

MIT to Study Development for African Drought Area

MIT was awarded a \$968,000 contract by the US Agency for International Development (AID) Tuesday to study ways of assisting the long-range development of six drought-stricken countries in sub-Saharan West Africa.

The contract authorizing the one-year study was signed at the State Department in Washington by Dr. J. Herbert Hollomon, director of MIT's Center for Policy Alternatives, and Maurice J. Williams, deputy administrator for AID and President Nixon's special co-ordinator for emergency relief to sub-Saharan Africa.

The ambassadors of the six countries—Chad, Niger, Upper Volta, Mali, Mauritania and Senegal—were invited to the

signing.

Also in Washington for the signing and for discussions were Dr. Peter S. Eagleson, professor of civil engineering at MIT and head of the Department of Civil Engineering, and Dr. William W. Seifert, professor of electrical engineering and professor of engineering in civil engineering.

The study will be carried out through the Center for Policy Alternatives and jointly administered by that center and the department of Civil Engineering. Professor Seifert will serve as principal investigator and the faculty member responsible for the over-all program.

The MIT faculty members met in Washington prior to the contract

signing with Dr. Samuel C. Adams Jr., assistant administrator for Africa for AID.

The main purpose of the study, Professor Seifert said, is to:

Identify the basic long-range problems facing the countries.

Develop a strategy for appraising plans proposed for helping the area.

The World University Service is seeking contributions at MIT and other universities to aid the victims of the West African drought.

Contributions may be sent to the Technology Community Association office, W20-450.

Examine the cost and political feasibility of implementing plans that are judged as having desirable long-range social and cultural development potential.

Dr. Seifert said that the effort would be "inter-department, inter-school and international."

"People from various departments at MIT, people from other US universities, people from French groups active in the area and people from Africa—all will be part of the team," he said.

"We will bring some of these people to MIT," he added, "and some of them will work in their own countries."

Dr. Seifert stressed that "we are not, in any sense, looking for quick solutions."

"What we are doing primarily at the moment," he said, "is pulling together a team and developing a methodology that could lead to a sensible, long-range approach. At the end of the year, we will have some alternatives for development."

Dr. Hollomon emphasized that in this process "it is essential that the people involved in the various countries must finally decide their own fate."

"It is the purpose of this work," he said, "to aid them in determining their own future as well as to aid the various agencies of the world that must contribute financially to the region."

Dr. Seifert said that about five members of the MIT team would

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Lectureship Honors Pioneer Neuroscientist F. O. Schmitt

A distinguished lectureship in neurosciences has been established by the Neurosciences Research Program (NRP) at MIT in honor of the 70th birthday of Francis O. Schmitt, the pioneering neuroscientist who founded the NRP in 1962 and has presided over it since that time.

The NRP functions as a center for theoretical research on all phases of neuroscience, from the molecular level to the mental life of humans. The program currently lists many of the world's top neuroscientists as associates.

The first neuroscientist to be honored with the F. O. Schmitt lectureship, and an accompanying commemorative medal, is Professor John Zachary Young,

University College, London. Professor Young is the noted British neuroscientist, perhaps best known for his discovery of the giant nerve fibers of the squid. These giant nerve fibers have given neuroscience one of its most useful models for studying the way nerves conduct their messages to the brain.

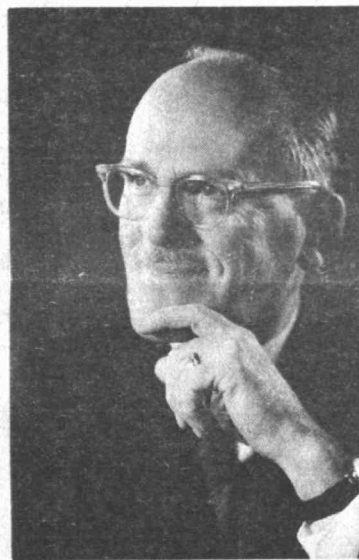
Professor Young graduated from Magdalen College, Oxford, in 1928, and immediately went to Naples, Italy, where he began his study of squids and octopuses. He returned to Oxford to become a fellow of Magdalen College from 1931 to 1945, and became a professor of anatomy at University College, London in 1945. That year he was also named a

fellow of the Royal Society.

Professor Young's discovery of the giant nerve fibers of the squid in the 1930s removed one of the principal limitations to studying nerve function—the tiny size of most nerves. While nerves in humans range in size up to one-hundredth of a millimeter thick, the squid's giant nerve measures up to a millimeter across. Thus, electrodes can be inserted into one of them easily, and components can be readily separated and analyzed.

From his research with squid nerves and on nerve regeneration during World War II, Professor Young went on to study the central nervous system of the octopus,

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Professor Francis O. Schmitt



Professor John Z. Young

Seismic Studies Hold 'Startling Implications for Lunar Science'

Seismic studies of the moon have revealed that the lunar interior may have been molten as recently as four billion years ago.

Lunar geologists Gene Simmons and Terry Todd of MIT and Herbert Wang of the University of Wisconsin, in an article to be published in the Oct. 12 issue of *Science*, announced what they termed "startling implications for lunar science."

The researchers used data obtained with seismic waves generated by the impact of numerous Apollo lunar module ascent stages and S4B boosters on the lunar sur-

face. Both of these units were jet-tisoned by the Apollo astronauts after their use.

The seismic waves were received by seismometers placed on the moon by the Apollo astronauts.

Professor Nafi Toksoz, also of MIT, and other seismologists had previously found two abrupt, unexpected jumps in the velocity of sound waves travelling in the interior of the moon—one jump which occurred in the lunar material 25 kilometers below the lunar surface, the other at 60 kilometers.

Professor Simmons and his col-

leagues compared those velocities with those in earth rocks shocked by meteorite impacts. They concluded that, unlike shocked earth rocks, and unlike lunar rocks above 25 kilometers, the moon rocks in the 25-60 kilometer region contained no microcracks. Such microcracks are consistently produced in rocks subjected to the shock of meteorite impact.

"This meant either that the cracks in that layer of rocks had annealed, or, more likely, that the rock at that depth had been molten when the large meteorite impacts in the moon's past had occurred,"

said Professor Simmons. "Since lunar rocks in the mare regions have been dated at around four billion years old, this means that lunar scientists will now have to assume that the lunar crust was 25 kilometers thick at that time," he said.

Though the scientists say their findings are consistent with the general features of present scientific theories about the moon's thermal history, the findings do not agree with the specific details of any model.

Professor Simmons and his colleagues describe one scenario of

lunar development that accounts for their findings:

"During an initial Stage 1, an outer shell hundreds of kilometers thick was liquid and the interior of the moon was solid. If impacts occurred, the resulting surface features would not have been preserved. During Stage 2, the moon cooled, forming a crust that began at the surface and increased in thickness.

"All major impacts (that is, those which produced shock effects at depths of 25 kilometers or more) must have ceased just when

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'Useful Purpose' Called Engineering's Goal

The ultimate objective of engineering is to apply knowledge to useful purposes, the president emeritus of MIT said Friday, Oct. 5, at the dedication of a major Institute building complex.

Julius A. Stratton spoke at ceremonies dedicating the Sherman Fairchild Electrical Engineering and Electronics Complex, largest single building project at the Institute since the Cambridge campus was constructed in 1916.

"No matter how close the relation between a student and his teacher, no matter how extensive his exposure to the laboratory, no matter how complete his ap-

preciation of the interlocking of disciplines—one with another—the education of an engineer will be deficient if it fails to impart an adequate degree of understanding of the industrial process," Dr. Stratton said.

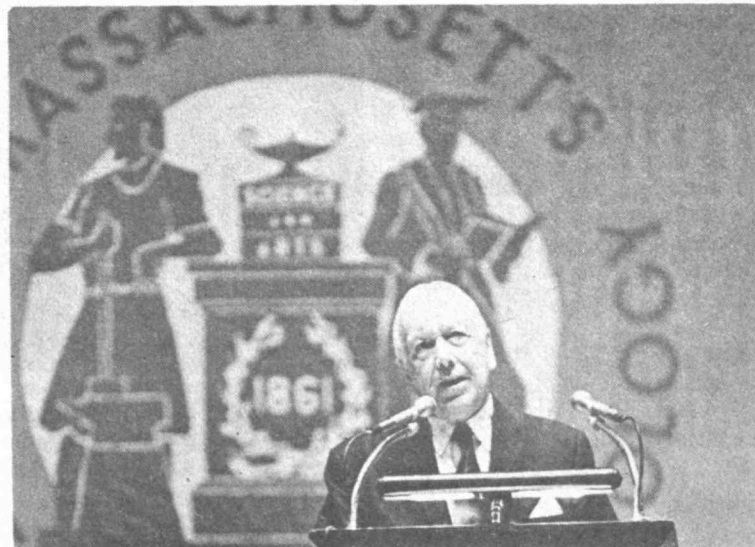
"He must learn well that the ultimate objective of engineering is to apply the fruits of research, the products of pure science and the lessons of practical experience to useful purpose."

The \$18.5 million Sherman Fairchild Complex—named for the inventor-genius who founded the Fairchild Camera and Instrument Co. and Fairchild Industries,

Inc.—will house components of the Department of Electrical Engineering—the Institute's largest—and the Research Laboratory of Electronics (RLE). RLE, which grew out of MIT's World War II Radiation Laboratory—where radar was developed—was the prototype of the interdisciplinary research facilities now common at major universities.

Praising the department, Dr. Stratton said its "philosophy of engineering education and the practice of it in the setting of this Institution...merit the highest distinction."

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Julius A. Stratton, MIT president emeritus.

New Theory on How Diamond Pipes Were Formed

(The following article originally appeared in the September issue of Popular Science Monthly and is reprinted here with permission.)

By ALDEN P. ARMAGNAC

The ground heaved and went flying. From the rent earth an awesome jet of vapor shot into the sky, with a shriek like steam from a million broken high-pressure mains. Down again from the billowing cloud rained rocks and mud.

Before the weird eruption ended, the eroding jet widened its orifice to a funnel-shaped crater probably more than 1000 feet across in the sandy, treeless African plain. The opening filled up again, with rocks falling back into it or with material that didn't quite clear the vent. In time, the debris became cemented into solid rock. Millions of years later, men probed the curious formation—and found diamonds, of fabulous size and value.

That is the way the world's diamond fields were born—in Africa and wherever else the gems have not been carried far from their original sites by streams—according to a new theory advanced by Dr. Thomas R. McGetchin, Massachusetts Institute of Technology geologist. Other U.S. scientists have lately been turning up fascinating bits of evidence supporting it.

Gems from depths. Nature's diamonds, it's been known, must have been formed 80 to 125 miles deep, in the region below the earth's crust called the mantle. Only at this depth could they have undergone the fantastic pressure and great heat needed to turn plain carbon into crystalline gems. But how the diamonds got to the surface where they could be mined has been a mystery. Here is the story as Dr. McGetchin sees it:

Beneath the African continent some 120 million years ago, a strange sort of fluid began making its way up from the depths. It consisted at least largely of water and liquid hydrocarbons, heated far past their normal boiling points but prevented from turning to vapor by subterranean pressure.

An underground "rocket." As the hot liquid welled up, pressure on it fell with diminishing depth, until suddenly it was able to flash into vapor. Then, as if from a gigantic upside-down rocket, a mighty jet of gas erupted upward. Nothing could resist its force. Rocks shattered, yielded a passage. Slowly at first but gaining speed, the ascending

gases broke through to the earth's surface, to reach supersonic velocity.

Swept along in the blast was rock from every level. Flying pieces knocked off more rock from the walls of the tubular passageway. What came up could well have been samples of the earth's interior all the way down to perhaps 125 miles.

Africa has no monopoly on kimberlite pipes. Similar ones in the United States have yielded diamonds up to the size of a 40-carat gem from a mine (no longer operating) near Murfreesboro, Ark. Its site became a tourist attraction where, for a small fee, visitors could hunt diamonds and keep any they found. In 1957 a lucky lady rockhound came away with a three-carat stone.

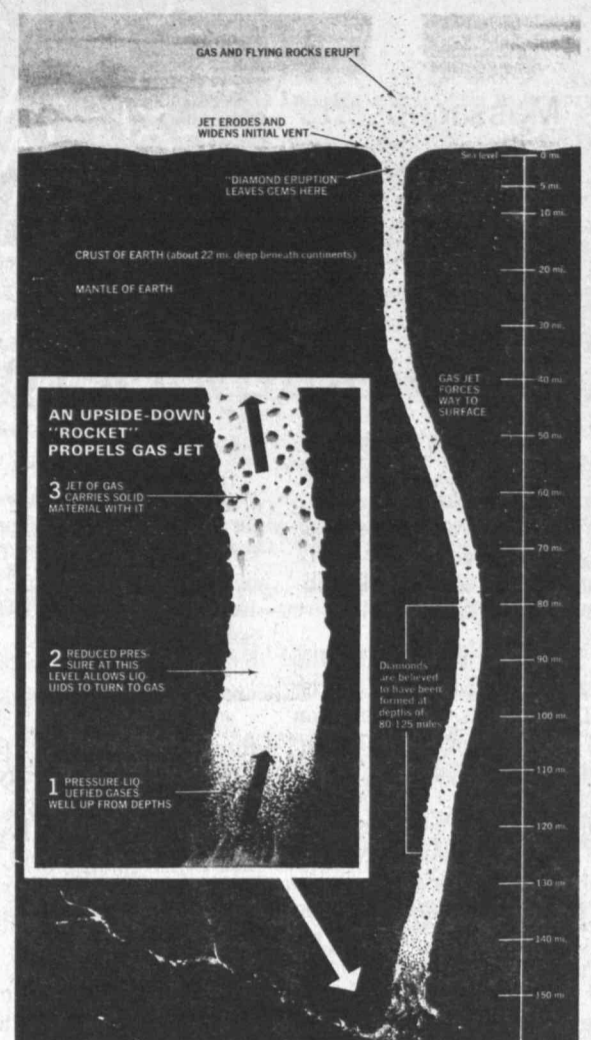
Microscopic bubbles of foreign substances trapped in natural diamond crystals support the new theory of diamond field's origin.

Clues from bubbles. Analysis shows the bubbles contain a variety of things as unlikely as water, methane (marsh gas), and ethyl alcohol, and proves they were present at the depths where diamonds were formed. That can amply account for the vapors that brought them up.

Like compressed air released from a tire valve, Dr. McGetchin suggests, the superhot ascending gas was cooled by expansion. That would explain the long-puzzling fact that beds of coal show no sign of being burned or scorched by kimberlite pipes piercing them—and coal is sometimes embedded, unaltered, in the kimberlite.

Some diamond-bearing kimberlite rocks, and even the ultrahard rough diamonds themselves, are rounded—like beach pebbles—as if by abrasion. This is regarded as strong evidence that the diamonds had a long rough ride to the surface—and again backs the theory that a high-velocity jet carried them up.

Eruptions of gas from comparatively shallow depths of the earth have occurred within recorded history. But the mighty jets pictured by Dr. McGetchin, coming all the way up from the deep mantle, probably never have been witnessed by man. Some suspect they may have been triggered by the straining force of shifting continents, millions of years before man came along.



Diamond pipes. Thus, the theory holds, were formed nature's diamond-bearing "pipes" filled with "blue ground"—the mineral kimberlite, natural matrix of diamonds.

African diamond mines began as open-pit workings. Since diggers followed the diamonds, quite possibly the early excavation may outline the shape and extent of the original gas vent. In later years, mine shafts probed the pipes deeper.

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Bennington College Names Solomons

Choreographer and dancer Gus Solomons Jr., a 1961 MIT graduate and a recent member of the Corporation Visiting Committee for the Arts, has been appointed to the teaching faculty in dance at Bennington College.

Mr. Solomons has studied and performed dance extensively, most notably with the Martha Graham and Merce Cunningham companies.

He has also toured nationally with his own dance company with occasional performances at MIT.

His father, Gus M. Solomons, of Cambridge, was a graduate of the Institute in 1928.

'Two Philosophies' Lecture Oct. 11

The first of three lectures by Dr. Gian-Carlo Rota, professor of applied mathematics and natural philosophy at MIT, on "The End of Objectivity" will be presented Thursday, Oct. 11 in Room 9-150 at 5:15pm.

The lecture, entitled "The Two Philosophies," will be followed by a buffet supper (\$1) served in the mezzanine lounge of the Student Center, at 6:30, and an open discussion initiated by Dr. Victor F. Weisskopf, Institute Professor and former head of the physics department.

The second and third lectures of the series will be given Oct. 17 and 25.



A PLASTER BUST of MIT founder William Barton Rogers was recently given to MIT Historical Collections by Marie Siegrist of the Geological Society of America. The bust was sculpted in 1882 by Truman H. Bartlett,

Juried Exhibit

Major BVAU Show To Open in Hayden

A major juried show of works by members of the Boston Visual Artists Union, will be exhibited in Hayden Gallery from Friday, Oct. 19 through Saturday, Nov. 10.

The show will have a public opening from 8-10pm on Oct. 19.

Seventy-five paintings, sculptures and works on paper were selected for the exhibition by a three-member jury: Rudolf Arnheim, professor in the Department of Visual and Environmental Studies at Harvard's Carpenter Center; Gyorgy Kepes, director of the MIT Center for Advanced Visual Studies and Nancy Spero, a noted New York artist, active in the women's movement.

The BVAU exhibition catalogue includes a selection of photographs of works in the show and statements by the artists on problems and benefits of being working artists in Boston.

In conjunction with the show, a panel discussion on "The 'Responsibility' of Artists" will take place Thursday, Oct. 25 at 8pm in the Sala de Puerto Rico.

BVAU panel participants will be Bilg e Friedlaender an abstract painter; Louis Kampf, professor of humanities at MIT; Lois Swir-

noff, painter and lecturer in the Department of Visual and Environmental Studies at Harvard and Arnold Trachtman, a painter. Harold Tovish, sculptor and chairman of the BVAU exhibitions committee, will moderate the discussion which is open to the public.

Both the exhibit and the panel discussion will be sponsored by the MIT Committee on the Visual Arts.

The Boston Visual Artists Union was organized by a group of Boston-area artists in 1970 and now has 600 members.

The BVAU has recently received a grant from the National Foundation of the Arts and Humanities which has made possible the establishment of a gallery scheduled to open this November at 3 Center Plaza in the Boston Government Center.

Morrison Elected

Philip Morrison, MIT Professor of Physics, has been elected chairman of the Federation of American Scientists for 1973. David Baltimore, professor of biology and Francis Low, professor of physics, have been named to four-year terms on the Council of the Federation.



Dr. H. Guyford Stever, director of the National Science Foundation, addressing the MIT Corporation Luncheon Friday, Oct. 5, before ceremonies dedicating the Sherman Fairchild Engineering and Electronics Complex. From the left, Walter Burke, Fairchild Foundation president; Dr. Jerome B. Wiesner, MIT president; Howard W. Johnson, MIT Corporation chairman; Luis Alberto Ferre, former governor of Puerto Rico, Corporation member, and James R. Killian, honorary chairman, MIT Corporation.



Former presidential science advisers meet with news reporters following last Thursday's symposium. Clockwise, from MIT President Wiesner, seated in the foreground with his back to the camera, are: George B. Kistiakowsky, Boston Globe science reporter Robert Cooke, Lee A. DuBridge, New York Times science reporter Walter Sullivan, James R. Killian, Jr., MIT News Office director Robert M. Byers, Quincy Patriot Ledger reporter Diane Baltozer, Associated Press reporter Warren Leary, Edward E. David, Donald Hornig.

MIT Dedicates New Sherman Fairchild EE Complex

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The faculty's "overriding concern for the interests and progress of its students" is manifested in the extent to which senior department members teach basic subjects and in the degree "to which teaching and research are intermixed," Dr. Stratton said.

Earlier Friday, Dr. H. Guyford Stever, science adviser to President Nixon and director of the National Science Foundation, addressed a luncheon meeting of the MIT Corporation.

Dr. Stever said "there are signs" that the country was falling behind other nations in the rate of growth and application of new scientific findings. He said the rate of decline was notably evident in new patent applications, in the balance of trade, and in productivity.

At a news conference before his luncheon address, Dr. Stever attributed the situation in part to the tremendous strides made by France, Japan and West Germany from the effects of World War II. But he also suggested that, in contrast to the early postwar years, American business leaders were more concerned with financial problems than with the research basis of their industry.

Dr. Stever said the economic success of the country depends not only on what happens in Washington "but to an important extent upon the attitude and activities of the leaders of our high-technology industrial community and upon the science and engineering community in the universities."

Thursday, the night before the dedication of the Sherman Fairchild Complex, the six men who served in the position of presidential science adviser in the administrations of Presidents Eisenhower, Kennedy, Johnson and Nixon, met in a symposium on "High Technology in a Livable World" at Kresge Auditorium.

Participants in the symposium were James R. Killian, Jr., honorary chairman of the MIT Corporation, the first man to hold the post of science adviser, serving from 1957-1959 under President Eisenhower; Dr. George B. Kistiakowsky, professor emeritus of chemistry at Harvard and visiting scholar at MIT's Center for International Studies, presidential adviser from 1959-1961; Dr. Donald Hornig, president of Brown University, presidential adviser from 1964-1969; Dr. Lee A. DuBridge, former president of California Institute of

Technology and former head of MIT's Radiation Laboratory, adviser from 1969-1970; and Dr. Edward E. David, Jr., director and executive vice president of Gould, Inc., presidential adviser from 1970-1973.

Dr. Jerome B. Wiesner, president of MIT and presidential science adviser from 1961-1964 under Presidents Kennedy and Johnson, was moderator of the symposium.

Some of the former advisers expressed concern at what they said was the lack of impartial, high-level, scientific assessment of weapons policy, such as that previously furnished by the President's Science Advisory Committee.

While some of those responsible for weapons assessment in the disbanded White House Office of Science and Technology have moved into the National Security Council staff, they are now one step lower in the hierarchy and, as Dr. Wiesner put it, providing advice "on White House stationery" carried much more weight.

Audience comments at the conclusion of the symposium included one from Dr. Pierre Aigrain, former chief science adviser to the French government

who is now lecturing at MIT. Dr. Aigrain said providing advice on civilian and military problems were separate functions in France. He said the National Science Foundation should have more control over the size of its budget if it is to fulfill its role more effectively.

Walter Burke, president of the Fairchild Foundation, which made a \$4 million grant to the Institute for the new building, made the formal presentation of the complex at the dedication ceremonies. Dr. Wiesner made the acceptance

speech. Presiding at the ceremonies was Howard W. Johnson, chairman of the MIT Corporation.

Attending the dedication were Gordon S. Brown, Peter Elias and Harold L. Hazen, all former heads of the Department of Electrical Engineering, now headed by Professor Louis D. Smullin.

Dr. Stratton and Dr. Wiesner are former directors of the RLE, now headed by Professor Henry J. Zimmermann. Dr. Wiesner is also a former head of the electrical engineering department.



KEY OF DOUBLE E—Electrical engineering graduate students Jack M. Aiello, left, and Alan J. Grodzinsky, play Mozart during open house at the Sherman Fairchild Complex following Friday's dedication.

National Medal of Science Awarded to Harold E. Edgerton

Dr. Harold E. Edgerton of MIT, widely known for his achievements in stroboscopy, ultra-high speed photography and ocean exploration, is one of 11 scientists and engineers being awarded the 1973 National Medal of Science today at the White House in Washington.

The medal is the federal government's highest award for distinguished achievement in science, mathematics and engineering.

Dr. Edgerton, Institute Professor and professor of electrical measurements, emeritus, is being honored, the White House said, "for his vision and creativity in pioneering in the field of stroboscopic photography and for his many inventions of instruments for exploring the great depths of the ocean."

The National Medal of Science was established in 1959 by the 86th Congress. It is presented to individuals who, in the judgment of the President, are deserving of special recognition by reason of their outstanding contributions to knowledge in the physical, biological, mathematic or engineering sciences.

The President is assisted in the selection of recipients by the President's Committee on the National Medal of Science, a committee of distinguished

scientists currently chaired by Dr. Charles P. Slichter, professor of physics at the University of Illinois.

Others receiving the medal today include Vladimir Haensel, a petrochemist and vice president for science and technology at the Universal Oil Products Co. of Des Plaines, Ill., who received a master's degree in chemical engineering from MIT in 1937.

The other recipients are: Daniel I. Arnon, California-Berkeley cell physiologist; Carl Djerassi, Stanford steroid chemist; William M. Ewing, University of Texas ocean geophysicist; Arie Jan Haagen-Smit, Caltech biochemist; Frederick Seitz, mathematician and physicist, now president of Rockefeller University; Earl W. Sutherland Jr., Miami, Fla., biochemist; John W. Tukey, Princeton statistician; Richard T. Whitcomb, NASA aeronautical engineer and Robert R. Wilson, National Accelerator Laboratory director.

Dr. Edgerton, 70, a resident of Cambridge, has been referred to as the father of electronic flash photography. Although he didn't invent the stroboscope (the word was coined in 1832) his research transformed it from a scientific curiosity into an important tool.

He saw that if rapidly flashing light could be synchronized with

the rotation of motors, generators and flywheels, it would provide the means for engineers to study these parts while in motion. He and his students spent years developing the techniques and equipment—the circuitry, the brilliant flash tubes, the energy-storing capacitors, etc.—to achieve this.

Dr. Edgerton dramatized another of the stroboscope's capabilities—ultra-high speed photography—by photographing bullets in flight, light bulbs shattering, hummingbirds in flight and athletes in multiple exposure action. These stopped-motion photographs received wide dissemination and have been seen by millions throughout the world.

The MIT scientist also pioneered in developing electronic flash equipment and cameras capable of making pictures miles beneath the sea. In addition, he extended his interests to short pulse sonar instruments that he designs, builds and uses to chart underwater phenomena the world over.

Edgerton, Germeshausen & Grier, Inc., now called EG&G, which Dr. Edgerton helped establish with two of his former students, has become a major element in the world's electronics industry.

Dr. Edgerton helped develop and build the New England Aquarium in Boston, is one of its

trustees, and is chairman of the Science Advisory Committee. He is also a member of the board of trustees of the Boston Museum of Science, which has scientific exhibits designed by him.

At MIT, he has been a staunch supporter of the arts and is a member of the Institute's Council for the Arts.

The Institute this year established a \$900,000 education fund to honor Dr. Edgerton and his wife, Esther, for the "devotion, affection and warm friendship" they gave to generations of students and faculty members over a period of nearly 50 years. The fund will support research by younger faculty members and students.

Dr. Edgerton was born in Fremont, Neb., and educated in Aurora, Neb. He received a bachelor of science degree in electrical engineering from the University of Nebraska in 1925, a master of science degree from MIT in 1927 and his doctorate at MIT in 1931.

He was appointed an instructor in the electrical engineering department in 1928, assistant professor of electrical measurements in 1932, associate professor in 1938 and full professor in 1948. In 1966, he was given the additional title of Institute Professor, a rank used at MIT to honor the most distinguished faculty members

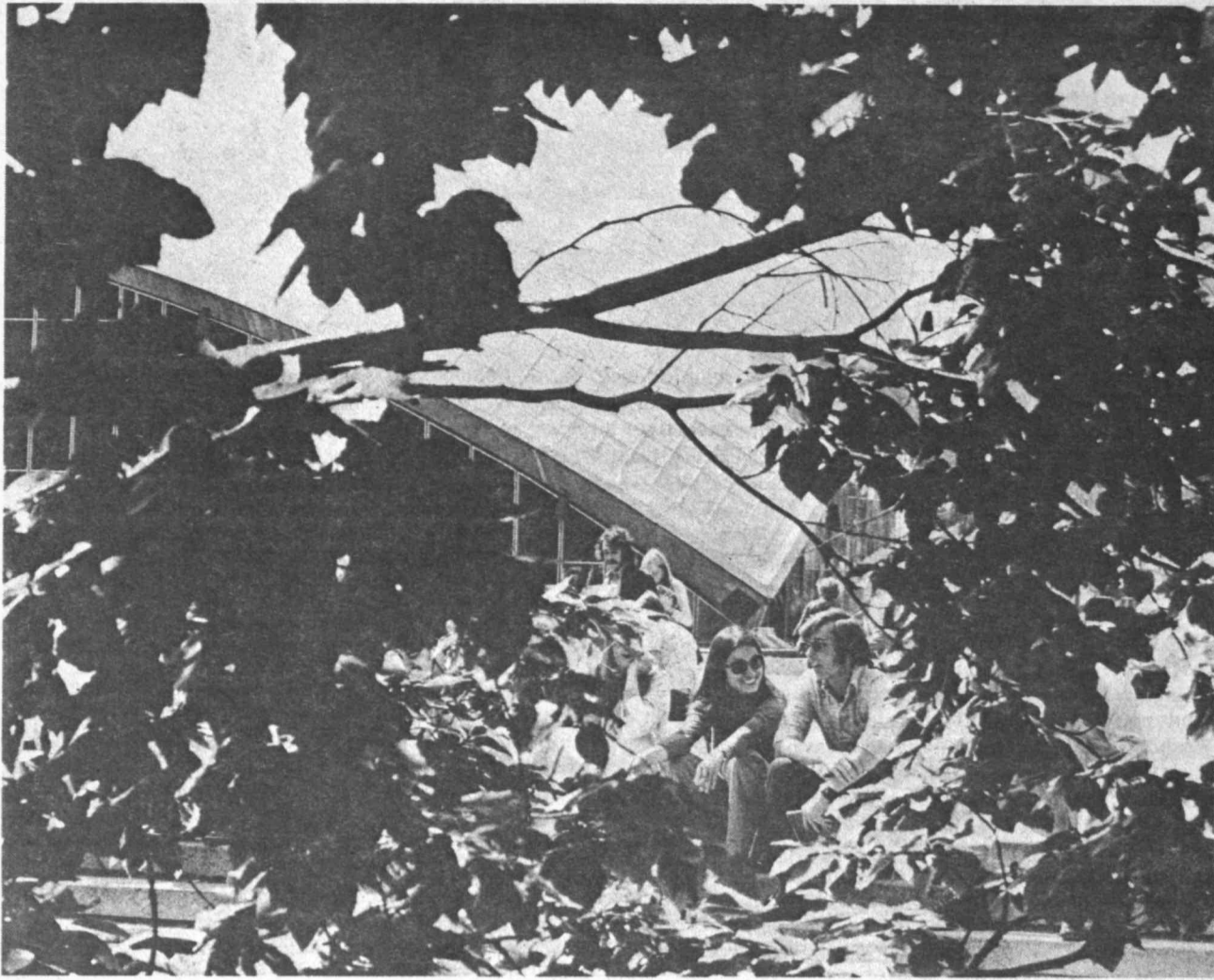
upon nomination by their colleagues on the faculty.

Dr. Edgerton became emeritus professor in 1968 upon reaching 65, but continues to be active in teaching and research in his laboratory at MIT.

He also travels widely on various scientific and oceanographic expeditions. In recent months, for example, he has been to Mauritania in West Africa, to take measurements of an eclipse; to Greece twice, for underwater archeological expeditions, and to the Cape Hatteras region in North Carolina, to search for the wreckage of the USS Monitor, the Union ironclad.

He has received many honors and awards, including the Medal of the Royal Photographic Society of London, the Potts Medal of the Franklin Institute, the National Geographic Society's Franklin L. Burr Prize and John Oliver LaGorce Gold Medal, the Photographic Society of America's Progress Medal Award and the Morris E. Leeds Award of the Institute of Electronic and Electrical Engineers.

Among other activities, he is a member of the American Academy of Arts and Sciences, the American Philosophical Society, the National Academy of Sciences and the National Academy of Engineering, and a trustee of the Woods Hole Oceanographic Institution.



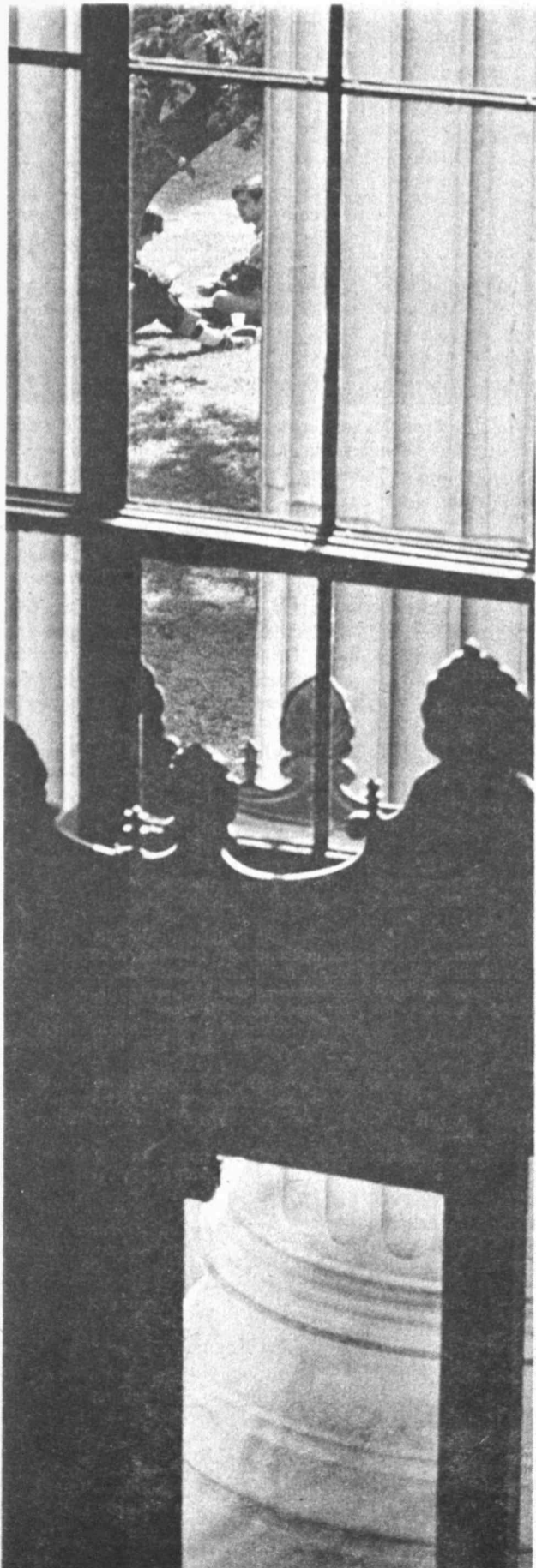
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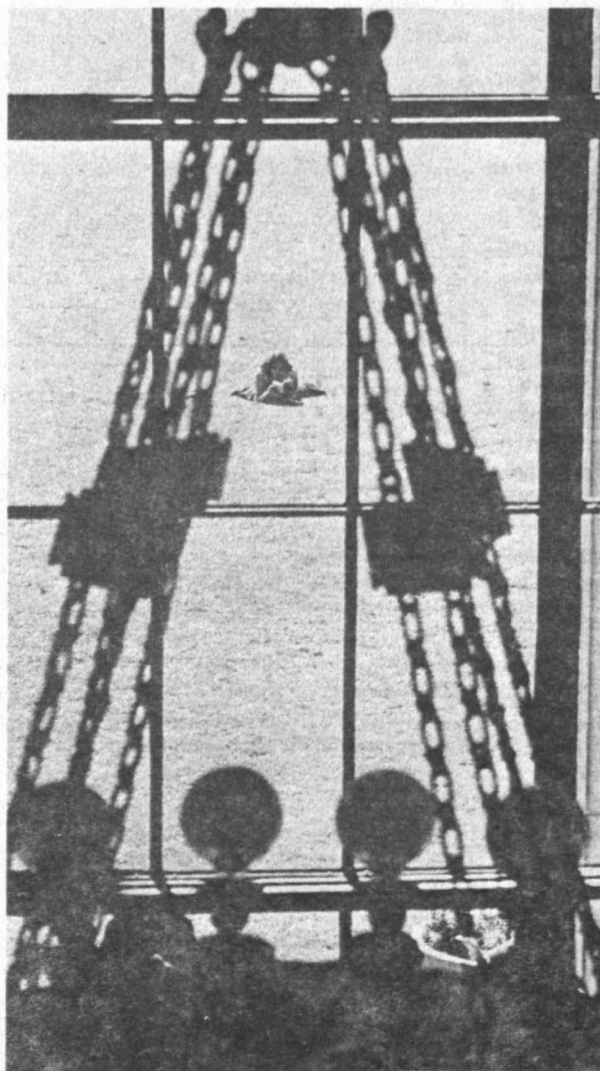
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Point of View

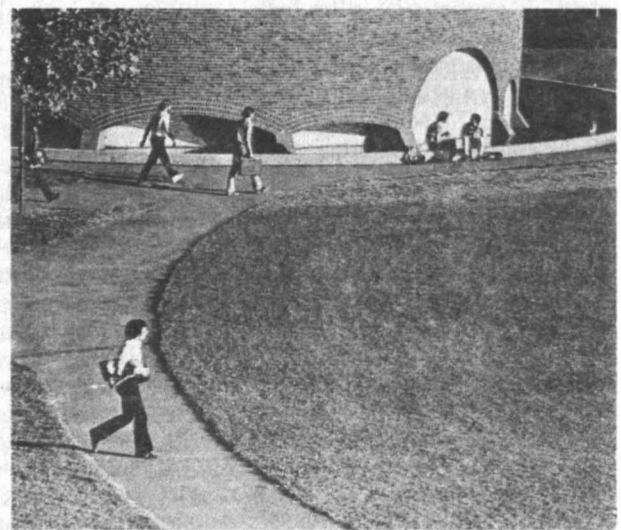
A selection of photographs
by Margo Foote
and Calvin Campbell



Margo Foote



Calvin Campbell



Margo Foote

Lectureship Honors Pioneer Neuroscientist F. O. Schmitt

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which offered an excellent simplified model for studying brain function. He conducted experiments on the way octopuses learn and isolated the nerve centers involved in octopus learning.

Professor Young contributed numerous theories and models to explain brain function, and demonstrated for the first time that memory stores were located at definite spots in the animal brain.

Professor Schmitt, the founder of the NRP, received his PhD in physiology from Washington University in 1927, followed by postdoctoral work at the University of London in 1928 and the Kaiser Wilhelm Institute (now the Max-Planck Institute) in 1929. After returning to Washington University, Dr. Schmitt became one of the first investigators in the United States to apply X-ray diffraction and polarization optics to biology. Professor Schmitt also contributed to the development of biologic electron microscopy, his research group having the first university electron microscope in the country.

He became a professor of biology at MIT in 1941, and headed the department from 1942 to 1955. His studies during this period concerned the fibrous proteins of

the giant nerve axons of squid. During World War II he developed a technique for the production of collagen sutures. In 1955 he became an Institute Professor at MIT.

He received the Albert Lasker Award of the American Public Health Association in 1956 for his research on cells, fibers, and substances comprising connective tissue. In 1958 he established the discipline of biophysics.

Impressed by the need for theory to bridge the gaps separating the scientific disciplines involved in studying the nervous system, Professor Schmitt founded the Neurosciences Research Program in 1962.

The basic idea of this innovative type of scientific organization was to establish a rapid information exchange between scientists working at the cutting edge of neuroscience research. The NRP also aimed at organizing multidisciplinary attacks by carefully selected "task forces" of experts to develop new theories that could bring breakthroughs in brain research.

By selecting appropriate task force participants, the NRP aimed at keeping the theoretical research flexible, as scientific research progressed. This is in contrast to the traditional re-

search institute which tends to become "frozen" to the research in its own laboratories.

This model of scientific organization has subsequently become widely recognized and adapted to other research fields as an important method to build new scientific understanding from the flood of information being generated at an accelerating rate by research.

Sponsored by MIT and funded by federal agencies, the NRP enlisted the aid of 36 associates in planning its activities. These associates are world leaders in neuroscience-related fields such as mathematics, physics, biochemistry, biology, neurology and psychology.

Among the present contingent of NRP associates are five Nobel Prize winners.

In addition to its associates, the NRP maintains a professional staff and a contingent of staff scientists who organize and conduct a program of work sessions, intensive study programs and publishing. The work sessions bring together authorities in a specific promising area of neuroscience for a several-day-long conference.

The intensive study programs usually last three weeks and draw about 100 neuroscientists from around the world. The programs

are designed to bring together a wide range of neuroscientists and draw attention to emerging opportunities for research.

"Over the past nine years approximately 1,200 scientists have participated in NRP programs, and the resulting publications have contributed considerably to the coherency of neuroscience as a field," said Professor Frederic G. Worden, executive director of the MIT Neurosciences Research Program.

The first Francis O. Schmitt Lecture will be given by Professor Young as part of a two-day

symposium October 29-30 in Kresge Auditorium. Professor Young will give the lecture at 8pm Tuesday, Oct. 30.

The symposium, entitled "The Neurosciences: Paths of Discovery," will feature 25 distinguished neuroscientists—among them several Nobel Prize winners—in addition to several associates of the NRP. The participants will describe the people, ideas and experiences that have shaped their careers and the important developments in neuroscience. They will also speculate about the future of brain research.



The F. O. Schmitt lectureship medal.

MIT Announces Tax Sheltered Annuity Plan

MIT will offer a Tax-Deferred Annuity Program to its faculty and staff, effective January 1, 1974, John M. Wynne, vice president, administration and personnel, has announced.

This Program, which is offered pursuant to current Federal income tax laws, provides that teachers and other employees of certain tax-exempt organizations may receive special income tax treatment on amounts used to purchase retirement annuities—usually referred to as tax-deferred annuities under Section 403(b) of the Internal Revenue Code of 1954.

Two companies have been selected by the Institute to fund this benefit, the Prudential Insurance Company of America and the Teacher's Insurance Annuity Association—College Retirement Equity Fund (TIAA-CREF). The details of each company's program will be provided shortly. Meanwhile, a general discussion of tax-deferred annuities to familiarize all staff members with this program follows:

A tax-deferred annuity provides a way to supplement a person's retirement income from current earnings not subject to current income taxes. By enrolling in the program, a person can direct the Institute to withhold a portion of his or her salary to be paid to an insurance company where it is applied to buy an annuity. Because the annuity is purchased by the Institute, the amount applied to buy the annuity each year is not considered currently taxable income. In addition, all investment income on the amounts set aside accumulates tax-free until received.

When the person receives benefits, whether in annuity payments or in a lump sum, these amounts become taxable. If a staff member chooses to receive benefits at retirement, he or she will enjoy a tax savings if the person is then in a lower tax bracket than when working. An individual may also wish to make withdrawals from his or her account during a sabbatical or any interruption of career during which time taxable income may be smaller.

There is no fixed contribution schedule in a tax-deferred annuity program. Each person can select the amount by which his or her salary is to be reduced subject to federal law which provides a maximum contribution on which income tax may be deferred. This maximum is referred to as the "Exclusion Allowance."

The Exclusion Allowance for any individual depends upon a number of factors. Among these are the number of years of membership in the Retirement Plan for Staff Members, and the value of the contributions made on behalf of a Staff member by the Institute to the Retirement Plan in prior years. A person may have any reasonable amount, up to the maximum, withheld from his or her salary in any year. If a staff member wishes, assistance will be provided in calculating the individual Exclusion Allowance by the insurer. A person can receive this assistance by returning to the Benefits Office the card that will be enclosed with the bulletins explaining the program.

Both the Prudential and TIAA-CREF offer fixed-dollar and variable Annuities. The fixed-dollar annuity provides monthly payments of a fixed-dollar amount. The variable annuity also provides monthly payments but the amount of these payments will vary either up or down to reflect the investment results of the underlying portfolio consisting primarily of common stocks. This type of annuity was developed in an attempt to produce a retirement income that would respond to the continuing rise in the cost of living.

Other features of the program such as withdrawal provisions, flexibility of transferring funds between fixed-dollar and variable annuity, death benefits, and annuity purchase rates will be covered when each company presents its program in greater detail. Additional information concerning the program, the enrollment period, and procedures will be made available shortly.

Group to Study Grading System

Seven faculty members have been appointed to an ad hoc committee on grading to make the intensive study of MIT's grading system voted by the faculty in April.

Two undergraduate students and one graduate student, who have yet to be named, will complete the membership of the committee.

President Jerome B. Wiesner and Professor Elias P. Gyftopoulos, chairman of the faculty, named Dr. Roy Kaplow, professor of metallurgy, as chairman of the committee. Other faculty members are:

Dr. Donald L. M. Blackmer, professor of political science and associate dean for the School of Humanities and Social Science; Dr. Ernest G. Cravalho, associate professor of mechanical engineering; Dr. Arthur P. Mattuck, professor of mathematics; Dr. Phillips W. Robbins, professor of biochemistry; Dr. Arthur C. Smith, professor of electrical engineering, and Dr. Benson R. Snyder, professor of psychiatry.

The study of the grading system was recommended by the Committee on Educational Policy (CEP) as a way of bringing about "desirable, and possibly fundamental, changes in grading policy and practice at the Institute."

The CEP suggested that the study include such matters as more explicit guidelines for grading, the assignment and use of credit units for subjects and the role of the drop date in the grading system.

It recommended that the committee make its report within the present academic year.

Professor Kaplow said last week the committee "intends to seek the widest possible input regarding the issues from everyone's point of view."

He said the committee probably would hold open hearings and would also "invite people to express their opinions and concerns in written form."

Team to Study Ways to Aid Drought Area

(Continued from page 1)

soon make a field trip to the drought region for four to six weeks to lay the groundwork for the study.

Among the areas of expertise that will be covered by team members will be social anthropology, food and nutritional problems in developing countries, arid lands agricultures, livestock raising and livestock disease, water resources, mineral resources, development economics, the development of human resources and transportation.

The six countries most affected by the persistent drought encompass an area two-thirds as large as that of the continental United States and include some 25 million people. The problem

extends into neighboring countries and, all together, millions of people are affected.

International aid organizations have to a large extent alleviated the immediate problem of human starvation by sending large quantities of food and other emergency supplies into the region, but millions of cattle have died. Emergency assistance from all sources to the drought area has reached about \$154 million, of which the United States has contributed approximately \$48 million. This has included 256,000 tons of grain as well as medical and other humanitarian assistance.

Beyond this effort, the United Nations last June convened a meeting to consider problems of

medium and long-term development in the region.

At the UN meeting, the United States volunteered to carry out the first phase of developing a plan for a long-range plan of action. AID accepted basic responsibility for the task, and has now contracted with MIT to carry out the study. AID plans to make an interim report to the UN in January, based on information obtained from the study up to that time.

"We recognize that this is an area with very difficult problems, and that there are limitations to what we can achieve," Dr. Hollomon said. "But we felt that MIT should make this effort, and bring its technical, economic and political talents to bear on these problems."

Lunar Seismic Study Implications Called 'Startling'

(Continued from page 1)

the crust reached a thickness of 25 kilometers.

"During Stage 3, the crust continued to thicken and the zone of melt thinned, but no large impacts occurred."

Dr. Simmons, a professor of earth and planetary science at MIT, is principal investigator for another lunar science experiment, the Surface Electrical Properties Experiment, which was conducted by Apollo 17 astronauts. The experiment consisted of using radio waves to "see" beneath the lunar surface.

THE INSTITUTE CALENDAR

October 10
through
October 19

Events of Special Interest

Open House - Bioelectric Engineering Area VII
Primarily for new grad students. Meeting followed by social hour & tours of labs. Thurs, Oct 11, 2-5pm, Rm 36-428.

Technology Matron's Plant Sale**
Thurs, Oct 11, 9:15am, steps of Stu Ctr.

Air Pollution: The Terrible News, Air Is For Breathing*
Barker Engineering Library Environmental Science Film Series. Thurs, Oct 11, 5pm, Fri, Oct 12, 12n, 4th Fl Conference Rm (enter Rm 10-400). Free. Coffee.

In Search of Dracula
Prof. Radu Florescu, Mon, Oct. 15, 8:15pm, 26-100, LSC/UA lecture series on *Unsolved Mysteries of the World*, first lecture. Free. Further information, call x3-3791.

Bake Sale*
Sponsored by Health Advocates of Somerville, Somerville Health Consumer's Coalition. Bake and food sale. Wed, Oct 17, 8am-5pm, Bldg 10 Lobby.

World Energy and the Oceans**
Dr. William E. Shoupp, senior vice president for research, Westinghouse Electric Corporation; Dr. John W. Devaney III, marine systems, ocean engineering; Dr. Donald R.F. Harleman, civil engineering. Second Annual MIT Sea Grant Lecture and Symposium. Thurs, Oct 18, 2pm, Rm 9-150.

The End of Objectivity: The Reform of Logic*
Dr. Gian Carol Rota, applied mathematics and natural philosophy; Dr. Victor Weisskopf, institute professor of physics. Technology and Culture Seminar. Second of three sessions. Thurs, Oct 18, 5:15pm, Rm 9-150. Buffet supper 6:30pm, Stu Ctr Mezzanine Lge. Fee \$1. Open discussion, 7-9pm.

Water Pollution: Rise & Fall of the Great Lakes, River With a Problem*
Barker Engineering Library Environmental Science Film Series. Thurs, Oct 18, 5pm, Fri, Oct 19, 12n, 4th Fl Conference Rm (enter Rm 10-400). Free. Coffee.

Seminars and Lectures

Wednesday, October 10

Transport Phenomena*
T.A. Postol, grad stu. Nuclear Engineering Doctoral Seminar. 2pm, Rm 24-307.

Discretization of the Diffusion-Controller Equation System with Fuel Depletion*
R. Chin, nuclear engineering. Nuclear Engineering Doctoral Seminar. 3pm, Rm NW 12-222.

Myth and Knowing*
Prof. Jerome Lettvin, biology, electrical engineering, RLE. Concourse Forum. 3-5pm, Bush Room (10-105).

Summer Research on Some Fluid Dynamical Problems*
Vijay K. Singhal, aero/astro. Energy Conversion & Propulsion Colloquium 3pm, Rm 31-261.

On the Optimal Time to Pull the Goalie: A Poisson Model Applied to a Common Strategy Used in Hockey*
Prof. Donald Morrison, grad school of business, Columbia University. Operations Research Center Seminar. 4pm, Rm 24-121. Coffee, Rm 24-219.

Uranium Enrichment by Mass Diffusion*
C. Forsberg, nuclear engineering. Nuclear Engineering Doctoral Seminar. 4pm, Rm NW12-222.

Thursday, October 11

Solution of Boltzmann Equation for the Simple Relaxation Process*
Dr. Jury D. Nagornykh, research fellow, aero/astro. Aero/Astro Seminar. 3pm, Rm 33-206.

Simulation of Multicorrelated Random Processes Using the FFT Algorithm**
Dr. L. E. Wittig, Bolt, Beranek & Newman. Interdepartmental Acoustics Seminar. 4pm, Rm 5-134. Coffee, 3:30pm, Rm 1-114.

Substorms: Flares in the Earth's Magnetosphere*
Prof. Vytenis M. Vasyliunas, MIT. Physics Colloquium. 4:30pm, Rm 26-100. Refreshments. 4pm, Rm 26-110.

The End of Objectivity: The Two Philosophies*
Dr. Gian-Carlo Rota, applied mathematics and natural philosophy; Dr. Victor Weisskopf, institute professor of physics. Technology and Culture Seminar. First of three sessions. Thurs, Oct 11, 5:15pm, Rm 9-150. Buffet supper 6:30pm, Stu Ctr Messanine Lge. Fee \$1. Open discussion, 7-9pm.

Friday, October 12

A Non-Riccati Approach to Linear Least Squares Filtering of Stationary Processes*
Prof. Anders Lindquist, visiting professor, Brown University. Electrical Engineering, Decision & Control Sciences Group Seminar. 10am, Rm 37-212.

Velocity Dependence of Laser Induced Saturation Resonances*
A. T. Mattick, physics. Physics Seminar. 11am, Rm 26-414. Coffee, 10:30am.

Direction for Federal Urban Transportation R&D Policy*
Daniel Brand, assoc prof, grad school of design, Harvard. Center for Transportation Studies Luncheon/Seminar Series. 12n, Stu Ctr Messanine Lge. Buffet lunch. Fee \$2.

Effect of Conformation of Macromolecules on Drag Reduction*
H. Banijamali, grad stu. Chemical Engineering Seminar. 2pm, Rm 10-105.

Hydroxylated Styrene Butadiene Styrene Block Copolymers as Potential Bio-Materials*
M. Sefton, grad stu. Chemical Engineering Seminar. 3pm, Rm 10-105.

Crack Tip Plasticity and Fracture Criteria
James R. Rice, engineering, Brown University. 3pm, Rm 3-133. Coffee, 4pm, Rm 1-114.

High Power Excitation**
Dr. J. D. Dougherty, Avco-Everett Research Lab. RLE, Plasma Dynamics Seminar. 4pm, Rm 36-261.

An Introduction to Metastability: Structural Aspects of Some Simple Amorphous Solids*
Prof. Simon C. Moss, physics, University of Houston, Texas. Material Science Colloquium. 4pm, Rm 9-150. Coffee, 3:30pm.

Antibiotics as Animal Growth Promotants**
Dr. William E. Brown, Squibb Institute for Medical Research, Princeton, N. J. Microbiology & Biochemical Engineering Seminar. 4pm, Rm 16-134. To arrange consultation, A. L. Demain, x3-1711.

Monday, October 15

The Unified Treatment of Power Balance in Fusion Reactors*
Masao Nazawa, Nuclear Engineering & ANS Student Branch Seminar. 1pm, Rm NW 12-222.

Hormones and Development*
Seymour Levine, M.D., Stanford University School of Medicine. Nutrition & Food Science Seminar. 3pm, Rm 16-310.

Feedback Technology and Small Group Interaction*
Noam Lemelshtrich, grad stu. Mechanical Engineering Doctoral Thesis Seminar. 3pm, Rm E53-482.

How Can an Ion Pass Through a Membrane? Some Clues Provided by Laser Raman Spectroscopy*
H. Eugene Stanley, Irving M. Ascher, Kenneth J. Rothschild. Harvard-MIT Program in Health, Science & Technology/ Interdisciplinary Program in Biomaterial Science. 4pm, Rm 37-212.

Material Science in the Practice of Orthopedics
R. M. Rose, MIT. Metallurgy and Material Science Colloquium. 4pm, Rm 6-120. Coffee, 3:45pm.

Performance Criteria in the Management of Boston's Health and Hospitals Department: Technical and Political Constraints*
The Hon. Leon S. White, Commissioner of Health and Hospitals. Innovative Resource Planning Project, Operations Research Center Seminar. 4pm, Rm 3-133.

Recent Advances in Statistical Estimation Theory*
Prof. Bradley Efron, statistics, Stanford University. Applied Mathematics Colloquium. 4pm, Rm 2-338. Tea, 3:30pm, Rm 2-349.

Surveillance of Satellites - Some Techniques and System Aspects*
Joseph D. Aronson Jr. Space & Tactical Program Office, Aerospace Systems Division, RCA. Aero/Astro General Seminar. 4-5pm, Rm 37-252. Coffee, 3:30.

The Design of Sampling Networks for Multi-Dimensional Processes in Civil Engineering*
Prof. Ignacio Rodriguez-Iturbe, civil engineering. Water Resources and Hydrodynamics Seminar, Dept of Civil Engineering. 4-5pm, Rm 48-316. Coffee, 3:45pm, Rm 48-410.

Tuesday, October 16

Possibilities of Driving Low Frequency Waves in a Plasma by Mode Coupling of High Frequency Waves*
Gerald Pine, grad stu. Nuclear Engineering Doctoral Seminar. 12n, Rm 38-166.

Writing, Women and MIT*
Tillie Olsen, visiting lecturer, author of *Tell Me a Riddle*, O'Henry Award-winning short story collection, Department of Humanities. 3pm, Rm 14E-304.

Design of Offshore Rigs for Severe Environments*
L. C. Scot Kobus, vice pres, Zapata Offshore Group. Ocean Engineering Seminar. 4pm, Rm 3-446. Coffee, 3:30pm.

Theories of Accelerated Ekman Flow*
Prof. John Young, visiting professor from University of Wisconsin. Meteorology Seminar. 4pm, Rm 54-100.

Public Safety and Textile Flammability
Prof. Guiliana C. Tesoro, visiting prof, mechanical engineering. Mechanical Engineering Special Seminar. 4-6pm, Rm 3-444.

The Linear Exponential Gaussian Control Problem*
Prof. John J. Deyst, Jr., aero/astro. Electrical Engineering, Decision & Control Sciences Group Seminar. 4pm, Rm 37-212.

Women's Athletics**
Mary Lou Sayles, director women's athletics. Association for Women Students Seminar. 4-6pm, Cheney Rm 3-310. Refreshments, men and women welcome.

Somatic Cell Genetics of Immunglobulin Production*
Dr. Matthew O. Scharff, Albert Einstein College of Medicine. Biology Colloquium. 4:30pm, Rm 6-120. Coffee, 4pm, Rm 56-520.

Political Economy of Community Development*
Prof. Willard Johnson, political science. Community Fellows Program. 5-6pm, Rm E40-169.

Wednesday, October 17

Kinetic Theory of Binary Mixtures*
J. Castresana, grad stu. Nuclear Engineering Doctoral Seminar. 2pm, Rm 24-307.

Distribution of Some Reduced Gases in the Ocean and Atmosphere*
Dr. Robert A. Lamontagn, Naval Research Lab, Washington, D.C. Joint Earth & Planetary Sciences/Meteorology Colloquium. 4pm, Rm 54-100. Tea, 3:30pm, Rm 54-923.

Thursday, October 18

Expansion into Vacuum of Binary Mixture of Heavy and Light Gases*
Dr. Jury D. Nagornykh, research fellow, asro/astro. Aero/Astro Seminar. 3pm, Rm 33-206.

Measurement Predictions and Assessment of Ground Vibrations Due to Highway Traffic on Elevated Structures*
Dr. C. E. Hanson, Bolt, Beranek & Newman. Interdepartmental Acoustics Seminar. 4pm, Rm 5-134. Coffee 3:30pm, Rm 1-114.

Deformation of Nuclei as Seen in Electron Scattering*
Prof. Jochen Heisenberg, physics. Physics Colloquium. 4:15pm, Rm 26-100. Refreshments, 3:45pm, Rm 26-110.

Statistical Turbulent Mixing Models Applied to Nitric Oxide Formation in Combustion*
Dr. Richard C. Flagan, mechanical engineering. Physics Colloquium. 4pm, Rm 3-343. Coffee.

Friday, October 19

Pyrolysis of Solid Waste
D. Aldrich, grad stu. Chemical Engineering Seminar. 2pm, Rm 10-105.

Polymerization in Electrical Discharge*
D. Lam, grad stu. Chemical Engineering Seminar. 3pm, Rm 10-105.

Structural, Thermal, Superconducting and Mossbauer Properties of Metastable Alloys*
Prof. W. Geissen, chemistry, mechanical engineering, Northeastern University. Center for Material Science & Engineering Colloquium. 4pm, Rm 9-150. Coffee 3:30pm.

Community Meetings

U.S. Culture and Family Life
First meeting of discussion group for foreign women, open to students, staff, faculty wives, visitors. Wed, Oct 10, 3:30-5pm, 3rd fl Medical Dept (use rear elevator). Information, call Mrs. Rodrigues, (social worker), x3-4911 or Mrs. Schwartz, (sociologist), x3-2916.

Student Committee on Educational Policy
Work meeting: degrees, grading, units & requirements. Wed, Oct 10, 7:30pm Stu Ctr Rm 400.

Blood Drive Volunteers
Meeting of all persons interested in dorm solicitations for blood donors. Wed, Oct 10, 8:30pm, Stu Ctr Rm 407. If unable to attend, call x9315 Dorm, x9685 Dorm, or x3-3788, lve msg.

Student Committee on Educational Policy
Meeting on Institute Requirements. Speaker: Prof. Kenneth Hoffman, head math dept, former chairman MIT Commission. Wed, Oct 17, 7:30pm, Stu Ctr Rm 400.

Introduction to OS/TSO**
Non-credit course, Information Processing Center. Oct 15, 17, 19, 24, & 26, 11am-12:30pm, Rm 39-530. Open to community with computer experience & knowledge compiler language. Register, Lynne Penney, Rm 39-427, x3-6320. Fee: \$5.

Student Art Association**
Open drawing workshop. Tues, 7:30pm, Stu Ctr Rm 429.

MIT Community Players
Meeting. Tues, Oct 9, 7:30pm, Stu Ctr Mezzanine Lge.

Women's Forum
Meetings and discussions. Mon, 12n, Bush Rm, 10-105.

Course Evaluation**
Sponsored by TCA & SCEP. Come help out. Info, lve msg at TCA, Stu Ctr Rm 450, x3-4885.

MIT Club Notes and Meetings

Bridge Club
ACBL Duplicate Bridge. Thurs, 6pm, Stu Ctr Rm 407. IMP-scored team games (similar to rubber bridge scoring). Smaller IMP team games, Fri, 9:30pm, Sat, 2pm Stu Ctr Rm 407. Club Tournaments, Thurs, Oct 11. Jeff, x3-5285 or 864-5571.

Chinese Choral Society**
Singing. Sun, 3-6pm, Stu Ctr Rm 473.

Classical Guitar Society
Classes, group or private. Mon & Thurs, 5-8pm; Sat, 8am-12n; Rm 1-132, 134, 136. Vo Ta Han, 494-8353.

Association of Student Activities
Business meeting, each activity should send representative. Sun, Oct 14, 7pm, Stu Ctr Rm 407. Film society, contact Fred Duncanson, x3-2692, as soon as possible.

MIT/DL Duplicate Bridge Club**
Tues, 6pm, Stu Ctr Rm 473. Club Tournaments, Tues, Oct 2, Jeff, x3-5285 or 864-5571.

Chess Club**
Sat, Sun, 1:30-5pm, Stu Ctr Rm 473.

Fencing Club
Wed & Thurs, 6:30pm-9:30pm, Dupont.

Women's Gymnastics Club
Mon-Fri, 5-7pm, Dupont Gym, Ursula, x3-5954.

Hobby Shop**
Mon-Fri, 10am-6pm, Rm W31-031. Fees: \$10/term for students; \$15/term for community. x3-4343.

Judo Club**
Sport and self defense. Mr. M. H. Yanagi, 5th degree Black Belt, chief instructor. Mon, Wed, Fri, 5pm; Sat, 1pm; Exercise Rm, Dupont Gym, Beginners welcome, Info. Mike Pertnoff, x3-7319.

MIT Karate Club**
Evening classes, 8-10pm, Mon, Wed, Dupont Wrestling Rm. Demonstration & films of recent tournament by Mr. Tabata Wed, Oct 10. John Miller, x3-1588.

Kung Fu Club**
Northern Praying Mantis. Tues, Thurs, 7-9pm, T. Club Lge. Info, H. C. Wong, 876-5071.

MIT Club of Boston*
Speaker at the monthly luncheon meeting will be William Loeb, president & publisher, *Manchester Union Leader*. Thurs, Oct 11, 12:15pm, Aquarium Restaurant, 100 Atlantic Ave, Boston. Reservations, Leena, x3-3878.

Outing Club*
Mon & Thurs, 5-6pm, Stu Ctr Rm 461.

Pistol & Rifle Club
Club has equipment for smallbore rifle team for winter league, instruction available, Practice Fri evenings. Details, George Sechen, x3-2398.

Pot Luck Coffeeshouse**
Live entertainment, cider, coffee, donuts. Fri & Sat, 8:30pm-12m, Stu Ctr Mezzanine Lge. Performers & others interested in helping out, call Doug, x8766 Dorm. Free.

24-Hour Coffee House*
The MIT 24-Hour Coffee House has re-opened. Inexpensive food, candy, and non-alcoholic drinks are sold. Relax, play games, and read. Open: 24 hours daily, center lge, 2nd fl, Stu Ctr.

Friday Afternoon Club**
Music, conversation, and all the cold draft you can drink. Fri, 6pm, the Thirsty Ear, Ashdown basement. Admission: \$1 men, 50 cents women. Must be over 18.

Muddy Charles Pub**
Join your friends for music, beer, wine, snacks, conversation at the Muddy Charles Pub, 110 Walker. Hours: Mon-Fri, 11:30am-2pm and 4-8pm. Call GSC, x3-2195.

Movies

La Dolce Vita
Concourse Program, Wed, Oct 10, 7pm, Rm 26-100. Free.

The Discreet Charm of the Bourgeoisie
LSC. Fri, Oct 12, 7pm, 9:30pm, Kresge. Admission 50 cents, ID's required.

Capricious Summer (Jiri Menzel)
Film Society. Fri, Oct 12, 7:30pm, 9:30pm, Rm 6-120. Donation \$1.

The Time Machine
Midnite Movie Series. Fri, Oct 12, 12m, Sala. Free, ID's required.



ALEXANDER'S FEAST, a minstrel group of five early American musical traditions, will return to Building 7 lobby, today, Wednesday, Oct. 10 at noon and 1pm.

Rugby Club**
Practices, Tues & Thurs, 5:30pm, Briggs Field. Games, Sat, 1:30pm, Briggs Field.

Science Fiction Society*
Fri, 5pm, Rm 1-236.

Scuba Club**
Compressor hours: Mon, Fri, 4-6pm, Alumni Pool.

Strategic Games Society*
Offers opponents and discounts on merchandise to members plus gaming periodical library. Sat, 1pm-1am, Walker Rm 318. Call Kevin Slimak.

Student Information Processing Board Meeting*
Mon, 7:30pm, Rm 39-200.

Tech Engineering News**
General staff meeting, Sun, 5pm, Stu Ctr Rm 453.

Tech Squares***
Western style square dancing. Tues, 8-11pm, Sala de Puerto Rico. Admission \$1, first time free.

Tiddlywinks Association*
Wed, 8-11pm, Stu Ctr Rm 491

Volleyball Club**
Serious volleyball, and eventual participation in Boston area tournaments, Sun (except vacations), 2-4pm, DuPont Gym.

MIT Wheelmen*
Wholesale parts orders placed, racing & touring events planned, informal discussion of everything about bicycling. Wed, 7:30pm, Rm 1-203.

White Water Club**
Pool session. Tues, Oct 16, 8-10pm, Alumni Pool.

Wellesley Events

Columbus String Quartet*
Sun, Oct 14, 8pm, Jewett Auditorium.

Lilly Martin Spencer: The Joys of Sentiment*
Exhibition of many of the works of the Victorian painter. Through Nov 25, Main Gallery.

Greek Coins - Dewing Numismatic Foundation*
One of world's finest collections, formed by Arthur Stone Desing of Cambridge. Sculpture Court. Through Oct 31.

Social Events

Hellenic Student Association*
Party. Fri, Oct 12, 8pm, Stu Ctr West Lge.

Dance

Folk Dance Club*
International, Sun, 7:30-11pm, Sala. Balkan, Tues, 7:30-11pm, Student Center Rm 491. Israeli, Thurs, 7:30-11pm, Sala. Afternoon dance break, Fri, 12:30-1:30pm, Kresge Oval.

Exhibitions

Elephant Skull*
An exhibition of sculpture and numerous etchings by Henry Moore, presented by the Committee on Visual Arts. Mon-Sat, 10am-4pm, through Oct 12, Hayden Gallery. Free

Creative Photography Gallery*
Prints from the Prospect Gallery. Mon, Oct 1-Sat, Oct 13, W31-310. Hours: 9am-10pm, Mon-Fri; 12n-6pm, Sat, Sun.

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.

Music Library Exhibit
Pictorial Exhibition, Mozart's Opera the Magic Flute. Daily, Rm 14E-109.

Student Push Pin Shows*
Oct 15-Oct 31. Mon-Fri, 9am-10pm; Sat, Sun, 12n-6pm, Creative Photography Gallery. Free.

Boston Visual Artists Union
An exhibition of 75 works by members of the BVAU, selected by jury last spring. Oct 19-Nov 10. Mon-Sat, 10am-4pm, closed Sun. Free.

Athletics

V Golf*
Boston College, Bentley. Wed, Oct 10, 2pm, Crystal Springs Country Club, Haverhill.

Water Polo*
Brown. Wed, Oct 10, 7:30pm, Alumni Pool. Northeastern. Wed, Oct 17, 7:30pm, Alumni Pool.

JV/F, V Cross Country*
Boston College, Lowell Tech. Sat Oct 13, 12n, Franklin Park.

JV/F Soccer*
Harvard Sat, Oct 13, 10:30am, Briggs Field.

WV Sailing* Man Labs Trophy.
Man Labs Trophy. Sat, Oct 13, Sun, Oct 14, 10am, Charles River Lower Basin.

Religious Services and Activities

The Chapel is open for private meditation from 7am to 11pm every day.

Campus Crusade for Christ/College Life Family Time*
Singing, sharing, prayer & teaching from God's Word. Fri, 7-9:30pm, Rm 1-132.

Celebration of Holy Communion*
The Revs John Crocker, Episcopal Chaplain; Peter Johnson, Boston/Cambridge Ministries; and Constance Parvey, Lutheran Chaplain. Wed, 5:05pm, Chapel. Supper following, 312 Memorial Dr.

Christian Bible Discussion Group*
Thurs 1pm, Rm 20B-031. Prof. Schimmel, x3-6739, or Ralph Burgess, x3-2415.

Seminars on the Catholic Faith*
Catholic Belief I. Introduction or refresher seminar on the teachings of the Catholic Church. Tues, 7pm, Bldg W2, 2nd fl seminar Rm. Father MacNevin, x3-2981. **Knowing and Believing.** Readings and discussion on the interaction of religion and culture. Thurs, 7pm, Bldg W2, 2nd fl seminar Rm. Steven Murphy, x3-2981.

Christian Science Organization*
Meetings, including testimonies of healing. Tues, 7:15pm, Rm 8-314.

Hillel Holiday Services*
Sh'mini Atzereth: Wed, Oct 17, 5:20pm, Kosher Kitchen; Thurs, Oct 18, 9am, Chapel. **Simchat Torah:** Thurs, Oct 18, 5:20pm, Kosher Kitchen (followed by Torah celebration at Camb Shul); Fri, Oct 19, 8am, Chapel, 5:20pm, Kosher Kitchen; Sat, Oct 20, 9am, Chapel.

Lecture: What Every Person Should Know About Tay-Sachs Disease. Dr. Robert Zeiger, fellow, immunology & allergy, Children's Hospital, Sun, Oct 14, 12n, Rm 4-231.

Islamic Society*
Juma prayers. Fri, 12:15pm, Kresge, Rehearsal Rm B. Discussion on the Qur'anic Interpretations. Sat, 5pm, ISC Lge, 2nd fl Walker.

Latter Day Saints Student Association*
Discussion of Beliefs. Tues, 8am, Stu Ctr West Lge.

Protestant Worship Services*
Sun, 11am, Chapel.

Roman Catholic Masses*
Sun, 9:15am, 12:15pm, 1:15pm; Tues, 5:15pm; Thurs, 5:05pm; Fri, 12:15pm. Chapel.

United Christian Fellowship*
Christians for Dinner and Sharing Meeting. Thurs, dinner, 5pm, Walker, followed by singing, sharing, praying 6pm, Rm 6-321..

Westgate Bible Study Meeting*
Includes study of the Gospel of Mark. Wed, 8pm, apt 1202 Westgate 1.

(Continued on page 8)

Hillel Services

Mon-Fri, 8am, Rm 7-108; Fri, Traditional 6:45pm, Kosher Kitchen, Non-Traditional 8:45pm, Chapel; Sat, 9am, Chapel.

Announcements

Training Section to Offer General Education Program

GED is an eight month program for MIT employees which may be used as preparation for the High School Equivalency Exam or to improve or refresh basic knowledge. Registration forms are available in Training Section, E19-734, or by calling x3-1912. Classes, beginning Mon, Oct 15, will meet Mon, Wed, Fri, 10am, for one hour.

Senior Thesis Topics at Wallace Observatory

George R. Wallace, Astrophysical Laboratory, is undertaking a program to study Comet Lohoutek 1973f. Seniors interested in observational, theoretical, or analytical thesis topics based on the comet, contact Alan Goldberg or Prof. Thomas McCord, Rm 24-422, x3-3748.

Upward Bound Program

Volunteers needed to tutor Cambridge High School students in evenings at MIT. Martha or Marshall, x3-5125.

Urban Action Volunteer & Resource Center

Tutors and teachers urgently needed for Cambridge and Boston schools, as well as other community agencies. Mon-Fri, 9am-5pm, Stu Ctr Rm 437, or x3-2894.

Dining Service

Wednesday, October 10

Lunch: Creamed fresh mushrooms on toast w/bacon
Dinner: Green pepper steak over rice

Thursday, October 11

Lunch: Beef stew over rice
Dinner: Roast fresh ham w/cinnamon applesauce

Friday, October 12

Lunch: French Fried haddock w/tartar sauce
Dinner: Supper Special: New England clam bake

Monday, October 15

Lunch: Chop suey over rice
Dinner: Yankee pot roast au jus

Tuesday, October 16

Lunch: Beef Salisbury steak w/gravy
Dinner: Sesame fried chicken

Wednesday, October 17

Lunch: Chicken pot pie
Dinner: Sugar baked ham w/honey sauce

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 October 17 through October 26 to the Calendar Editor, Room 5-111, Ext. 3-3279, before noon, Friday, October 12.

Placement Interviews

The following companies will be interviewing candidates for placement Wed, Oct 10-Fri, Oct. 19. Those interested may sign up for interviews Mon-Fri, 9am-4pm, Career Planning & Placement Office, E19-455, x3-4733.

Wed, Oct 10

University of Pennsylvania, Wharton Graduate Division

Thurs, Oct 11

Gulf Oil Corp.; Metcalf & Eddy, Inc.

Fri, Oct 12

American Electric Power Service Corp., University of Chicago Graduate School of Business, Gulf Oil Corp.

Mon, Oct 15

J.T. Baker Chemical Co, B.F. Goodrich Co, Hughes Aircraft Co., Rand Corp, M.W. Kellogg Co, Litton Industries GCS/D.

Tues, Oct 16

Columbia University, Graduate School of Business, Digital Equipment Corp; Hughes Aircraft Co.; Mitre Corp.; Rohm & Hass Co., Litton Industries.

Wed, Oct 17

ARCO, North American Producing Div.; Logicon Inc.; National Security Agency; Varian Assoc.; Argonne National Lab; Woodrow Wilson School of Public & International Affairs.

Thurs, Oct 18

Boeing Co., Bolt, Beranek and Newman, Inc.; NYU Graduate School of Business Administration; Texaco, Inc.; US Atomic Energy Commission, Schenectady Naval Reactors Office; Union Carbide Corp.; Argonne National Lab.

Fri, Oct 19

Boeing Co., Union Carbide Corp.

New UROP Listings

For more detailed information on UROP opportunities listed, MIT undergraduates should call or visit the Undergraduate Research Opportunities Program Office, Room 20B-141, Ext. 3-5049 or 3-4849. Undergraduates are also urged to check with the UROP bulletin Board in the main corridor of the Institute.

Physics Department

Recently, remarkable effects have been observed in highly conducting organic solids. One group has reported observing superconducting fluctuations at 60°K. Unfortunately, no crystals large enough for definitive experiments have been grown. The difficulty in growing large crystals may arise from the complexity of the organic molecules used. Our goal is to grow larger crystals with simpler molecules. A junior or senior physics major is needed to form the crystals, experimenting with starting materials and growth conditions. The student will assist in the examination of the structure, purity, and physical properties of the crystals. Contact Professor Marc Kastner, 13-2142, x3-4808.

Francis Bitter National Magnet Laboratory

An undergraduate is desired to assist in the design and construction of a pulser programmer for a pulsed nuclear magnetic resonance spectrometer. The pulser programmer will be a small computer which provides appropriately timed logic pulses to open rf gates, trigger sampling circuits, etc. The timing and the pulses will be derived from a program loaded into the programmer through, for instance, an interface with a PDP-11. Experience in the design and construction of digital electronic circuits and mini-computer interfacing and programming desired. Familiarity with the material in Wickes, *Logic Design with Integrated Circuits*, and a year of practical experience useful. Contact Dr. Robert Griffin, NW14-5113, x 3-5597.

Children's Hospital Medical Center

Boston

The Nuclear Medicine Division at Children's Hospital has suggested several project areas for undergraduates interested in bioengineering and biomedical instrumentation. Included in these are (1) Comparison of imaging detectors—comparing the effect of gamma ray scattering on spatial resolution using a single crystal isotope camera and a multicrystal camera; (2) Measurement of resolving time in radioisotope imaging systems and associated computer systems; (3) Safety of medical instrumentation; (4) Dynamic data analysis in nuclear medicine; and (5) Design and development of a whole body counting facility for infants.

Bolt Beranek and Newman, Inc.,

Cambridge

The Physical Sciences Division (Division 1) of BBN has suggested four research project areas for undergraduates: (1) An investigation of the relationship between the acoustical properties of tissue and specific pathological states; (2) The development of analytical techniques relating ultrasonic measurements to the acoustical properties of tissue in the presence of scattering and multiple reflections; (3) The development and evaluation of new piezoelectric techniques for producing short, broad-band pulses of ultrasound; and (4) A study of the nonlinear interaction of two arbitrary sound fields.

Cambridge Collaborative, Inc.

Cambridge

A consulting firm which provides professional services in the fields of sound, vibration and applied mechanics, Cambridge Collaborative has suggested four project areas for undergraduates: (1) Carry out a basic study of noise produced in printing presses by cutting and folding operations. Of particular interest is the dynamics of folded paper and how the sound generated depends on the paper tension, compactness, etc. (2) Truck manufacturers need a guide to ways of identifying noise sources in trucks—students interested in working on such a guide should know something about technical communication; (3) Develop acoustical scale modeling techniques for use by non-acousticians such as urban planners, and highway engineers. Models would be used for siting of buildings, roadways, choice of building layout and specification of any special noise control features that might be added. Problems include model construction, laboratory data gathering and analysis and field experiments; and (4) Acoustical barrier studies—a large scale model of a portion of the Los Angeles Airport and a nearby community has been constructed to study noise propagation from the airport into the community. The attenuation of sound due to houses, trees and barriers is under study.

Boston Biomedical Research Institute

Boston

The Department of Muscle Research is carrying out an investigation to elucidate the mechanisms of muscle contraction and the cause of several diseases (hypertrophy, myotonia and muscular dystrophy) in which muscle tissue is defective. Opportunities include enzymatic studies on muscle proteins and membrane systems of the muscle cell, electron microscopy of protein aggregates and mechanical measurement of single muscle fibers.

Boston Veterans Administration Hospital

Boston

The Aphasia Research Center at the Boston V. A. has recently initiated a new program of aphasia therapy utilizing a new iconic symbol system which by-passes customary auditory-oral channels. Efforts are currently aimed at devising a symbol system which will enable aphasic patients to communicate with maximum efficacy and determining which aspects of ordinary language are restricted to the usual channels of communication and which can be adapted to a new symbol system. Opportunities exist for several undergraduates interested in (1) Assisting with the development of the new language; (2) Teaching and testing of the new system and (3) Evaluation of the new therapy. Students would be able to participate in various educational programs at the Center (aphasia and neurobehavioral rounds, lecturers, seminars, etc.) and in other linguistic, psycholinguistic and cognitive psychology projects involving brain damaged patients.

J. B. Thomas Hospital

Peabody, Mass.

The Psychiatric Day Hospital of the J. B. Thomas Hospital provides "partial hospitalization" as a treatment alternative to full-time hospital care. This type of psychiatric care is regarded as a significant innovation in clinical care. The patient is treated in a comfortable and therapeutic environment while maintaining family and community ties. An undergraduate might pursue one of the following topics: Is the therapeutic community an effective treatment?; If so, how does it work? Who is most likely to benefit and who least likely?

NATO POSTDOCTORAL FELLOWSHIPS IN SCIENCE FOR 1973-74

In order to promote the progress of science and to assist in obtaining a closer collaboration among the scientists of various nations, the North Atlantic Treaty Organization will be offering 30 awards, known as NATO Postdoctoral Fellowships in Science to citizens or nationals of the US for further study in the sciences.

Fellowships will be offered to persons who have demonstrated ability and special aptitude for advanced training in the sciences and who have, or will have, by the beginning of the fellowship tenures, earned doctoral degrees in any of the qualifying fields of science, or who have had research training and experience equivalent to the doctoral degree. Applicants must submit an outline of their proposed program of study under the fellowship, and copies of transcripts of his college and university records. An "Oath of Affirmation" attesting to allegiance to the US is a required part of the application. The program is designed primarily for applicants who have received their doctorates within the past 5 years. The stipend for a NATO Postdoctoral Fellow is \$9,000 for 12 months and the Fellow will normally be provided with dependency allowances. The DEADLINE is: OCTOBER 29, 1973. Applications and further information can be obtained from the Foreign Study Office, Room 10-303, Ext. 3-5243.

Graduate Studies

THE NATIONAL FELLOWSHIP FUND FOR BLACK AMERICANS

The basic purpose of the program is to provide qualified personnel for careers in higher education in the United States. Black faculty members, graduate students, college seniors, and other Black Americans who can give evidence of intent to enter into academic careers in the United States are eligible to apply. The fellowships are limited to persons who wish to study full-time for the PhD. Each fellowship supports full-time graduate study for one year. The award may be renewed annually for as many as three additional years. The basic stipend for each fellowship is \$250 per month for either ten or 12 months, depending upon the period of full-time enrollment. Tuition and other fees are provided. Application should be made by the individual directly to the Fund.

Application and reference forms may be obtained from the Executive Director, 795 Peachtree Street, N.E.,

HUMANITIES AND SOCIAL SCIENCES

There are a number of fellowships pre- and post-doctoral in the field of Humanities and Social Sciences. If you are interested, please come to the Graduate School Office, Rm. 3-134.

DSR Staffs, member at NEROC Haystack Observatory will guide and participate in the development of electronic instrumentation and recording equipment for very long baseline interferometer experiments. Develop needed computer software; assist in the design and conduct experiments; analyze and interpret the data from observations. Strong background in EE and physics, Ph.D. preferred. Research experience in radio astronomy, and specifically in interferometric techniques is required. High level of analytical capability and the ability to utilize large-scale computers is needed. 73-901-R (9/12).

Manager of Subsystem Development - Administrative Staff in the Programming Development Office will provide technical direction of the design, development, and maintenance of software subsystems under the OS/360, OS/VS2, and Multics Operating Systems. Minimum of 7 years professional experience, and 2 years experience in technical management. 73-912-R (9/12).

Systems Analyst - DSR Staff at the Cambridge Project will adapt Time Series processor programs for use with the Consistent System on Multics. Knowledge of calculus, econometrics, statistics, and linear algebra; extensive PL/1 programming experience on Time Sharing Systems; familiarity with TSP-CSP required. Position is temporary until 6/74. 73-845-R (8/29).

Environmental Engineer - Administrative Staff in Physical Plant will organize and direct an Institute-wide energy conservation program. Survey campus buildings to determine areas of possible energy economy; plan procedures; maintain the Institute's compliance with environmental requirements. BS in Electrical Engineering with a basic knowledge of building Mechanical systems for heating, ventilating, and air conditioning. Experience in engineering design or operation of buildings. Experience in energy conservation helpful. 73-875-R (9/5).

Administrative Staff - Assistant Director in an administrative office dealing in resource development will handle specific tasks of educational fundraising, extensive writing of letters, memoranda, statements on priorities, some proposals and informational studies. Must have a minimum of three years active, consecutive experience in fund-raising, preferably in a university environment. Effective writing skill, ability to communicate verbally, professionalism and career motivation important. Exposure to data processing systems useful, BA required; advanced degrees welcome. 73-479-R (9/5).

Staff Recruiter (Admin. Staff) will report to the Employment Officer; will be responsible for coordination of search for well-qualified persons to fill non-academic positions. Particular emphasis will be given to assisting laboratories, centers, and departments in fulfilling Affirmative Action Plans with respect to research staff openings. Person will work closely with Personnel Officers and departments in defining description of positions and qualifications required. Frequent travel will be expected; experience in Personnel and/or recruiting required. Technical background with degree in Engineering or Science preferred. Please submit resume. 73-643-A (7/18).

Editor - DSR Administrative Staff will be an Assistant to the MIT Sea Grant Program Executive Officer. Assemble information and write the Marine Information Transmitter Newsletter; prepare and edit newsreleases, annual reports, proposals, and other publications. Function as an Advisory Service Representative, to organize and conduct meetings and symposia; select, edit, disseminate publications on marine resource information, working in the Reading and Reference Center; maintain liaison with National Sea Grant Office. 73-1017-R (9/16).

Administrative Staff - Associate Director of the Alumni Fund will be responsible for Staff support to alumni boards and committees engaged in the annual solicitation programs for the Fund. Duties require extensive interaction with senior alumni and corporation executives through out the country, and extensive interaction with senior members of the MIT faculty and administration. Incumbent must be an alumnus/alumna of MIT. The position will entail a moderate amount of travel. 73-1018-R.

DSR Staff at the Center for Cancer Research will work with biochemist assays, protein fractionation, animal cells, radioisotopes. Will help to maintain supplies and equipment in the laboratory. B.A. degree in Chemistry or Biochemistry and minimum 2-3 years experience required. 73-1055-A (10/3).

Administrative Staff in the Registrar's Office. Schedule students, classrooms classes, and final exams, supervise an office group, work with the computer

system that assists in scheduling. College graduate preferred; knowledge of computer programming, facility to deal with faculty effectively; patience and ability to handle detail important. Familiarity with MIT particularly helpful. 73-1047-R (10/3).

Technical Librarian - Administrative Staff will design and implement procedures for organizing and maintaining an Industrial Special Library within the Office of technical journals, internally prepared documentation. Will also edit and re-write material for a Programmers User's Guide. Knowledge of methods for development and maintenance of a Special Library required; minimal knowledge of data processing concepts and terminology desired. 73-953-A (9/19).

DSR Staff at the Cambridge Project will maintain and develop a major Multics System's operating primitives including dynamic storage allocation routines and a PL/1 preprocessor needed to support programs. Will work with others in development of behavioral science applications software. Multics and PL/1 experience; minimum 1 year system programming experience in the area of high order parsers, dynamic storage allocation, and multi-process interactions required. 73-1057-R (10/3).

DSR Staff at the Aeroelastic and Structures Research Laboratory will be Project Engineer at a large subsonic wind tunnel. Plan, prepare, run and report production and research wind tunnel experiments. Related in the study of the aerodynamics of buildings and aircraft. B.S. degree in Aeronautical Engineering or equivalent experience required. 73-1004-A (9/26).

Administrative Staff in the Provost's Office will work with faculty responsible for a variety of fieldwork activities and will assist in the development of fieldwork placements. Prepare budgets, handle accounts, initiate and maintain communications, coordinate the evaluation of the fieldwork experience and familiarity with MIT administrative and academic operations are preferable. Person must be able to work and think independently. Program has extremely limited clerical support, therefore candidate must be willing to do a large part of the support work. Temporary position: Sept. 1973-August 1974. 73-963-A (9/19).

Infirmiry Staff Nurse - Part-Time Exempt in the Medical Department; Emergency Nurse with opportunity to learn Nurse Practitioner functions in off hours of the Clinic. Hours: Sat and Sun and holidays rotating 8-4 pm or 4-12. Ideal for Nurse attending school. 73-1021-R (9/26). 73-1020-R (9/26).

DSR Staff member at Project Mac will do research on the implementation of new ideas about English language grammar and semantics. The implementation will be done in a LISP environment. Familiarity with LISP Computer program; ability to learn theories of English language; skills in system building required. 73-916-R (9/12).

Architect/Programmers - Administrative Staff in the Planning Office will work on the development of architectural programs for Institute buildings. Research and conduct preprogramming investigation of existing spaces and develop design Criteria and Standards for new facilities. Degree in Architecture; background in research methods; experience in design and general architectural procedures required. 73-879-R (9/15).

Planner/Architect - Administrative Staff in the Planning Office will concentrate on long-range planning for existing environmental conditions, define problems, develop plans and design concepts; degree in Architecture required; degree in Planning preferred. Minimum of 5yrs. experience and the ability to work independently important. 73-880-R (9/15).

Administrative Staff Planner will direct long-range physical planning for the various efforts of the planning team; develop budgets and schedule of events. Will act as liaison between government agencies and community groups. Must have a Masters degree in Planning and a minimum of 5 years experience. 73-535-R (6/13).

DSR Staff at the Center for Cancer Research, will carry out both biochemical techniques and cell culture techniques in the Virology Section. Individual must have more than eight years experience in laboratory research in the general area of Molecular biology or cell culture; and have demonstrated the ability to carry out independent research, supervise others, and to handle emergencies as they arise. Knowledge of enzyme purification methods and nucleic acid metabolism is necessary. 73-1073-A (10/10).

Technical Assistant - Academic Staff in Nutrition and Food Science will study biochemical characteristics of the squid and use such data for the development of stable squid protein concentrate. Evaluate the Nutritive val-

ue of these products and develop means of utilizing these in foods. BS degree in Food Science Technology or Chemistry required. 73-968-A (9/26).

Administrative Staff - Systems Programmer will work full time in the Programming Development Office on the 370/165. The job will consist of programming and maintenance, systems assurance, and user interface functions. Applicant should have some project management experience, and understanding of operating systems, and a good working knowledge of assembler language. 73-795-R (8/15).

Administrative Staff Programmer for the MIT Information Processing Center must have experience and thorough knowledge of large-scale time-sharing computer system. PL/1 language, documentation and communication skills are necessary qualifications. The Users Services Group requires an individual who understands and is responsive to the needs of the Center's users. This person will be challenged in entering a new area of time-operation for this group which includes the following:

User Assistance - assisting users by providing programming information and debugging help and tracking down special problems.

User Information - instructional documentation and conducting seminars, workshops, and other courses. 73-640-A (7/11).

DSR Staff Programmer - Part-time at Project MAC for research group involved in the automation of group theory computations. Knowledge of high level programming languages required including FORTRAN and LISP. Programs will be written for a PDP - 10 system. 10 hour work week. 73-1081-A (10/10).

Systems Programmer - Academic Staff will provide technical expertise; develop and implement methods of improving computer performance. Minimum of two years S/360 or S/370 BAL (ALP) Assembler Language Programming experience. Knowledge of tele-processing, and COBOL or PL/1. 73-265-R (4/73).

Systems Programmer - Administrative Staff member will design, implement and test software operating systems. Minimum of two years experience as DOS/360/370 systems programmer; system experience; some knowledge of OS/360/370. 73-137-R (2/73).

DSR Staff - Part-time will be the Cambridge Project's documentor. Edit, verify and sometimes write detailed reference documentation for consistent system programmers; write program descriptions to be included in an informal primer for the uninitiated and non-programming Consistent System User. Familiarity with on-line computing systems, PL/1 or FORTRAN; ability to organize ideas into logic sequence required. 10 hour work week. 73-1074-R (10/10).

Jr. Programmer V - Part-time in Earth and Planetary Science will run mathematical programs in the lab of a professor of Marine Geology. Understanding of mathematical analysis techniques and running a digitizer; strong college math background required. 15-20 hour work week. 73-1036-R (10/3).

Industrial Hygienist - Academic Staff will work in the Environmental Medical Service to study and control occupational disease and other environmental factors such as noise, heat, pressure and toxic materials that may be physically or chemically hazardous to employee health. Will work closely with physicians, depts, supervisors. BS in Chemical Engineering is required. 73-336-A (4/29).

Senior Secretary V in the Arteriosclerosis Center will coordinate the office activities of the Director of a multifaceted medical research program. Schedule appointments, conferences, lectures, maintain student records and appointments and a variety of office files; periodically prepare reports; type manuscript reviews and other materials. Individual will have extensive telephone contact with other medical areas and patients. Good organizational skills, ability to establish priorities and supervise junior secretaries required. Knowledge of medical terminology and machine transcription helpful. 9:30-5:30. 73-1088-R (10/10).

Secretary IV in Resource Planning will provide secretarial support and help coordinate procedures in a newly reorganized operation. Good typing and organizational skills required. Ability to interact effectively with a variety of people important. 73-1049-A (10/10).

Secretary IV in Academic Department will handle general secretarial duties for one staff member. Type reports and manuscripts using specialized terminology from handwritten copy and dictaphone; may also involve some editing. Previous secretarial experience required. 73-498 (10/3).

Secretary IV to the Director of the Industrial Liaison Office will handle all

office procedures, including accounting and some statistics necessary in operation of a large office. Excellent typing and shorthand skills are essential; previous experience preferably at MIT required and business school background preferred. 73-1031-R (10/3).

Secretary IV in the Institute Archives, MIT Libraries, will handle all general office work and library processing, assist in arranging historical record material, aid library users. Accurate typing required; interest in history; strong reading and writing skills, mature judgment important. 73-1026-R (10/3).

Secretary IV will perform secretarial duties for the administrative officer of an academic department. Maintain department contract and personnel records. Excellent shorthand, dictaphone, typing skills needed. Organizational ability, familiarity with keypunch or computers desirable. 73-390-R (10/3).

Secretary IV will work in Center for Theoretical Physics for three-four professors. Must be able to work well in busy, pressured office; establish work priorities; type technical manuscripts, correspondence, class notes, papers. Some telephone work. Typing and shorthand must be excellent. 73-630-R (7/11).

Secretary IV to a professor and several faculty members in the new Division for Study and Research in Education will type classroom materials, reports, proposals; handle all general secretarial duties. Good typing and dictaphone skills important; ability to establish priorities required. 73-959-A (9/19)).

Secretary IV to a physician in the Medical Department will be responsible for secretarial support to the Gyn clinic. Schedule appointments, transpondence and reports. Excellent typing skills; ability to transcribe medical terminology required. Maturity, tact and organizational skills important. 73-971-R (9/26).

Secretary IV to two professors in the Lab for Nuclear Science will handle all general secretarial duties for several small projects. Good shorthand or ability to take dictation and highly skilled typing required. Initiative and organizational abilities important. 73-297-R (9/26).

Secretary IV to the headquarters staff of Housing and Food Services will type correspondence, special reports, budgets; assist in compiling and organizing data for special reports; handle all general office duties. Secretarial training; excellent typing and shorthand skills; knowledge of accounting and bookkeeping required. Ability to work independently important. 73-986-R (9/26).

Secretary IV to the Institute Secretary for Foundations will be responsible for budget accounting, file maintenance; research in reference materials. Maintain communications and smooth relations with top level offices of the Institute. Excellent secretarial skills, ability to organize and to use discretion required. Knowledge of MIT desirable. 73-976-R (9/26).

Secretary IV in Mechanical Engineering will handle general secretarial duties for a group of faculty, researchers, and students. Maintain accounts; type technical reports, proposals; transcribe from shorthand and machine dictation. Excellent typing required. Shorthand and dictaphone skills, ability to organize within a very busy office is important. 73-1048-R (10/10).

Secretary IV for Institute secretary for Corporations will organize and run the office. Very accurate typing needed for some letter-perfect copy. Other typing duties require speed. Preliminary research on corporate prospects; gather backup information for visits; draft not-too-technical correspondence. Work closely with other Institute offices in obtaining pertinent data; receive visitors. Flexible, adaptable, good telephone presence. 73-1091-R (10/10).

Secretary IV in the Division for Study and Research in Education will work for the executive officer of this new research group. Type proposals, reports, budgets; establish and maintain office procedures for all administrative functions; arrange schedules and travel. Good typing and shorthand skills a must; organizational ability, initiative, tact important in assisting with the beginning of the headquarters operation. 73-1085-R (10/10).

Secretary IV in Physics will assist with the production of the monthly *American Journal of Physics*. Edit manuscripts, type correspondence, keep track of approximately 100 manuscripts as they are received, reviewed, judged, revised and published. Good editing skills, typing, spelling required. College English background preferred. 73-1061-R (10/10).

Secretary IV in Biology will handle general secretarial duties in one-person office working for a research group.

Type scientific manuscripts, maintain petty cash account, prepare materials for courses. Excellent typing skills required. Ability to read and write French and/or Arabic preferred. 73-1064-R (10/10).

Secretary IV at the Urban Systems Laboratory will type a large volume of papers, reports, correspondence. Organize and edit material keeping deadlines in mind. Excellent typing, grammar and spelling skills required. Ability to work accurately under deadline pressure important. 73-1066 (10/10).

Secretary IV in the Transportation Division of Civil Engineering will handle all the secretarial duties for the office; maintain student records for Admissions Officer; may assist with the department newsletter. Good typing required; ability to organize and work with a variety of people important. 73-864-R (9/26).

Secretary IV in Academic department will type correspondence, proposals, DSR reports, manuscripts, theses (much of it technical) keep DSR account records; maintain small library; compose routine letters; assist professor with details of registration. Ability to work independently and to write letters important; accurate typing essential; knowledge of shorthand, technical typing and bookkeeping preferred. 73-578-R (6/27).

Secretary IV in the Office of the Dean of the School of Architecture and Planning will perform general secretarial duties, maintain budget records, set up luncheon meetings, open houses. Excellent typing and dictaphone skills needed. Previous bookkeeping experience. Knowledge of MIT helpful. 73-981-R (9/26).

Secretary III-IV Part-time for a professor in Metallurgy and Materials Science will type correspondence and technical manuscripts, and handle all general office duties. Good skills required, experience in technical typing preferred. 15-20 hour work week. 73-1072-R (10/10).

Secretary III in the Humanities Library will handle general secretarial duties for the library; maintain payroll records; participate in interlibrary borrowing operation; assist with some bibliographic searching. Speed and accuracy in typing required; ability to work with detail important. Library experience helpful. 73-1051-R (10/3).

Secretary IV in Mathematics will handle general secretarial duties for a group of professors and instructors. Type mathematical papers, oversee the department Reading Room, make travel arrangements, maintain files and records. Shorthand, experience or the ability to learn technical typing required. Organizational ability will be important for working for several busy people. 73-742-R (8/8).

Secretary III to the Vice President for Administration and Personnel and to the Administrative Assistant in that office will handle heavy load of typing, transcribe from dictating equipment, maintain active calendar, serve as office receptionist, maintain files and answer phones. Good language skills, ability to take accurate messages essential. Knowledge of Institute policy and resources desirable to provide assistance to a large number of callers and visitors. Will use IBM Executive typewriter. 73-737-A (8/8).

Secretary III for a group of faculty members and research staff in the Research Laboratory of Electronics. Type technical manuscripts, including setting format and verifying footnotes and references; handle all other general office duties. Excellent typing experience preferred. 73-861-R (9/5).

Secretary III in the Medical Department will transcribe clinic notes and case histories; assist with secretarial duties in a variety of areas; provide support during vacations, sickness, and lunch breaks. Accurate typing essential; previous transcribing experience and a knowledge of Medical terminology required. 37½ hour work week; 8:30-5:00. 73-1012-R (9/25).

Secretary III in Humanities will order and schedule films for department; answer busy headquarters phone; order books for courses, occasionally type manuscripts. Excellent typing and secretarial skills required. Ability to work independently is important. 73-1077-R (10/10).

Administrative Assistant V in Aeronautics and Astronautics will handle administrative duties for the Concourse Program. Coordinate instructional procedures and materials; maintain student records; analyze accounts and prepare budgets. Handle publicity for events; manage social functions. Ability to establish priorities and use independent judgment is essential. Prior experience with diverse academic groups is highly desirable. 73-1060-R (10/10).

Administrative Assistant V in the Dean for Student Affairs Office will be responsible for coordinating room as-

signments; assisting students with housing-related problems; independently handle many questions; answer correspondence on own; perform secretarial duties for one Dean. Ability to work independently and under pressure important; good typing and dictaphone skills required. Knowledge of Institute procedures and resources preferred. 73-1033-R (10/3).

Administrative Assistant V to Administrative Officer in Civil Engineering will advise and direct secretarial personnel, prepare confidential material, monitor and maintain budget records, maintain personnel files; assist with payroll procedures. Good typing, shorthand and administrative skills required. Knowledge of MIT extremely helpful. 73-1019-R (9/20).

Senior Accounting Clerk IV or Accounting Assistant V will maintain the payroll and monthly account statements and records for the Office of the President and the Chancellor and to assist in preparation of budget analysis, routine reports, some correspondence and questionnaires, along with some general office responsibilities. Accounting background and experience with budgets would be helpful. Must be able to work independently and with little supervision and do own typing. 73-1099-R (10/10).

Reactor Operator Trainee IV in Nuclear Engineering will serve as shift operator on the MIT Reactor after passing A.E.C. Operators' Examination. Two years of technical college education or its equivalent background will be necessary for preparing for operators' licensing. Knowledge of electronic circuits would be helpful. Ability to work under pressure of emergencies important. 40 hour work week. 73-988-R, 73-987-R (9/26).

Senior Clerk IV in the Office of Personnel Relations will provide comprehensive clerical and statistical support to the Wage and Salary section. Collect data, make computations, prepare salary survey return, record and process unemployment claims, assist with other clerical assignments. Individual must have a flair for working with figures; initiative, ability to work with detail important. Good typing skills required. 73-1035-R (10/3).

Technical Typist III in the Office of Administrative Information Systems will type technical memoranda, data processing control documents and manuals. Maintain documentation library, including filing, organization and maintenance of programmer reference library. Good typing skills, experience in a data processing environment desirable. 73-684-R (7/25).

Senior Key Punch Operator III in the office of Administrative Information Systems will operate the IBM 129 key punch machine. Punch into computer inputs cards formatted and unformatted documents. Minimum 2 years experience operating IBM 029 or comparable equipment. 73-1039-R (10/3).

Technical Assistant Trainee IV in Psychology will assist with the cat colony; run experiments; care for and feed animals; record data and keep general records; assist in surgery. Biology or psychology background and/or experience in working with animals required. Candidate should not have any known allergies to animals. 73-1089-R (10/10).

Senior Accounting Clerk IV Part-time at the MIT Press will handle complete accounts payable functions. Process purchase orders, bills statements. Ability to use the typewriter and calculator required. 20 hour work week. 73-1096-R (10/10).

Library General Assistant III in the Document Unit of the Libraries will record and process government and supranational serials and journals on visible file. Accuracy in typing and detail work required; library experience and knowledge of foreign languages of value. 73-1087-R (10/10).

Technical Statistical Typist III for the School of Management and the Economics Department will use IBM magnetic keyboard typewriter for technical (Mathematical) manuscript typing. Excellent typing skills; ability to work independently and maintain records and files required. 73-993-R (9/26).

Senior Clerk III in the Student Financial Aid Office will type correspondence and reports; gather data for office studies and assist with reception duties. Strong typing skills are required. 73-883-R (10/10).

Senior Clerk III at the Neurosciences Research Center in Jamaica Plain will use the IBM MTST/Selective Composer System for work on the Center's bulletin. Individual will be audio-visual assistant for projections of slides and tape recording of meetings. Maintain files, equipment, and journal storage. Strong typing skills required. 37½ hour work week. 73-1067-R (10/10).

Senior Clerk III will take and process orders at Graphic Arts. Price and schedule Xerox work, handle requisition details. Knowledge of photography preferred, but not essential. 73-946-A (10/10).

Library General Assistant III Part-time for the Sea Grant Program will handle general library duties. Shelve books, file catalog cards, perform circulation duties, fill report requests. Good spelling, accurate typing library course work preferred. 10 hour work week. 73-991-A (10/10).

Library General Assistant III at Barker Engineering Library will search card catalog and type orders for materials to be acquired for the collection. Assist users at the Catalog Information/Reference Desk 8-10 hours/week. Accurate typing, ability to work with details and assist users efficiently. Reading background in German and/or Russian preferred. 8-4 or 9-5. 73-1069-R (10/10).

Technical Typist III-IV in Chemistry will type technical manuscripts, proposals etc. for 3-4 professors. Good typing skills required, previous technical typing experience important. 73-1086-A (10/10).

Technical Typist III at the Information Processing Center will prepare technical documents relating to computer programming, mathematics and statistics. Set up and record original drafts, make corrections and produce final copy using the MTST. Maintain library of storage volumes or computer files. Technical typing experience, ability to learn MTST required. 73-1093-A (10/10).

Senior Clerk III Part-time in the Medical Department will assist with MIT Health Plan Enrollment procedures; prepare and type reports and forms. Good typing skills, ability to work efficiently and accurately with details required. 20 hour work week, 9 am-1 pm. 73-1093-A (10/10).

Technical Assistant III - IV Part-time in Nutrition and Food Science will assist laboratory personnel in performance of spectrophotometry, fluorimetric, spectrophotometric, and other assays; prepare chromatographic columns and resins; and assist in washing laboratory glassware. 24 hour work week 73-1919-A (10/10).

Clerk II in Biology will maintain account files for Financial Officer; assist in preparation of special budget reports (primarily Xeroxing and collating); will help with report mailing. Ability to work independently, light typing skills desired. 73-999-A (9/26).

Clerk-Typist II Part-time in Nutrition and Food Science will handle general secretarial duties for the Administrative Officer. Excellent typing skills required. 20 hour work week. 73-874-R (9/5).

Clerk Typist II or Senior Clerk III in the Comptroller's Accounting Office will type vouchers, charge and credit projects for work performed; handle other clerical duties. Knowledge of bookkeeping, ability to clear and reconcile accounts required. Good typing skills important. 73-1076-R (10/10).

General Helper at Graphic Arts will perform a variety of routine jobs such as cleaning, oiling and supplying raw materials to the bindery, press room, ozalid room, Works in various groups doing repetitious work as assigned. Graduation from high school or its equivalent required. 40 hour work week. 8-5. 73-948-A (9/26).

General Helper in the Graphic Arts Service will perform a variety of routine jobs such as cleaning, oiling and supplying raw materials to the bindery, pressroom, ozalid room, etc. Works in various groups doing other work as assigned. 40 hour work week. 73-1029-R 73-1030-R (10/10).

2nd Class Engineer must have a Mass. second class Engineer's license or higher. Individual must be willing to work on any shift. 73-182-R (4/73).

Waitresses/Waiters Part-time at the Faculty Club will set up silver and china on dining room tables. Take number orders; serve food and beverages. Clear, clean and reset tables. Experience helpful, but not necessary. Shifts: M-F 11:00 am - 3:00 pm. (4 jobs) All positions may require weekend work. 73-1068-R, 73-1070-R, 73-1071-R, 73-921.

Committee of Seven to Weigh 'Social-Impact' Review of Grants

President Jerome B. Wiesner has named seven faculty members to an ad hoc committee to study the advisability of establishing a faculty group to review research contracts for their impact on society.

The faculty voted for the study at its monthly meeting in May and asked the ad hoc committee to make its report in the spring term of 1974.

Dr. John M. Deutch, professor of chemistry, was appointed chairman of the committee. Its other members are:

Dr. Michael Modell, associate professor of chemical engineering; Dr. Philip Morrison, professor of physics; Dr. Frank Press, R. R. Shrock Professor of Earth and Planetary Sciences; Dr. Harvey M. Sapolsky, associate professor of political science; Dr. William M. Siebert, professor of electrical engineering, and Dr. Nathan Sivin, associate professor of the history of science.

Professor Morrison was one of

November 5-9

Red Cross Blood Drive Goal: 1,875 Pints

Blood: 375 pints per day is the goal for the five-day MIT Red Cross Blood Drive, Nov. 5-9.

Last year the MIT community donated 4,000 pints of blood to the Massachusetts Chapter of the Red Cross. The total is equal to approximately three percent of all blood donated in the state for the year.

So long as MIT maintains a high contribution rate, members of the Institute community and their

five faculty members who in May proposed the formation of an ad hoc committee "to study the need for a standing Committee on Grant and Contract Assessments."

Joining in the proposal were Dr. David H. Frisch, professor of physics; Dr. William B. Watson, professor of humanities; Dr. Eugene Bell, professor of biology, and Dr. Bernard T. Feld, professor of physics.

They said in a statement accompanying the proposal that a "systematic procedure is needed for the faculty to accept some continuing responsibility" for the effects of research and development carried out on campus.

The goal of the proposed standing committee, they said, would be to try to estimate "the impact of research and development projects upon national security, physical environment, social welfare and technical and scientific education."

"The main basis for such an estimate," they said, "would be a

immediate families are entitled to free and unlimited blood transfusions.

Blood donor registration forms will be available at the Technology Community Association, Room W20-450 and in the Building 10 lobby on Oct. 15. Student solicitors will begin canvassing in fraternities and campus houses that week.

Donors may also make appointments to give blood during

brief statement prepared by the responsible applicant for the award, which sets forth his/her expectation of the impact of the work. These statements would become a necessary link added to the present chain of documents and action which normally precede... acceptance of an award."

The sponsors suggested that a review apply only to on-campus grants and contracts of \$100,000 or more in order to keep "as small as possible" any effect on freedom of research.

They estimated that about 60 new on-campus awards would be reviewed each year and that "most one-or-few person grants would be exempt from attention."

Some faculty members at the May meeting expressed reservations about the idea. They said it was difficult to make such assessments and that worthwhile projects might face critical delays.

The vote on the motion to set up the study group was 40-27.

the week of Oct. 29 at information booths in Walker and Lobdell dining halls.

The first day of the drive, Oct. 5, donors will be scheduled from 9:45am to 9:15pm. Tuesday through Friday, Nov. 6-9, donors can give between 9:45am and 3:30pm.

Donors can anticipate the bi-annual event replete with music and refreshments in the Sala de Puerto Rico.

Arts Council to Meet in All-Day Session

The second annual meeting of the MIT Council on the Arts will be held Friday, Oct. 26, at MIT. A majority of the council's 65 members is expected to attend the all-day gathering.

Plans for the meeting were announced by Professor Roy Lamson, Special Assistant to the

President for the Arts.

The meeting will open with a morning business session in Kresge Little Theatre at which council chairman Paul Tishman will speak.

Agenda for the business meeting—the first such meeting of the entire council—will include

Student Accounts

The Student Accounts Office advises that students who do not receive their first billing for the Fall Term by Oct. 13 may pick them up in the Building 10 lobby on Oct. 15 and 16.

A \$20 payment fine is now being assessed against those students who failed to make their scheduled Oct. 1 deferred payment.

Scope Gondola

To Hang in Lobby

A gondola that will eventually be supported by the largest balloon ever flown will soon be dangling from the ceiling of the Building 7 lobby as part of a test being conducted by the Center for Space Research (CSR).

The gondola will soar to 150,000 feet next spring during a CSR expedition to Australia carrying a telescope that will observe extra-terrestrial x-ray sources.

The equipment that will be dangling from the lobby ceiling is the stabilization system for the telescope. From the top, the units will be an inertial boom against which the driving motor reacts, the connecting ladder, a D/C torque motor and the gondola itself.

Object of the exercise is to optimize the servo characteristics for pointing stability. The objective is approximately one arc minute.

The experiment is being conducted by Dr. George R. Ricker, Professor Walter H. G. Lewin, students James E. Ballentine and John R. Doty and Jerry B. Roberts and Anton Scheepmaker of the Office of Sponsored Programs.

Forem to Speak

Jack Forem, author of the new book, *Transcendental Meditation: Maharishi Mahesh Yogi and the Science of Creative Intelligence*, will speak at MIT Friday, Oct. 12, at 8pm in the Student Center, Room 491.

Fire Extinguished

A small grease fire yesterday, Tuesday, Oct. 9, at the Lobdell short order counter in the Student Center was extinguished at 10:38am when heat from the fire triggered the automatic extinguishing system which sprayed foam over the grill area.

discussion and possible ratification of a council constitution. Among committee reports to be heard will be a report from Professor Donlyn Lyndon, head of the architecture department and chairman of the faculty arts committee.

Harold J. Hanham, Dean of the MIT School of Humanities and Social Science, will present remarks at a luncheon in the Sala de Puerto Rico for council members, faculty, students, and invited guests. The afternoon schedule includes individual committee meetings and visits to MIT arts facilities.

Professor James Ackerman, professor of fine arts at Harvard University, will be guest speaker at an evening dinner at the St. Botolph's Club, Boston, to which members of the Boston arts community will be invited.

Shooters Sought

The MIT Pistol and Rifle Club is looking for people interested in shooting smallbore rifles on a winter league team. The club has all necessary equipment, including rifles, jackets and spotting scopes for member use. Practice will be held Friday evenings with coaching and instruction available. For information, call George Sechen, Ext. 3-2398.

Voter Registration

The Cambridge Election Commission will conduct voter registration at MIT in the Student Center's West Lounge on Wednesday, Oct. 10, 11:30am-5pm, and Monday, Oct. 15, 11:30am-2:30pm.

Help for Rube: Computer Program Permits Engineers To See and 'Operate' New Linkages

By DENNIS L. MEREDITH
Staff Writer

Rube Goldberg, that famous (or infamous) inventor of outrageous machines would have been delighted with a computer program developed at the Massachusetts Institute of Technology.

The powerful-but-inexpensive computer system allows engineers designing mechanical linkages to see their designs "built" and operated for them using highly complex mathematics and visual display techniques.

The MIT computer program is called KINSYN by its developer, Dr. Roger E. Kaufman, associate professor of mechanical engineering at MIT. KINSYN is short for "kinematic synthesis." Kinematics is the study of the motion of mechanical linkages and ways of creating them.

Mechanical linkages—which do everything from control jet aircraft to pop up the footrest on a reclining chair—have been designed in the past by a form of creative doodling, which is a long and expensive process.

"A designer developing a car hood hinge mechanism in the usual way creatively fiddles with pins and pieces of cardboard until he comes up with a linkage that will

move the hood the way he wants," said Dr. Kaufman. "He usually encounters several blind alleys in his design, because he is not sure of its inherent limitations."

"Automobile engineers say it takes 2000 man-hours to design each hood linkage, and one large manufacturer has to design 84 such linkages each year. Thus, such methods can be highly expensive," he said.

"Using KINSYN the designer could simply draw the device's requirements on the computer's television-like screen—specifying the hood's path of movement, and the forces and speeds the hood would normally experience.

"The computer performs complex calculations on the design engineer's drawing and comes up with a whole set of possible dimensions for the given device. The computer then traces its results on the screen, so the designer can 'talk' more about the design with the computer."

KINSYN, the first such general-purpose design program, is a relatively inexpensive system, said Dr. Kaufman. A small computer and simple communications devices are all that are needed to put it into operation. Thus, he feels the program would be quite useful to industry

in its present form.

According to Dr. Kaufman, previous "computer-aided design" programs haven't really been "designers" at all—a human being has done the inventing and the computer has simply carried out the calculations. In contrast, he says, KINSYN is not only a jack-of-all-trades designer but is a constant partner of the engineer in the design process.

The program does not merely test the feasibility of proposed solutions, or "discuss" a particular solution with the engineer, but also "suggests" various alternatives.

In emphasizing the versatility of KINSYN, Dr. Kaufman tells of his project to design an improved artificial knee joint.

"The knee is more than a simple hinge," he said. "It is actually a combination of oddly shaped surfaces, connected by ligaments, that slide and rotate over one another in a complicated fashion. When a person stands, the knee joint actually twists slightly in the third dimension, locking the joint.

"Artificial knee joints, such as those used in conventional braces, are somewhat unsatisfactory, because a person's real knee moves differently from the

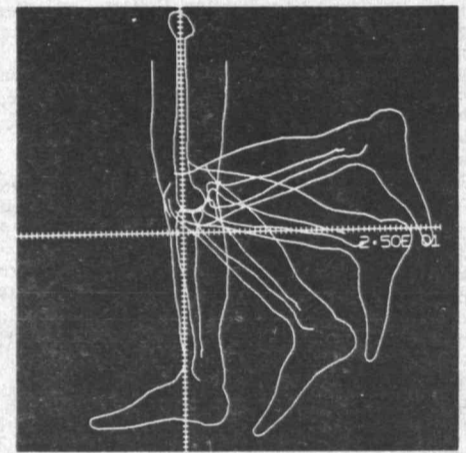
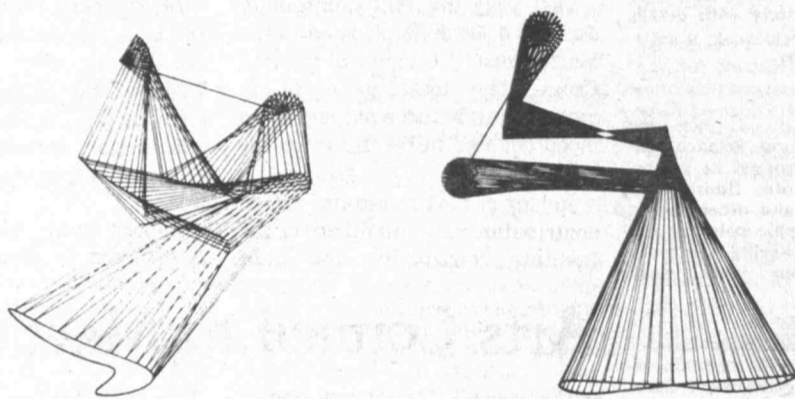
artificial joint, which is usually only a simple hinge. The patient may suffer considerable pain and joint wear because of this difference."

By feeding information from knee X-rays into the computer, and asking the computer to develop the linkage which could best mimic the real knee, Dr. Kaufman and a graduate student designed an improved joint in one afternoon. Medical researchers have worked years trying to accomplish the same thing, he said.

Dr. Kaufman envisions a system whereby patients needing knee braces could have their X-rays sent to a computer design center, where a computer using KINSYN could rapidly and precisely design a custom, pain-free brace for them.

In a recent scientific paper Dr. Kaufman said: "Ideally a designer should be able to envision a new device, and presto!—instantly a machine shop model materializes in his hands, one which he can handle, massage, rock back and forth, wiggle and contemplate; a model whose dimensions are plastic, so he can push it and pull it into new shapes, molding it until its behavior is just right." KINSYN, of course, will never achieve this goal, but Dr. Kaufman wants to come as close as he can.

The KINSYN computer goes through a few drills in the first two pictures to the right, calculating how given sets of mechanical linkages will move. The results are beautiful to both engineers and aesthetes. In the last picture, far right, the computer does just the opposite: given the pathway of a human knee, it begins to calculate the mechanism required.



'Objective Visual Design'

MIT Graphics Featured First in Chicago Gallery Exhibit Series

MIT Design Services and the MIT Press are currently featured in an exhibit entitled, "Objective Visual Design: Recent American Developments," at the Ryder Gallery, Chicago.

The Container Corporation of America and Frederic Ryder Co., Advertising Typographers are sponsoring the show. The Ryder is a gallery devoted to graphic design.

The show is first of a series dealing with "objective visual design"—the transmission of information through quality graphics in which the elements of design (typography, illustration, photography, layout and color) are subordinated to and derived from what is being communicated.

The first phase of the exhibitions is an attempt to document recent work of some American institutions and corporations doing progressive work in design as communication. Graphic design from Westinghouse, IBM, the Container Corporation of America and J.C. Penny will be exhibited in subsequent shows.

MIT was among the first American universities to employ graphic designers as staff members. The graphics program was established in the early 1950's by John I. Mattill, the first director of publications at MIT and current editor of *Technology Review*, and

graphic designer Muriel R. Cooper.

Design Services is headed by Jacqueline S. Casey, who was recently a guest lecturer at Yale University. Ms. Casey, who came to MIT in 1955, has been asked to serve on a panel to review govern-

ment publications.

Ralph Coburn studied architecture at MIT and joined the Institute's staff as a graphic designer in 1957. Mr. Coburn received his artistic training in Boston and Paris.

German-born Dietmar R. Wink-

ler was with the MIT design group from 1966 to 1971. He now works independently as a graphic designer and consultant and teaches at Southeastern Massachusetts University.

Works by MIT Design Services were recently featured in *Novum*

Gebrauchsgraphik, an international journal of graphic design, *Graphics Annual* and others.

The design program of the MIT Press is under the direction of Ms. Cooper, now media director and editorial associate of the press. The media department is composed of both design and production people dedicated to the integration of the book production process—analysis, organization, design and implementation—to increase the effectiveness of economical mass production.

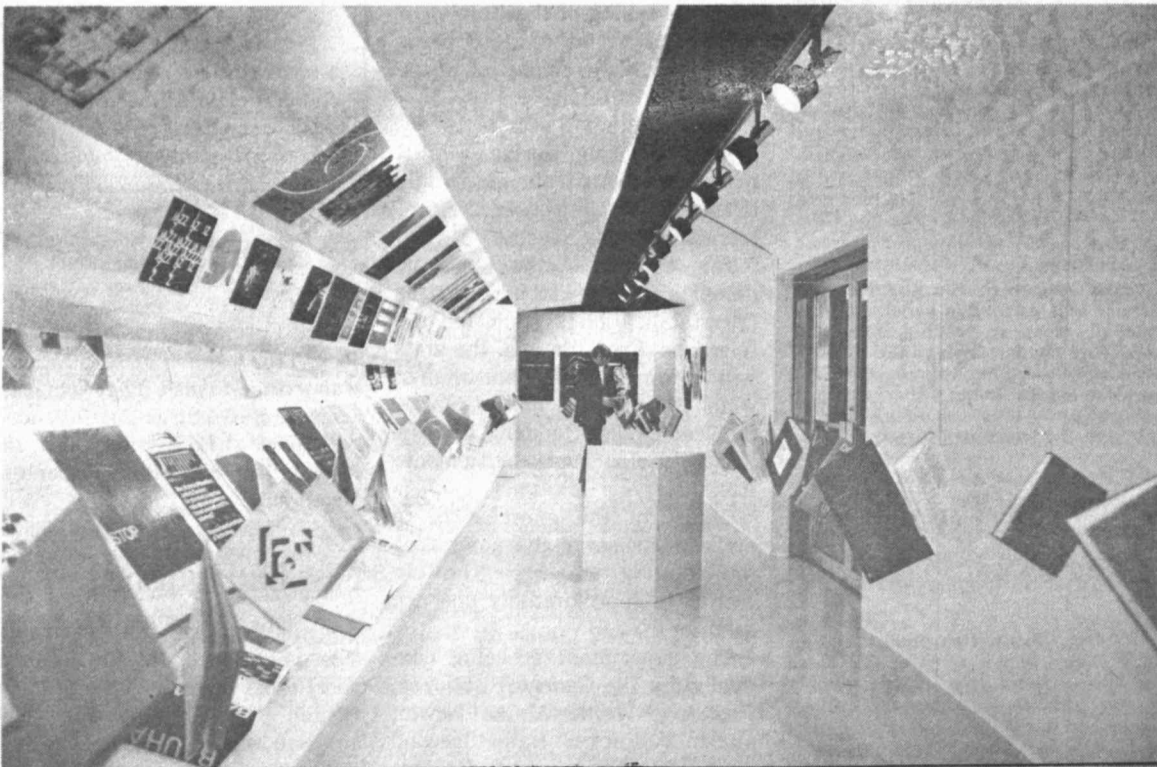
The results of the design program of the Press have been widely and consistently exhibited in major national and international design and book shows.

3 Kodak Grants

MIT's graduate departments of chemistry and chemical engineering have each been awarded \$10,000 research grants by the Eastman Kodak Company. The grants are to be applied for general graduate education and research in the departments.

Chorover Article

Dr. Stephen L. Chorover, professor of psychology, is author of an article, "Big Brother and Psychotechnology," which appears in the October issue of *Psychology Today*.



Graphic art from MIT is displayed at the Ryder Gallery in Chicago, above. MIT Design Services and the MIT Press are featured in the exhibit "Objective

Visual Design: Recent American Developments," Sept. 10 to Oct. 19.