

## Lincoln Satellites Launched

Two experimental communications satellites designed and built for the Air Force by MIT's Lincoln Laboratory were launched Sunday (March 14) from Cape Canaveral in Florida aboard a TITAN III-C launch vehicle.

Following is a statement issued by Lincoln Laboratory:

Liftoff took place at 8:25pm (EST), and the satellites were released simultaneously into orbit at 3:10am (EST) on Monday, exactly on schedule. This was a great moment at Lincoln, eagerly awaited by the hundreds of people who have contributed to the development of the satellites over a period of more than five years. The first direct telemetry signals from the spacecraft, received from both satellites promptly after separation, were greeted with great enthusiasm, and the laboratory's experimental program got underway immediately.

The initial phase of this program includes several activities. First, the orientation and motion of the satellites had to be determined, corrections calculated, and commands sent to the spacecraft to stabilize them with communication antennas pointed at the earth. Second, the orbital positions and velocities of the satellites must be determined very precisely so that they can be directed to start moving slowly away from one

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## Perkins Named Head Of Civil Engineering

The appointment of Professor Frank E. Perkins as head of the Department of Civil Engineering has been announced by Dr. Alfred A.H. Keil, dean of the School of Engineering.

Professor Perkins, who has been acting head of the department since July 1975, succeeds Professor Peter S. Eagleson, who asked to be relieved of responsibilities as head of the department and is spending 1975-76 visiting the California Institute of Technology. Professor Perkins' appointment was effective March 1.

From 1973-1975 Professor Perkins was special assistant to the dean of engineering for special education programs, participating in several studies of US engineering education.

"That experience," Dean Keil said, "has made him intimately familiar with the broadening scope of the School of Engineering and the need to find a balance between engi-

neering sciences, technologies and systems engineering."

Professor Perkins received the SB in civil engineering in 1955 from MIT. Following service in the US Army Corps of Engineers, he returned to MIT where he received the SM in 1959 and the ScD in 1966. From 1957-62 he was a research assistant and research engineer at the Hydrodynamics Laboratory and in 1962 became an instructor in civil engineering, winning the 1965 Goodwin Medal for conspicuously effective teaching.

Appointed assistant professor of civil engineering in 1965, he was promoted to associate professor in 1966

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### Faculty to Meet

A regular meeting of the faculty will be held today (Wednesday, March 17) at 3:15pm in Rm 10-250. Agenda items include:

- Report by the ROTC Advisory Committee
- Report by the Committee on Educational Policy concerning freshman experimental programs (Concourse and the Experimental Study Group)
- Resolution on Non-smoking.

### Postal Rate Reminder

Everyone noticed when first class postage recently jumped from 10 to 13 cents.

But many people are not aware that the 13-cent amount applies only to the first ounce. Additional ounces up to 13 ounces total require only 11 cents postage. For example, a 2-ounce letter costs 24 cents, a 3-ounce letter 35 cents, and so forth. Beyond 13 ounces postage is determined by weight and distance.

The Office of Laboratory Supplies now stocks both 13-cent and 11-cent stamps in Rm 4-070.



COMET WEST streaks behind the MIT George R. Wallace, Jr., Astrophysical Observatory in Westford, Mass. The photograph was taken shortly before dawn March 8 by physics senior Russell Chipman of Norwalk, Conn., who spends most of his time at the observatory taking photographs of hydrogen alpha radiation from nebulae. Although the recently discovered comet is becoming fainter, it should still be seen with binoculars in the eastern sky between about 3:45 and 4:45am—weather permitting.

## Future Holds Promise For Mining Asteroids

By BARBARA BURKE  
Staff Writer

Shortages of accessible iron and nickel on earth could be solved by turning to plentiful supplies in space, according to two astrophysicists at MIT.

The two believe that it would be possible and profitable to mine the asteroids for iron and nickel. They suggest that the metals could be made into a buoyant metal "foam," which could be shaped into a vehicle and guided by remote control to a landing site in the ocean.

Dr. Thomas B. McCord, associate professor of planetary physics in the MIT Department of Earth and Planetary Sciences, and staff scientist Dr. Michael J. Gaffey, presented a tentative scenario for extraterrestrial mining at the Seventh Lunar Science Conference in Houston, Texas, Tuesday (March 16).

They estimate that each year the venture could bring back metals worth "at least 140 billion dollars."

"We're not trying to define precisely how or what should be done, but to show that it is feasible," said Professor McCord, who is also director of MIT's George R. Wallace, Jr.,

Astrophysical Observatory.

"We find the prospects exciting and unexpectedly reasonable," he said. "There's no question that more serious studies will have to be made, but the basic capability is there, and the country ought to be preparing for it."

Iron and nickel, which make up as much as 80 or 90 percent of some asteroids, are becoming increasingly difficult and expensive to extract from the earth, Professor McCord said.

"Even before supplies are completely exhausted, the cost of discovery and development of low grade ores in terms of money, time and environmental impact will become prohibitive," he said.

Asteroids are tiny "planets" or fragments of planets, most of which circle the sun in a belt between Mars and Jupiter. The surface composition of many of the asteroids has been determined by the two scientists and their associates, using remote sensing techniques applied from ground-based optical telescopes.

The simplest way to mine these

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## Lactose Intolerance Test is Questioned

The value of supplemental milk programs for children has been questioned in recent years because of reports that many non-white children are made sick by milk, or cannot utilize milk sugar (lactose).

Two MIT nutritionists have found that those reports were based on a faulty premise: the assumption that a standard "lactose tolerance" test accurately reflects a child's capacity to tolerate milk.

In a study of 69 black children and 30 white children, they found that although many of the black children were shown by that test to be "lactose intolerant," none of them reacted badly to an eight-ounce glass of milk.

The study was conducted by Cutberto Garza, MD, who recently received his PhD at the MIT Department of Nutrition and Food Science, and noted nutritionist Dr. Nevin S. Scrimshaw, PhD, MD, head of the department. The study was reported in a recent issue of *The American Journal of Clinical Nutrition*; it was funded in part by The National Dairy Council.

Primary lactose intolerance—the most common form—occurs when a person lacks adequate amounts of lactase, the intestinal enzyme that breaks down the sugar (lactose) in milk. In some people, the amount of

lactase appears to decrease normally with age.

When a lactose-intolerant child is given test doses of lactose, gastrointestinal symptoms such as flatulence, bloating, abdominal cramps

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## Blood Drive Nets 1465 Pints

A total of 1,465 pints of blood was collected during the annual MIT Spring Blood Drive which ended March 12.

"We did pretty well considering the circumstances," said Vinay Reddy, drive chairman and a sophomore in electrical engineering from Bloomfield Hills, Mich. "We had to contend with the flu, many winter colds and crazy weather, all of which reduced donations."

The drive's original goal was 2,000 pints.

The winners of the fraternity and dormitory living group beer contests will be announced shortly after MIT's spring vacation which ends March 28.

During the two-day Lincoln Laboratory Blood Drive a total of 251 pints of blood were donated by Lincoln people.

## Son at MIT Almost a Dream for Physical Plant Mechanic

John MacKinnon, the father of five and an air-conditioning mechanic in Physical Plant, started life in a family of Nova Scotia coal miners, never dreaming that one day he would send a son to MIT.

Today his oldest child, Richard, 20, is a sophomore in biology with plans to attend medical school. The first generation-college aspect of Richard's success is enhanced, Mr. MacKinnon says, by the fact that as the child of an MIT employee, Richard attends MIT tuition free.

"We would have managed to send him somehow, I'm sure," the ruddy-faced maintenance mechanic said.

"But it still would have been difficult with tuition at \$3700 a year and an increase scheduled for next year. Now Richard simply pays for as much of his room and board as he can from summer job money.

Other MacKinnon children who might follow their brother's example are Wayne, 18; Theresa, 14; Brian, 11; and Judy, 10.

According to their mother, Mrs. Sadie MacKinnon, the possibility of acceptance at MIT has had a positive effect on homework habits.

"While they may not have been particularly bent on college before, now they think about shooting for a

goal like MIT. They see their brother earning A's and B's in an effort to get into medical school, and it makes an impression."

Richard, a member of MIT's hockey team and still a participant in family ski weekends, actually came to MIT by a strange stroke of luck. In the spring term of his senior year at Sharon High School he received letters of acceptance from Colby College, the University of Massachusetts at Amherst, and McGill University.

With his name on the waiting list at MIT, Richard decided to send an affirmative reply to McGill in Mon-

tréal—only to have it returned because of the 1974 Canadian mail strike. As postal problems blocked his plans to attend McGill though, an MIT admissions officer phoned to say that a space had become available and would he attend?

"I accepted without hesitation," recalls Richard, who said the combination of an MIT degree and a full tuition grant was too much to resist.

Under the present MIT benefits plan, children of bi-weekly, hourly and exempt employees who are admitted to MIT while their parents are employed at the Institute are entitled to a full tuition grant during

their undergraduate years. The grant does not apply to employee's children attending colleges other than MIT.

"I was lucky enough to get summer jobs right here at MIT—in the Carpentry Shop, on the buildings and grounds crew, and last January, in the Heat, Vent, and Air-Conditioning Department, where I had the fire extinguisher detail," says Richard, who cuts down on board costs by cooking his own meals in MIT's Baker House. Last semester he volunteered as an orderly in the

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# Record Number Join Quarter Century Club

A record "class" of 105 new members—the largest in history—will be inducted at the annual meeting of the MIT Quarter Century Club Tuesday, March 23, at a dinner in Walker Memorial.

Included in the new group as an honorary member is Margaret Compton, widow of MIT's ninth president, Karl Taylor Compton. Dr. and Mrs. Compton came to MIT in 1930 and Mrs. Compton has continued to play an active role in the community ever since. Dr. Compton died in 1954.

Paul V. Cusick, MIT vice president for fiscal relations, will be master of ceremonies. Jeri Whitman of the Draper Laboratory, president of the Club, will give welcoming remarks.

Ms. Whitman and Robert Radocchia, chairman of the board of the Club, will present certificates and pins to the new members. Closing remarks will be given by Howard W. Johnson, chairman of the MIT Corporation and also an honorary member of the Club.

Altogether, some 500 active and retired members are expected to attend the dinner. The Club is composed of persons who have worked at MIT for 25 years and includes members from the campus, Lincoln Laboratory and Draper Laboratory. This year's new members will bring total membership to approximately 1,200.

## New members are:

John Adams of Bedford, Lincoln Laboratory, Group 43.  
 Frederick Allen of Lynnfield Center, Draper Laboratory Business and Legal Office.  
 Robert Baltimore of Randolph, Draper Laboratory Navy Programs Department.  
 Earl F. Bardsley of Arlington, Draper Laboratory Air Force Programs Department.  
 John W. Barrett of Concord, Research Laboratory of Electronics.  
 Robert S. Berg of Lexington, Lincoln Laboratory Group 63.  
 Michael Blah, Jr. of Cambridge, Francis Bitter National Magnet Laboratory.  
 Dominick Bonelli of Hingham, Draper Laboratory, Administration and Facilities Department.  
 Ralph C. Brown of Braintree, Draper Laboratory Component Development Department.  
 Francis T. Buckley of Roxbury, Physical Plant.  
 Gertrude E. Burns of Belmont, Sloan School of Management.  
 Joseph E. Cairns of Burlington, Department of Electrical Engineering and Computer Science.  
 Joseph A. Caloggero of Nahant, Department of Mechanical Engineering.  
 Kenneth M. Campbell of North Acton, Center for Space Research.  
 Michael M. Catalano of Waltham, Lincoln Laboratory Group 72.  
 James J. Cattel of Milton, Draper Laboratory NASA/Army Programs Department.  
 Harold David Clinch of Stoughton, Draper Laboratory Air Force Programs Department.  
 Mark E. Connelly of Concord, Electronic Systems Laboratory.  
 Nathan A. Cook of Cambridge, professor of mechanical engineering.  
 Russell M. Daniels of Braintree, Draper

Laboratory Navy Programs Department.  
 William L. Davis of Cambridge, Department of Physics.  
 Anthony G. DiNapoli of Quincy, Draper Laboratory, Navy Programs Department.  
 David E. Donald of South Boston, Graphic Arts.  
 Frederick R. Donald of Arlington, Draper Laboratory Navy Programs Department.  
 Harold E. Dreyer of Belmont, Draper Laboratory Office of the Executive Assistant to the President.  
 Rebecca Fairbanks of Cambridge, Draper Laboratory, President's Office.  
 David F. Flett of Somerville, Physical Plant.  
 John M. Frankovich of Lexington, Lincoln Laboratory Group 27.  
 Erik D. Frederikson of Burlington, Lincoln Laboratory Group 61.  
 Vincent A. Fulmer of Arlington, secretary of the Institute.  
 Michael J. Giunta of Malden, Draper Laboratory, Digital Computation Department.  
 Anthony J. Guarnieri of Medford, Physical Plant.  
 William M. Hall, Jr. of Reading, Lincoln Laboratory Group 12.  
 Andrew Hamilton of Somerville, Laboratory Supplies.  
 John V. Harrington of Lexington, professor of aeronautics and astronautics and professor of electrical engineering.  
 George N. Hatsopoulos of Lincoln, senior lecturer in mechanical engineering.  
 Hermann A. Haus of Lexington, Elihu J. Thompson Professor of electrical engineering.  
 Jean S. Holden of Cambridge, Lincoln Laboratory, Group 13.  
 Kerson Huang of Cambridge, professor of physics.  
 John W. Hursh of Needham, Draper Laboratory Air Force Programs Department.  
 Mark A. Kelly of North Quincy, Research Laboratory of Electronics.  
 Richard B. Kendall of Saugus, Draper Laboratory NASA/Army Programs Department.  
 Arthur V. Kesselhuth of Nashua, N.H., Lincoln Laboratory, Group 65.  
 Andrew C. Lattanzi of Holliston, Draper Laboratory Component Development Department.  
 Salvatore Lauricella of East Boston, Dining Service.  
 Bertrand Lewis of Boston, Draper Laboratory Administration and Facilities Department.  
 William Lobar of Brookline, Laboratory for Nuclear Science.  
 Joseph Arthur Loughran of Milton, Laboratory for Nuclear Science.  
 John C. MacCarey of Lexington, Lincoln Laboratory, Group 13.  
 Theodore R. Madden of Somerville, professor of earth and planetary sciences.  
 Samuel Maloof of Westwood, Draper Laboratory Navy Programs Department.  
 Oscar J. Manupelli of Everett, Physical Plant.  
 Samuel Marcolongo of Stoneham, Department of Mechanical Engineering.  
 Winston R. Markey of Lexington, professor of aeronautics and astronautics.  
 Joseph L. Marksteiner of Dorchester, Aerophysics Laboratory.  
 Frank L. Marshall of Cambridge, Draper Laboratory Air Force Programs Department.  
 Richard E. Marshall of Concord, Draper Laboratory Air Force Programs Department.  
 Bruce Mazlish of Cambridge, professor of history and head of the Department of Humanities.  
 Noreen J. McSorley of Cambridge, assistant to the dean of the School of Science.  
 James W. Melendy of Randolph, Draper Laboratory Business and Legal Office.  
 Stanley Miller of Quincy, Comptroller's Accounting Office.

Willard A. Mosher of Winthrop, Francis Bitter National Magnet Laboratory.  
 Georgia M. Nagle of Dorchester, Information Processing Center.  
 Robert E. Ogilvie of Lexington, professor of materials science and engineering.  
 Peter J. Palmer of Wellesley, Draper Laboratory Air Force Programs Department.  
 Theodore L. Parrella of Medford, Draper Laboratory Component Development Department.  
 Benjamin Paulekas of Arlington, Physical Plant.  
 Elizabeth A. Pigott of West Medford, Office of the Honorary Chairman of the Corporation.  
 Albert R. Pitts of Holbrook, Draper Laboratory Air Force Programs Department.  
 Henry J. Pritchard of Norwood, Purchasing Office.  
 Fiori H. Puntiri of Holbrook, Laboratory Supplies.  
 John J. Quirk of Hyde Park, Lincoln Laboratory Group 72.  
 Ernest Rabinowicz of Newton Centre, professor of mechanical engineering.  
 Robert R. Ragusa of Melrose, Comptroller's Accounting Office.  
 Robert C. Reid of Lexington, professor of chemical engineering.  
 Frank P. Ricchio of Belmont, Francis Bitter National Magnet Laboratory.  
 Alden V. Roberts of Woburn, Lincoln Laboratory Group 76.  
 Paul Rosen of Lincoln, Lincoln Laboratory Division 6.  
 Julia D. Rosentel of Islington, Patent Office.  
 John G. Rossiter, Jr. of Rockland, Draper Laboratory Navy Programs Department.  
 Louis W. Rovner of Randolph, Draper Laboratory Navy Programs Department.  
 Arthur P. Rudolph, Jr. of Burlington, Department of Civil Engineering.  
 Howard D. Ryder of Lexington, Lincoln Laboratory Group 28.  
 Arthur Sabbag of Lincoln, Draper Laboratory Administration and Facilities Department.  
 Joseph M. Salvatore of Canton, Physical Plant.  
 Nunziato Sansevero of Needham, Draper Laboratory Navy Programs Department.  
 Theodore Sarantos of Lowell, Lincoln Laboratory Group 69.  
 Norman E. Sears of Sudbury, Draper Laboratory NASA/Army Programs Department.  
 George L. Sherback of Watertown, Draper Laboratory Air Force Programs Department.  
 Agnes V. Smith of Arlington, Comptroller's Accounting Office.  
 Benjamin S. Smith of Marblehead, Draper Laboratory Air Force Programs Department.  
 Joseph W. Souza of Dorchester, Lincoln Laboratory Group 15.  
 William L. Spiers, Jr. of Lexington, Lincoln Laboratory Group 11.  
 Ralph E. Stahle of Melrose, Draper Laboratory Navy Programs Department.  
 Frederick D. Straccia of Medford, Draper Laboratory Component Development Department.  
 Dominic Tino of Everett, Faculty Club.  
 Milton B. Trageser of Winchester, Draper Laboratory Scientific Research Department.  
 Carol Ann Tranfaglia of Melrose, Lincoln Laboratory Director's Office.  
 John F. Throughton of Wakefield, Draper Laboratory NASA/Army Programs Department.  
 Charles O. Webber of Billerica, Physical Plant.  
 Roger P. Webber of Hingham, Center for Space Research.  
 Herbert G. Weiss of Lexington, Lincoln Laboratory Division 4.  
 Warren D. Wells of Cambridge, Registrar's Office.  
 Robert F. Williams of Harvard, Lincoln Laboratory Group 69.



ACCOUNTING TRANSFER of a portion of MIT's present group life insurance coverage to two minority firms was discussed this week by (left to right): Kim Valentine, assistant to the treasurer; William J. Kennedy III, president of North Carolina Mutual Life Insurance Company; Chancellor Paul E. Gray; Clarence Williams, special assistant to the President and Chancellor for minority affairs; and Weathers Y. Sykes, senior vice president of Supreme Life Insurance Co. of Chicago.

## Black Firms to Share MIT Life Insurance Business

By PATRICIA M. MARONI  
 Staff Writer

MIT announced this week that negotiations are in progress for transferring 10 percent of its group life insurance coverage with the John Hancock Company to two of the nation's largest black-owned insurance companies—North Carolina Mutual of Durham, N.C., and Supreme Life Insurance Company of America, of Chicago.

The agreement is basically an accounting transfer in which the minority companies share in revenue from MIT and MIT's insurance risk, with all other administrative and contractual responsibilities remaining with John Hancock.

Chancellor Paul E. Gray, who made the announcement, said the move represents a significant commitment on the part of MIT to help minority companies play a greater role in America's majority businesses. He said that MIT was initially approached by North Carolina Mutual after the company had negotiated a similar agreement with Harvard.

MIT currently holds \$266 million (face amount) of group life insurance with the John Hancock Company. Under the negotiated plan, each minority company will be responsible for five percent of this total business.

Kimball Valentine, Jr., assistant to the treasurer and insurance officer for MIT, said, "From the individual insured's point of view, there is no change. John Hancock is still responsible for the account, but it is transferring—or ceding—a share of the risk and the premium dollar to the minority-owned companies."

MIT offers its faculty and employees a choice of group life insurance options: a contributory plan, whereby both MIT and the insured contribute a monthly percentage, or a free policy, providing \$5,000 in insurance, pro-rated in the case of part-time employees.

Clarence G. Williams, Special Assistant to the President and Chancellor for Minority Affairs, said the business agreement illustrated MIT's role as a prime mover in aiding all segments of society.

"We hope this helps open doors and generate new contacts for the minority companies, which have already distinguished themselves as economically sound, reputable concerns," he said.

The 76-year-old North Carolina Mutual Company, which operates in 15 mid-border states and Washington, D.C., is the largest black-owned corporation in America, according to its 1974 annual report. With more than \$2 billion in insurance, the company holds policies for such black universities as Morehouse and Howard and re-insurance agreements—similar to the MIT arrangements—with several Fortune 500 companies.

"Re-insuring, or contracting for part of another company's insurance business is becoming more of a nationwide trend," Mr. Valentine said.

The Supreme Life Insurance Company of America began operations in 1921 and has increased its business over the years by re-insuring such companies as the Federal Life Insurance Company of Washington, D.C., Dunbar Life Insurance Company of Cleveland, the minority business of the Chicago National Life Insurance Company, and others.

## Commitments Group Issues Statement

With the selection of students Kenneth S. Flamm, G, and Douglas C. Knott, '78, membership on the Ad Hoc Committee on International Institutional Commitments is complete. Dr. Phillips W. Robbins, professor of biology and committee chairman has announced.

Other members are: Ann M. Graybiel, assistant professor of psychology; Thomas F. Jones, vice president for research; Fred Moavenzadeh, professor of civil engineering; George W. Rathjens, professor of political science; Edward B. Roberts, David Sarnoff Professor of Management; Walter A. Rosenblith, Institute Professor and Provost, and William F. Pounds, dean of the Sloan School of Management, coordinator for new international programs for the administration.

The Committee this week issued the following announcement.

By resolution of the Faculty, November 19, 1975, the Ad Hoc Committee on International Institutional Commitments has been established. It is to "review the scale and nature of MIT's international contractual commitments for education and/or research or service (whether at MIT or abroad) and report to the Faculty." The resolution also requires that "the Committee shall stand ready on request to consult with administration or faculty initiators of projects that involve such international institutional commitments."

We now invite initiators of such projects to bring to our attention

those they think appropriate. The judgment as to whether particular projects should be brought to our attention will be difficult in some cases, especially since the predecessor committee chose not to provide specific guidelines. In the light of the resolution of November 19 it is clear that this judgment is to be made by the initiators of any projects. We can provide little by way of guidance at this time except to remind the faculty that our Committee, and its predecessor, were established because of concern that some international programs might, in the opinion of a part of the community, be inappropriate for MIT, because of the likelihood of the training or research results being used for socially undesirable ends or because of jeopardy to those involved. We suggest that, in deciding whether to consult with us, initiators of projects consider not only whether they see any unusual or possibly objectionable features but whether there is a reasonable likelihood that others in the community might. Additionally, we would point out that if we are to be maximally useful we should be informed of possible commitments before they are terminated or the nature they to be terminated or the nature of the project substantially modified.

Finally, we would remind the community that this Committee is not charged with any oversight role as regards such matters as criteria for admission and requirements for de-

gree programs, those issues being within the purview of the CGSP and the CEP; nor does it have any responsibility with respect to individual consulting arrangements.

Initiators of projects or persons with questions should send them to the Committee, in care of Professor Phillips W. Robbins, Rm E17-233A, x3-3041.

## NSF Summer Grants Available

The Department of Nutrition and Food Science is accepting applications from undergraduates interested in conducting research this summer in the application of biology to energy and resource utilization.

Twelve stipends of \$900 each are available, through the National Science Foundation's Undergraduate Research Participation Program. The program this year will provide research grants for 1,481 college students in the United States.

The project director for the grant made to MIT is Dr. Charles L. Cooney, associate professor of biochemical engineering in the Department of Nutrition and Food Science.

Applications can be obtained from the department's undergraduate office, in Room 56-125. The deadline is April 15. Students with questions are requested to call Miss Debbie McCoy in the undergraduate office, at x3-1712.

## Water Specialist Appointed To A.D. Little Professorship

Dr. Keith D. Stolzenbach, assistant professor of civil engineering at MIT, has been appointed Arthur D. Little Assistant Professor in Environmental Sciences and Engineering at MIT for a term of one and a half years.

Announcement of the appointment was made by MIT Provost Walter A. Rosenblith.

Professor Stolzenbach is the third named to the professorship. Previous chairholders were Professors William H. Matthews, also of civil engineering, and Michael W. Golay of the Department of Nuclear Engineering. The purpose of the term professorship is to encourage and support younger MIT faculty members in interdisciplinary environmental studies.

"Professor Stolzenbach is especially well suited to hold the Arthur D. Little Professorship of Environmental Sciences and Engineering," Professor Rosenblith said. "In addition to his technical expertise in the application of fluid mechanics to environmental engineering problems, his awareness of the economic and social aspects of, and conflicts between, effective resource utilization and environmental protection is a great asset."

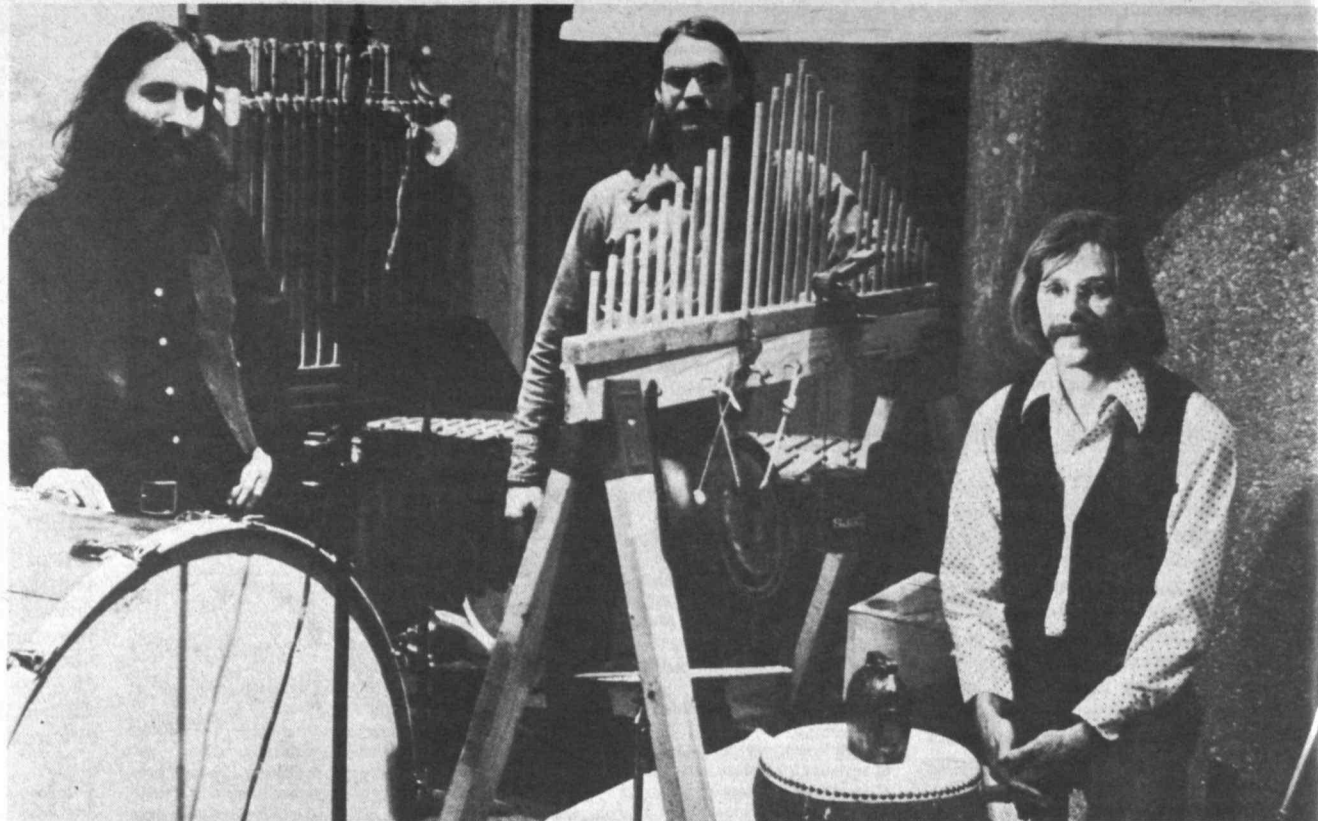
Since Professor Stolzenbach became assistant professor of civil engineering in 1974, his teaching and research have centered on fluid mechanics and dynamics and measurement and modeling of physical processes in water environments. Professor Stolzenbach is a member of an interdisciplinary team which will carry out large-scale field studies on pollutants in the water environment.

A native of Washington, D.C., Professor Stolzenbach received the SB in 1966, the SM in 1968 and the PhD in 1971, all in civil engineering from MIT. He joined the Tennessee Valley Authority in 1971 where he developed a computer program for three-dimensional heated-surface discharge computations now used by government agencies and consultants engaged in nuclear power plant licensing and design.



# THE INSTITUTE CALENDAR

March 17  
through  
March 28



The Blackearth Percussion Group (above), a trio of young musicians devoted to contemporary percussion music, are shown with some of the instruments they'll use in a lecture demonstration Thursday, March 18, 1pm, and a concert that evening at 8pm

in Kresge Auditorium. Group members, all faculty artists-in-residence at Northern Illinois University, DeKalb, Ill., are (left to right) Garry Kvistad, David Johnson and Allen Otte.

## Seminars and Lectures

### Wednesday, March 17

**Mechanisms of the Human Use Committee\*** – Warren Point, MD, assistant medical director, chairman of Committee on Use of Humans as Experimental Subjects. Nutrition & Food Science Seminar. 9am, Rm E18-408.

**Oceanic Renaissance: Using the Seas to Save People\*\*** – Dean Hom, executive officer, Sea Grant Program; Douglas Carmichael, power engineering; and students. Women's League Seminar. 11am, Rm 10-340. Followed by sherry, 12:30pm, & luncheon, 1pm. Cost: \$2.25. Reservations: Mary Pinson, Rm 10-342.

**Observed Correlations Between Oceanic Internal Waves and Low Frequency Currents\*** – Barry Ruddick, WHOI. Oceanography Sack Lunch Seminar. 12n, Rm 54-311. Bring lunch, coffee available.

**Perspectives in Evaluation\*** – Karen C. Cohen, visiting lecturer, DSRE. DSRE Luncheon Seminar. 12n, Rm 20C-117. Lunch \$1.

**Nuclear Engineering Plasmas and Controlled Fusion Seminar\*** – Franklin Chang. 3pm, Rm 38-136.

**Holographic Imaging: The Second Decade\*** – Stephen A. Benton, Polaroid Corporation. Laser Applications Seminar with demonstration. 4pm, Rm 37-212.

**Crystal Structure Relationships Among Some Families Sulfides\*** – Bernhardt J. Wuensch, ceramics. Materials Science Panel Seminar. 4pm, Rm 13-5101.

**Mesozoic and Cenozoic Sea Level Changes and the Sedimentary Structure of the Continental Margin\*** – Walter Pitman, Lamont-Doherty Geological Observatory. Earth & Planetary Science Colloquium. 4pm, Rm 54-915. Tea 3:30pm, Rm 54-923.

**Evaluation of Advanced Reactor Blanket Designs\*** – J.I. Shin, G. Nuclear Engineering Seminar. 4pm, Rm NW12-222.

**Transmission of Electric Pulses in Nerve Fibers\*** – Felix Villars, physics. Undergraduate Physics Colloquium. 4:15pm, Rm 4-339. Social hour following.

### Thursday, March 18

**Far Infrared Emission by Optical Pumping of Molecules\*** – H. Fetterman, Lincoln Laboratory. Laser Spectroscopy Seminar sponsored by Laser Physics Laboratory & Spectroscopy Laboratory. 11am, Rm 10-105. Coffee 10:30am.

**Later Jurassic and Early Cretaceous Evolution of the Western Central Pacific Ocean\*** – Roger Larson, Lamont-Doherty Geological Observatory. Earth & Planetary Sciences Sack Lunch Seminar. 12n, Rm 54-611.

**Illustrated Lecture on Dams\*** – J. Laginha Serafim, president of COBA, Lisbon. Civil Engineering Constructed Facilities Division Seminar. 12n, Rm 3-270.

**Introduction to the CMSE Computation Facility: Using BASIC and FORTRAN IV on the PDP 11/40\*** – Joe Driear, G. CMSE Computation Facility Seminar. 12n, Rm 13-5101.

**Manufacture and Properties of Hydrothermally Hardened Sand-Lime Lightweight Concrete Blocks\*** – Anders Henriksen, G. Materials Science & Engineering Ceramics Seminar. 1pm, Rm 3-464.

**Optical Wavefront Correction in Real Time\*** – V.N. Mahajan, C.S. Draper Laboratory. EE & CS Optics Seminar. 2pm, 36-428.

**Inter-Materials Competition-Economic Effects and Policy Implications\*** – Joel Clark, materials systems. Materials Resource Policy Seminar. 3pm, Rm 13-5101.

**Regulation of Purine Salvage Pathways in Human Cells in Culture\*** – Mary Jane Carey Holland, MD, Division of Human Genetics, New York University Medical Center. Nutrition & Food Science Seminar. 4pm, Rm 16-134.

**Computer Systems for Advanced System Control and Data Acquisition\*** – Martin S. Ewing, Owens Valley Radio Observatory, California Institute of Technology. HST Biomedical Engineering Center for Clinical Instrumentation Program Seminar. 4pm, Rm 36-428.

**Approaches Toward Carbohydrate Sequencing\*** – Gail Hudson, G. Analytical Chemistry Seminar. 4pm, Rm 8-105.

**Modern Biology and the Human Imperative\*\*** – Everett Mendelsohn, history of science, Harvard University. Humanities Lecture. 4pm, Rm 9-150.

**Pressure Measurement in Porous Media\*** – Ananda Wijesinghe, G. Mechanical Engineering Thermal-Fluids Seminar. 4pm, Rm 5-234. Coffee 3:45pm.

**Computerized Tomography: A New Role for X-Rays in Medicine\*** – Jay Stein, American Science and Engineering, Inc. Physics Colloquium. 4:15pm, Rm 26-100. Refreshments 3:45pm, Rm 26-110.

**Marine Mammals in Biomedical Research\*** – Dr. Sam Ridgeway, Naval Underwater Center, San Diego, Calif. Migrants in the Sea: Sharks, Whales, and Man Lecture sponsored by New England Aquarium & MIT Sea Grant Program. 7pm, NE Aquarium auditorium.

### Friday, March 19

**Degradation of Dilute Polymer Solution in Extensional Flow\*** – P. Leopairat, G. Chemical Engineering Seminar. 2pm, Rm 66-110.

**New Developments in Thermal Constriction Resistance\*** – M. Micheal Yovanovich, thermal engineering group, mechanical engineering, University of Waterloo. Mechanical Engineering Seminar. 3pm, Rm 3-133. Coffee 4pm, Rm 1-114.

**The Coalescence of Emulsions: Light Scattering from a Pair of Droplets\*** – K.G. Hellyar, G. Chemical Engineering Seminar. 3pm, Rm 66-110.

**The Congressional Budget Process and its Implications for Domestic Policy\*** – Karl Gregory, Congressional Budget Office. Community Fellows Program Lecture Series. 3:30pm, Rm 7-403.

**Radioimmunoassay Techniques with Application to Intravascular Coagulation Detection\*** – Malcolm M. Cronlund, MGH. Biomedical Applications of Radiation Seminar. 3:45pm, Rm NW12-222. Coffee 3:30pm.

**Crystal Field Effects in Dilute Magnetic Alloys\*** – A. Narath, Sandia Labs. Materials Science Colloquium. 4pm, Rm 9-150. Tea 3:30pm.

**Indian Agriculture\*** – Dharm Narain, agricultural economics, Cornell University. Sangam Lecture. 6pm, Stu Ctr Rm 473.

**Parallax: Perspectives on Photography\*** – Pete Turner, photographer. Sponsored by MIT Creative Photography Gallery & Polaroid Foundation in conjunction with Hayden Gallery exhibit. 8pm, Rm 26-100. Free.

### Monday, March 22

**Immunopathology in Aging Rodents\*** – Dr. Carel Hollander, Radiobiological Institute, Institute for Experimental Gerontology, Netherlands. Nutrition & Food Science Seminar. 1pm, Rm 16-310.

### Tuesday, March 23

**Large Commercial Systems, their Architectural and Technological Evolution\*** – Gene M. Amdahl, chairman of the board, Amdahl Corporation. Laboratory for Computer Science Distinguished Lecturer Series. 3pm, Rm 9-150. Refreshments 2:30pm.

**Our Security or the Lack of it\*** – Oliver Boileau, president, Boeing Aircraft Corporation. Seminar on Technology and International Security. 4pm, Rm E53-482.

### Wednesday, March 24

**History and Significance of Fish Protein Concentrate\*\*** – Ernst R. Pariser, advisory services officer, Sea Grant Program. Women's League Seminar. 11am, Rm 10-340. Followed by sherry, 12:30pm, & luncheon, 1pm. Cost: \$2.25. Reservation: Mary Pinson, Rm 10-342.

### Thursday, March 25

**Multistep Laser Spectroscopy in Atomic Uranium\*** – R. Solarz, Lawrence Livermore Laboratory, Berkeley, Calif. Laser Spectroscopy Seminar sponsored by Laser Physics Laboratory and Spectroscopy Laboratory. 11am, Rm 10-105. Coffee 10:30am.

**DNA Repair in Various Cell Lines and Human Fibroblast Strains\*** – Dr. James D. Yager, Jr., biological sciences, Dartmouth College. Nutrition & Food Science Seminar. 4pm, Rm 16-134.

**Distribution, Abundance, and Migration of Sharks in the Western North Atlantic\*** – Jack Casey, National Marine Fisheries Service, Narragansett, RI. Migrants in the Sea: Sharks, Whales, and Man Lecture sponsored by New England Aquarium & MIT Sea Grant Program. 7pm, NE Aquarium auditorium.

## Community Meetings

**MIT Women's Forum\*\*** – Meeting Mon, 12n, Rm 10-105 (Tues in case of holiday.) **Mon, Mar 22:** Report from members of the

Working Group on Office-Clerical Issues.

**MIT Faculty Club Dinner Dance\*\*\*** – Fri, Mar 26, 7pm-12m. Dinner served 5:30-8pm, choice of roast sirloin of beef or poached fillet of sole with lobster sauce. Dancing begins 8:30pm. Cost: \$15 couple. Reservations: x3-4896.

**Food Day** – Food Day Committee is coordinating a Benefit Dinner for the hungry Thurs, Apr 8. Theme will be "Food for All – Eating Lower on the Food Chain", and will feature international meatless dishes. Organizations needed to set up tables, help with publicity. Organizations or individuals should call Chiu-Nan Lai, coordinator, Rm 13-2062, x3-4170 or x5-7256 Dorm.

**The Wives' Discussion Group\*\*** – Led by Myra Rodrigues, social worker; Charlotte Schwartz, sociologist; & Carol Hulsizer, faculty family in residence, Ashdown. Wed, 2:15pm, Stu Ctr West Lge. Babysitting Stu Ctr Rm 473.

## Social Events

**Strat's Rat** – Sat, Mar 27, 8:30pm, Sala or Lobdell. Free, light & dark beer sold (\$.35/16 oz glass). Bottles of wine & coke also available. WTBS providing live announcer & records. College ID required.

**24 Hour Coffeehouse\*** – Enjoy relaxing conversation, piano playing, inexpensive food, candy & drinks. Open 24 hours per day, 7 days per week, Stu Ctr 2nd fl lge.

## Movies

**Far From the Madding Crowd\*\*** – Humanities Film Series. Wed, Mar 17, 7pm, Rm 54-100. Free.

**Secondary Flow\*** – Fluid Mechanics Film. Thurs, Mar 18, 4pm, Rm 33-319. Free.

**Ulysses\*\*** – Humanities Film Series. Thurs, Mar 18, 7pm, Rm 10-250. Free.

**Secrets of Women (Bergman)\*** – MIT Film Society. Fri, Mar 19, 7:30pm & 9:30pm, Rm 6-120. Admission \$1.

**Twelve Chairs\*\*** – LSC. Fri, Mar 19, 7 & 9:30pm, Rm 10-250. Admission \$.75, MIT or Wellesley ID required.

**A Big Hand for the Little Lady\*\*** – MidNite Movie. Fri, Mar 19, 12m, Sala or Lobdell. Admission free, MIT or Wellesley ID required. Bring blanket to sit on.

**Three Stooges Follies\*\*** – LSC. Sat, Mar 20, 7 & 9:30pm, Rm 26-100. Admission \$.75, MIT or Wellesley ID required.

**Roti Kapda Aur Makan\*** – Sangam movie with English subtitles. Sun, Mar 21, 2:30pm, Kresge. Admission \$.50 with MIT ID.

**Abandon Ship\*\*** – LSC. Sun, Mar 21, 6:30 & 9pm, Rm 26-100. Admission \$.75, MIT or Wellesley ID required.

**The Juggernauts\*\*** – LSC. Fri, Mar 26, 7 & 9:30pm, Rm 26-100. Admission \$.75, MIT or Wellesley ID required.

**Room at the Top\*** – MIT Film Society. Fri, Mar 26, 7:30 & 9:35pm, Rm 6-120. Admission \$1.

**Pretty Maids All in a Row\*\*** – LSC. Sat, Mar 27, 7 & 9:30pm, Rm 26-100. Admission \$.75, MIT or Wellesley ID required.

**Meet John Doe\*\*** – LSC. Sun, Mar 28, 6:30 & 9pm, Rm 26-100. Admission \$.75, MIT or Wellesley ID required.

## Lobby 7 Events

**Brattle Street Band\*** – Celebrating St. Patrick's Day. Wed, Mar 17, 12n, Bldg 7 Lobby. Free.

## Music

**Chamber Music Society Concerts\*** – Wed, 5:15pm, music library, Bldg 14E. Free. Info: x3-4892.

Organ Recital\* - Marian Ruhl. Noon Hour Concert Series. Thurs, Mar 18, 12n, Chapel. Free.

Slackearth Percussion Ensemble\* - David Johnson, Garry Kvistad and Allen Otte. Thurs, Mar 28, Kresge. Lecture/demonstration 1pm, concert 8pm. Free.

## Dance

Folk Dance Club Spring Festival\* - Workshops in Balkan dancing by Steve Murillo Sat, Mar 27, 10am-1pm & 2-5pm. Israeli workshops by Danny Vziel Sun, Mar 28, 10:30am-1pm & 2:30-5pm. Performance Sat, Mar 27, 7:30-9pm, followed by party until 12m. Admission \$1.25/session, \$5 for block of 5 if bought in advance. Prices higher for non-MIT. Info: Nina, x5-6548 Dorm or Paul, x5-6395 Dorm or come to Club events.

Folk Dance Performances\* - Performances of Irish, Scottish, Morris, Israeli and belly dancing as well as Balkan singing & music. Sponsored by Folk Dance Club. Sat, Mar 27, 7:30-9pm, Sala. Admission \$.75. Tickets available at Club events and at door.

MIT Folk Dance Club - International: Sun, 7:30-11pm, Sala. Balkan: Tues, 7:30-11pm, Stu Ctr 491. Israeli: Thurs, 7:30-11pm, Sala.

## Exhibitions

Photographic Portraits of Historic Houses in Newton, Mass\* - Rotch Library exhibit thru Fri, Mar 26 during library hours.

Photographs by Robert Arruda, Betsy uchs, Donald Grey, Georgia Litwach & Birgitta Ralston. Essays by Michael McKinnell & Jonathan Green, architecture. Documentary data by Jean Husher, Duscha Scott & George Stephen. Free.

Photographic Exhibition\* - Hayden Corridor Gallery exhibit in conjunction with lecture series, Parallax: Perspectives on Photography, cosponsored by MIT Creative Photography Gallery and Polaroid Foundation. This week's lecture: Fri, Mar 19: Pete Turner. See Seminar listings.

Center for Advanced Visual Studies\* - Works by Bart Johnson & Aljandro Sina. Tues, Mar 16-Fri, Apr 2, Bldg W11. Hours: Mon-Fri, 9am-5pm. Free.

Creative Photography Exhibit - Works by David Akiba Mon, Mar 1-Fri, Mar 26. Hours 10am-10pm, Creative Photography Gallery.

San Francisco North: Photographs of Landscape and Wooden Architecture\* - Photographs by Philip Molten. Faculty Club exhibit during March.

Helene Aylon: Paintings that Change in Time\* - Public opening Fri, Mar 12, 8pm. Exhibit Sat, Mar 13-Sat, Apr 10, Hayden Gallery. Hours: 10am-4pm, Mon-Sat.

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

MIT Historical Collections\* - Permanent exhibition Mon-Fri, 9am-5pm, Bldg N52, 2nd floor. Bicentennial Exhibits: Katharine

Dexter McCormick, '04; Vannevar Bush, '16; and Karl Taylor Compton, in Bldg 4 corridor.

Music of the Celestial Dieties\* - Music Library exhibit of manuscript facsimiles & pictures. Daily, Bldg 14E.

Hart Nautical Museum\* - Permanent exhibit of rigged merchant and naval ship models of yachts and engine models. Bicentennial exhibit: "1776-1976" - a frigate, 2 schooners, a gondola, and the Durham boat of the American Revolution. Open daily in Bldg 5, 1st floor.

## Athletics

Wednesday, March 17 - V. Rifle. Boston State, 4pm, duPont Rifle Range. Saturday, March 27 - V Pistol. Boston State, 9am, duPont Pistol Range.

Soccer Officiating\* - People interested in becoming high school of FIFA certified soccer referees should contact Tom Stagliano, x3-2433, before Fri, Apr 2.

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 Mar 24 through Apr 4 to the Calendar Editor, Room 5-111, Exy. 3-3279, before noon Friday, Mar 19.

# 200 Mile Limit Would Require Fisheries Management

Even if the US outlaws all foreign fishing within 200 miles of its coasts, domestic fishermen could easily overfish depleted offshore stocks, and will do so if effective regulations controlling entry to the fishery are not enacted, according to a study just released at MIT.

Whether through legislation re-

## Baram Authors Solar Energy Bill

Michael S. Baram, associate professor of civil engineering at MIT, is the author of a bill (H. 4316) recently introduced into the state legislature to govern and encourage the development of solar energy in Massachusetts.

Professor Baram, an attorney as well as an engineer, said the bill is "an omnibus approach in contrast to piecemeal approaches taken in other states." The bill would require state agencies to consider solar heating and cooling in buildings to be built with state funds or subject to state permits. The bill also would deal with present obstructions such as building codes, zoning limits, insurance and finance rates, restrictions on easements to light and air and other property rights issues.

cently passed by Congress, or through treaties resulting from Law of the Sea negotiations that resumed March 15, a 200-mile limit for US coastal waters will probably take effect within the next year, and many assume that exclusion of foreign fishermen under the limit will automatically solve the economic problems of America's fishing fleet.

However, Dr. John W. Devanney, III, associate professor of marine systems in the MIT Department of Ocean Engineering, the author of the Sea Grant Program study, disagrees. Professor Devanney says US control of offshore fish stocks will not restore America's rich fisheries resources without efficient management to prevent domestic overfishing. The 200-mile limit thus represents an opportunity for the US to apply hitherto ignored resource allocation principles in managing its fishing industry, he said.

In his research, funded by the National Oceanic and Atmospheric Administration's Office of Sea Grant (US Department of Commerce) and by MIT's Center for Policy Alternatives, Professor Devanney recognized that fisheries management methods would differ in their effect on national income and on the shares of this income that would go to fish

suppliers (fishermen and processors) and fish consumers.

Using economic analyses to evaluate alternative schemes, such as gear restrictions, fixed landing payments, total take restrictions and quotas, or boat-by-boat quotas or licensing, Devanney finds that competitive bidding for quotas may be the method most likely to bring about efficient exploitation of the stocks and to maximize national income.

Each scheme would encourage different levels of fishing effort, with corresponding variations in the yield of marketable fish and hence the price paid by consumers and received by the fishermen. Without

## Mazlish Book

*The Revolutionary Ascetic: Evolution of a Political Type* by Bruce Mazlish, professor of history and head of the MIT Department of Humanities, was recently published by Basic Books, Inc.

The book explores why great revolutionary leaders of modern times—Robespierre, Lenin and Mao Tse-tung, among others—have so often been ascetics and what these ascetic traits do for the revolutionary leader and his followers.

regulations, free entry to the fishery would allow any vessel to harvest the resources without limit. High levels of fishing effort would result in overfishing, consequent low yields, and correspondingly high prices, Professor Devanney said.

In such a situation, fishermen's income may not suffer from overfishing. While few fish may be landed, their price will be high, and fishermen may actually be better off than if they landed more fish at lower prices.

The major economic impact of overfishing, argues Professor Devanney, may be on the fish consumer who is forced to buy less fish at higher prices. To resolve the price conflict between fish suppliers and fish consumers, Professor Devanney says, fishing effort must be held at that level which will provide the most national income (the sum of fishermen's and fish consumers' income) realizable from the fishery. Controlled entry to the US fishery will have to be enforced in order to manage the resource in this manner.

Professor Devanney's Sea Grant research into the 200-mile limit's impact on the domestic fishing industry will continue next year. He will test his conclusions on a specific case, the George's Bank fishery off Cape Cod.

## Students Salute Expected Baby

When Rose and Paul Giordano, tutors of House Four, one of the six houses that comprise New House, announced that Rose was expecting their first child, they weren't quite sure how their students would react.

The students' reaction was definite—and positive. One particularly closeknit group of freshmen on the fifth floor, who call themselves the "Vardebedians," decided that the house should have a contest to come up with the most unusual names they could concoct for the baby. The entire house contributed ideas and money to print up the numerous posters which were distributed around the Institute Sunday night, announcing the results of the contest. The signs read, "Name Her Esmerelda" and "Name Him Neville" on—you guessed it—pink and blue paper.

The residents of House Four will have to wait until the end of July to find out if the baby is an Esmerelda or a Neville. Mrs. Giordano said that the students hope that the baby—who, according to the Vardebedians, will be an honorary member of next year's freshman class—is a boy, but, said they'd love it even if it is a girl.

## Schwartz on Panel

Dr. Brian B. Schwartz of the Francis Bitter National Magnet Laboratory served recently on the panel of judges for the 1976 science writing prize of the American Institute of Physics-United States Steel Foundation award in physics and astronomy.

Fred Golden of *Time* was selected the winner for his article "Forecast: Earthquake," which appeared in *Time* Sept. 1, 1975.

## Feld Thanks Many Helpers

Professor Bernard Feld, who suffered a heart attack in Room 26-100 Wednesday afternoon (March 10) while lecturing the junior physics subject 8.06, issued an open letter of appreciation this week to those who helped him get immediate medical assistance.

"One of the students called my distress to the attention of our demonstration technicians who promptly called the Campus Patrol," Professor Feld said. "The Patrol arrived immediately, quickly diagnosed the situation, and had me in an ambulance going to Mt. Auburn Hospital in a matter of minutes.

"I'd like to express my profound and literally heartfelt gratitude to my students, the Campus Patrol, to the young lady from the Medical Department who ministered to my needs in 26-100 and in the ambulance, and to my colleagues, without all of whose prompt and effective action I would not be writing this today."

Professor Feld is in good condition at Mt. Auburn where he is expected to remain for another two weeks.

## Nominees Sought For Sizer Award

Nominees for the Irwin Sizer Award for "the most significant improvement to MIT education," are being sought by the MIT Graduate Student Council.

The award, which carries a cash gift, was established by GSC last year as a permanent tribute to Dr. Irwin Sizer, former Dean of the Graduate School and now president of the Health Science Fund and consultant to the Resource Development Office.

Nominations are also being sought for the Graduate Student Council Award for "effective and dedicated teaching of a graduate level course." Through this award, the Council hopes to focus attention on faculty who devote increasing amounts of time and resources to improved teaching.

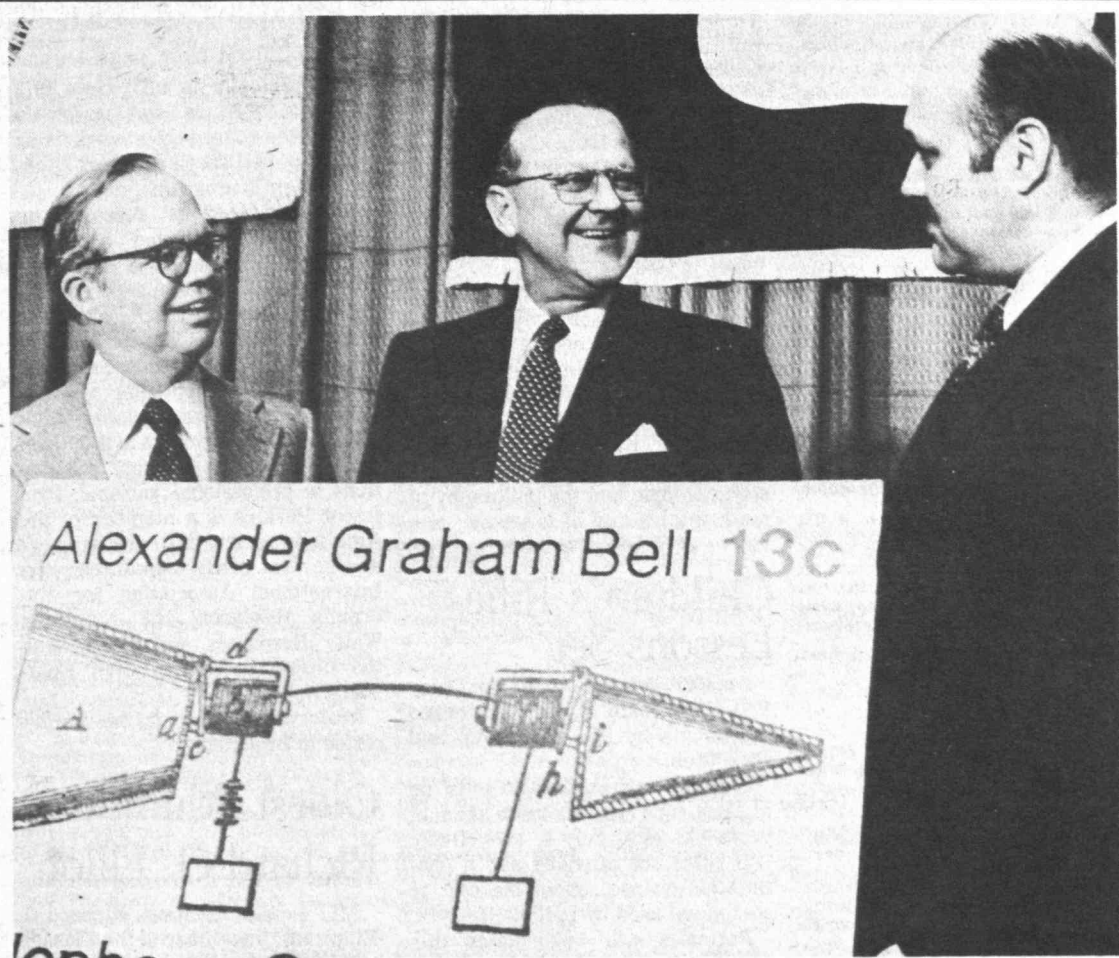
Letters of nomination for both awards—including references and supporting material—should be submitted to the Graduate Student Council Office, Room 50-110, by April 20 at the latest.

## Application Help

Any employee with college-bound children who has questions about admissions and financial aid applications, may drop in at either the Admissions Office (Rm 3-108) or the Financial Aid Office (Rm 5-119).

Staff members in either office also will help potential students and their parents to reach a decision about which college to attend. It is not necessary that the student be applying to MIT.

Interested employees may call Admissions, x3-4791, or Financial Aid, x3-4971, for an appointment.



TELEPHONE CENTENNIAL STAMP ISSUED—A 13-cent commemorative stamp marking the 100th anniversary of the first transmission of speech over the telephone was issued by the US Postal Service Wednesday (March 10). Participating in first day of issue ceremonies at MIT were (left to right) Howard W. Johnson, chairman of the MIT Corporation; John D. deButts, chairman of the board of the American Telephone and Telegraph Co., and Postmaster General Benjamin F. Bailar. Ceremonies were held at MIT as part of a two-day (March 9-10) Convocation on Com-

munications in Celebration of the Centennial of the Telephone co-sponsored by AT&T and MIT. The event marked by the ceremonies occurred March 10, 1876, when Alexander Graham Bell, working in a laboratory at 5 Exeter Pl., Boston, spoke via telephone to an assistant, Thomas D. Watson, located in another room. Bell, a professor of vocal physiology at Boston University, gave many of his early "telephony" lectures and demonstrations at MIT. Among those attending the stamp ceremonies in Cambridge Wednesday were descendants of both Mr. Bell and Mr. Watson.



## Tennis Lottery To Assign Places

Students for fourth quarter intermediate tennis classes will be selected a new way—by lottery—the Department of Physical Education has announced.

The lottery, limited to undergraduate and graduate students, is an attempt to deal fairly with the increasing number of student tennis enthusiasts.

All students interested in taking intermediate tennis should have good command of the games' basic strokes and the ability to execute them when playing. Beginners and near beginners should register for beginning tennis.

To participate in the lottery, students should pre-register in person by Friday, March 26, at the Physical Education Office (W32-135) for one of the following six sections:

Section 1: Monday and Wednesdays, 11am-12noon; Section 2: Monday and Wednesday, 1-2pm; Section 3: Monday and Wednesday, 2-3pm; Section 4: Tuesday and Thursday, 11am-12 noon; Section 5: Tuesday and Thursday, 1-2pm; Section 6: Tuesday and Thursday, 2-3pm.

Each section is limited to 14 students.

The drawing, by section, will be held Monday morning, March 29.

All students in the lottery must check in with instructor Manny Weiss during regular registration hours on Monday, March 29, from 11am-12 noon or from 1-3pm. Class positions not confirmed that day will be open for general registration on Tuesday, March 30, from 11am-12 noon and from 1-3pm.

## Spring Vacation Dining Hours

### Stratton Center

Saturday - March 20, 1976	Lobdell Dining Hall Twenty Chimneys	Closed 8:00 a.m. to 7:00 p.m.
Sunday - March 21, 1976	Lobdell Dining Hall Twenty Chimneys	Closed 9:00 a.m. to 7:00 p.m.
Monday - March 22 through Friday March 26	Lobdell Dining Hall Twenty Chimneys	7:15 a.m. to 7:00 p.m. Closed
Saturday - March 27, 1976	Lobdell Dining Hall Twenty Chimneys	Closed 8:00 a.m. to 7:00 p.m.
Sunday - March 28, 1976	Lobdell Dining Hall Twenty Chimneys	Closed 9:00 a.m. to 1:00 a.m.

### Walker Memorial

Monday - March 22 through Friday March 26	Morss Hall	9:00 a.m. to 2:00 p.m.
Friday - March 19 through Saturday March 27	Prichett Lounge	Closed
Sunday - March 28	Prichett Lounge	12 Noon to 12 Midnight

All dining facilities will resume normal schedule on Monday - March 28, 1976. Last meal for board plan is dinner on Friday - March 19 and will resume on Monday - March 29, 1976.

## Employee's Son Is Sophomore at MIT

(Continued from page 1)  
pediatric surgical unit of Tufts Medical Center.

He estimates that in addition to the \$2200 room-and-board fees, there are books, materials, health service costs and clothes which cost him about another \$900 per year.

"The fact that college is not such a burden to my parents has had a lot to do with my decision to experiment with other courses I might not have tried," Richard reports. "For instance, I'm trying out an introductory civil engineering course this term just to see how I perform. I may even decide to earn two degrees in five years—which could only enhance my chances for medical school."

According to Mr. MacKinnon, his son showed the same determination in applying to college two years ago.

"He took the SAT tests five times just to see if he could bring his marks closer to the MIT standards he had been taught to respect. The credit all belongs to him, but I'm still pretty proud when they tell me in Physical Plant how lucky I am to have a future doctor—with an MIT degree—in the family."

Other hourly, exempt and bi-weekly employees with children attending MIT include Mrs. Frances Chen, a scientific programmer at Lincoln Laboratory for the past six years and the mother of Leon, a freshman, and Elizabeth, a candidate for the SM degree at the Sloan School of Management; Sabet M. Mangoubi, a book checker in the MIT libraries, whose son is Rami Mangoubi; Franklin Payne, an hourly worker in Building 13 and the father of Cheryl; the late William S. Schwabe, whose son Edmund is an undergraduate; and William Strovink, an hourly employee in the Department of Biology



MIT HOCKEY RINK is the usual meeting place for John MacKinnon (left) of the Physical Plant Department and son Richard, a sophomore in biology at MIT. The late afternoon meetings—between Mr. MacKinnon's 4pm-midnight shift as an air-conditioning mechanic and Richard's varsity hockey practice—are times for catching up on family matters, scholastic performance and weekend plans.

and father of Eric Strovink.

Those with graduate student sons and daughters, who receive half tuition grants for up to three years' work, are: Mary E. Ciccolo of the Laboratory for Nuclear Science and mother of Arthur Ciccolo; Costas

Constantinidis, a physical plant employee with a daughter Maria; Yenking Kan Wang, payroll clerk and the mother of Yi Ming Wang; and Leova B. Wolf of the Department of Urban Studies and Planning, whose son is Mark Wolf.

planning; direct Committee work. Engineering degree, a broad technical, scientific background with extensive technical management experience, proven writing and speaking skills required. A Management Degree (or comparable experience) also necessary. D76-34 (3/17).

**Academic Staff, Systems Analyst/Senior Systems Analyst** to be responsible for all aspects of Medical Department computer system: plan and define objectives and requirements; design, implement and document programs; maintain security of confidential data base; prepare and monitor budgets; act as liaison with departmental staff. Bachelors degree, extensive systems analysis, PLI programming and other computer related activities required. Familiarity with the Transactions Processing System (TPS) preferred. C76-3 (3/17).

**Sponsored Research Staff, Energy Analyst** to work with data from New England Management Information Systems and other sources; guide and direct students in NEEMITS projects; estimate, design and execute projects to answer specific questions (data collection, computer use, standard package program development). Write user guides and instruct users in use of models and package programs; write reports; assist in interpretation of analytical results. Masters or PhD in economics plus 2 years working experience as economist required. Familiarity with N.E. regional energy situation, with N.E. state government operations, particularly energy-related operations desirable. D76-28 (3/10).

**Exempt, Nurse Practitioner or Physician Assistant** in Medical Department Off-Hours Clinic: Duties include treatment of episodic illness, preventative health care, initiation of screening and diagnostic evaluation of patients. Mass. Registered Nurse who has completed an Adult or Family Nurse Practitioner Program or Physician Assistant Program, and has a minimum of 2 years nursing experience, preferably in Ambulatory care and/or Emergency Room, required. Schedule: 4pm-12m weekdays, with an occasional day shift; rotate 8am-4pm or 4pm-12m weekend and holiday shift. E76-7 (3/17).

**Exempt, Programmer/Computer Operator Supervisor**, to supervise students in Center for Space Research. Will be responsible for acquisition of quick-look data, received by NOVA mini-computer from the SAS-C X-ray astronomy satellite. Will also organize tape library, set up computer catalogue routines, maintain summary of satellite aspect history. Must have good organizational/supervisory skills plus ability to work under pressure. Experience with X-ray satellite data acquisition highly desirable. E76-6 (3/10).

**Secretary IV** to several Mechanical Engineering Faculty members will type varied material; arrange travel, appointments, coffee seminars; maintain accounts; excellent typing, basic book-keeping skills, shorthand and/or machine dictation skill, ability to interact well with people required. B76-93 (3/17).

**Editorial Secretary IV, temporary**, in Nutrition and Food Science to assist in the editing of scientific manuscripts. Will type technical material consisting of tables, scientific terminology (few equations). Requires good typing, grammatical skills. Familiarity with chemistry and biology helpful. Will be

trained to use MT/ST machine. Position will be for 3 months with possible extension up to 6 mos. B76-99 (3/17).

**Secretary IV** in Resource Development's Leadership Campaign Office to provide general support: arrange appointments; travel; compose correspondence; type from machine dictation. Requires excellent typing, organizational skills; ability to set priorities and work independently. At least 2 years experience necessary. College background plus MIT experience preferred. B76-100 (3/17).

**Secretary IV** in Medical Department Psychiatry Service. Will perform secretarial duties for two psychiatrists and some shared responsibilities with other secretaries. Responsible job in busy and stimulating office with emphasis on personal and telephone contacts. Sensitivity and good judgement in dealing with confidential matters, careful attention to detail, good typing skill required. Secretarial experience and/or College training preferred. Knowledge of Key punching desirable but not essential. Hours: 8:30am to 5:00pm, B76-14 (3/17).

**Secretary IV** in Nutrition and Food Science to type scientific manuscripts, correspondence; arrange travel for large research group; prepare purchase orders and other documents. At least 1 year's secretarial experience, excellent typing required. Knowledge of biological and/or chemical terminology, shorthand skill helpful. B76-104 (3/17).

**Secretary IV** to Treasurer, MIT Development Foundation which is involved in the starting of enterprises to commercialize new technologies: type varied material including some tabular data; answer phones; file; schedule appointments; maintain financial records. Two years secretarial experience, familiarity with dictating equipment, facility with English grammar required. B76-90 (3/10).

**Secretary III-IV** in Research Laboratory of Electronics to faculty members and research staff. Will perform general secretarial duties including technical typing of reports and proposals. B76-102 (3/17).

**Secretary III-IV** to two faculty members in Electrical Engineering and Computer Science Department will type course material (including technical typing), reports, proposals; arrange appointments, travel. Requires technical typing skills, initiative, ability to work without supervision. B76-97 (3/17).

**Library Gen. Asst. III** in Dewey Library to assist in charging, receiving, library materials; maintain circulation records and statistics; train and supervise student assistants; may assist in other library duties, as required. Position may include some evening, holiday, week end work on pre-scheduled basis. Ability to deal effectively with the public, to understand and enforce regulations, some typing skill required. B76-92 (3/17).

**Sr. Clerk IV** in the Comptrollers Accounting Benefits Office: type letters, forms; act as receptionist; prepare benefits billing; assist in payroll distribution and other functions of the office. Minimum of two years office experience, accuracy with figures, typing and telephone skill required. Familiarity with computerized systems (input and output) desirable. B76-91 (3/10).

**Key punch Operator III** in Medical Department will assist Systems analyst with all phases of patient contact data processing system. Previous experience on IBM 129 Key puncher and Verifier, ability to work effectively with minimal supervision required. B76-95 (3/17).

**Clerk III** at the MIT Press will act as receptionist: answer phone inquiries independently, or refer to others; receive and direct visitors; process phone orders for books; receive and process a large volume of incoming mail. High school graduate, or equivalent, some secretarial school training, experience in dealing with public required. B76-94 (3/17).

**Clerk Typist III** in MIT Development Office to perform duties relating to fund-raising efforts of the Institute: filing; updating of files; typing—all in support of Development Office Analysts, strong organizational skills, accuracy with English grammar, good typing required. B76-103 (3/17).

**Sr. Clk. Typist III** for Neurosciences Research Program: type program Bulletin on IBM MTST/Electric Composer System (will be trained). Will also provide audio/visual assistance: project and copy slides; tape-record meetings; set up conference rooms; maintain files, equipment, library and journal storage. Must have good typing skills. B76-39 (1/28).

**Clerk-Typist III, part time, temporary**, in the Summer Sessions Office to assist in processing applications (type, xerox, file); prepare admissions material for participants; provide and obtain information regarding the Summer Session Program on telephone; assist in weekly registration process at 7:45am on Mondays during summer months. Position is for approximately 2 hrs. per day through 5/31/76; then will be full time, 35 hrs/wk. for an as yet undetermined amount of time. B76-89 (3/10).

**Jr. Accounting Clk. II, temporary**, in the Summer Session Office to perform varied clerical duties: handle payment receipts, purchase orders; process refunds, housing and other changes; file; post payments; type order forms, vouchers; prepare statistics. Will also help with registration: answer phones, address envelopes. Requires ability to work under pressure, deal with public. Typing and organizational skills necessary. Must be able to report to work at 7:45am every Monday throughout summer. Temp., May-August, 1976. B76-98 (3/17).

The following positions were still available at Tech Talk deadline. The date following each position is the date of the most recent Tech Talk issue in which the position was described.

**ADMINISTRATIVE STAFF:**  
A75-65, Acquisitions Editor, MIT Press (12/3)  
A75-71, Documentation Mngr., Off. of Admin. Inf. Syst. (1/7)  
A76-2, Prog. analyst, Inf. Proc. Center (2/18)  
A76-3, Industrial Liaison Officer, Ind. Liaison Prog. (3/10)  
A76-4, Systems Programmer, Inf. Proc. Center (2/25)

**BIWEEKLY:**  
B75-543, Sec. IV, Chem. Eng. (10/15)  
B75-590, Sec. III-IV, Res. Lab. of Elec. (2/4)

B76-65, Clk./Key puncher III, Physical Plant (2/25)

B76-69, Tech. Asst. V, Medical Dept. (2/25)  
B76-83, Sec. IV, Medical Dept. (3/10)

**SPONS. RES. STAFF:**  
D75-48, Economist, Energy Lab. (6/25)

D75-120, Systems Programmer, Lab. for Nuc. Sci. (11/26) D75-161, Economist/Policy analyst, energy Lab. (9/10)

D75-167, end-use technology, energy Lab. (9/10)

D75-219, continuing education, Chemical eng. (11/5)

D75-229, Research Engineer, Energy Lab. (11/19)

D75-232, Programmer, Center for Space Research (11/26)

D75-243, postdoc. res., computer science, Artificial Intell. Lab. (1/7)

D75-244, postdoc. res., computer science, Artificial Intell. Lab. (1/7)

D75-249, postdoc. res., physics, Lab. for Nuclear Sci. (1/14)

D75-250, postdoc. res., physics, Lab. for Nuclear Sci. (1/14)

D76-7, Project Coordinator, Energy Lab. (1/28)

D76-12, postdoc. res., National Magnet Lab. (2/18)

D76-14, Tech. Asst., Arteriosclerosis Center (2/18)

D76-17, Biochemist, Res. Lab. Elec. (2/25)

D76-18, postdoc. res., Lab. for Nuclear Sci. (3/3)

D76-19, postdoc. res., Lab. for Nuclear Sci. (3/3)

D76-21, Data Analyst, Energy Lab. (3/3)

D76-22, Laser Physicist, National Magnet Lab. (3/3)

D76-23, Programmer, Lab. for Comp. Sci. (3/10)

D76-24, Programmer, Artificial Intell. Lab. (3/10)

D76-25, Asst. Proj. Dir., Joint Ctr. Urban Stud. (e/10)

**HOURLY:**  
H75-55, Tech. B., Lab. for Nuclear Sci. (6/25)

H75-117, Tech. B., Radioactivity Center (10/15)

H75-143, 2nd Cl. Eng. (10/15)

H76-20, Cook, Endicott House, Dedham (2/25)

The following position have been FILLED since the last issue of TECH TALK:

B76-39 Sr. Clk. Typist III

B75-253 Spons. Res. Staff

B76-30 Sec. IV

D75-113 Spons. Res. Staff (Cancel)

B76-79 Sr. Lib. Asst. IV

B76-48 Sr. Clk. IV

H75-172 Tech. A

A75-63 Admin. Staff

E76-2 Nurse

B76-88 Clk. II p.t.

B76-87 Lib. Asst. III p.t.

A75-60 Sys. analyst (Cancel)

B76-47 Sec. IV

B76-81 Cashier

B76-66 Admin Asst. VB76-75

B76-78 Sr. Clk. III

A75-67 Acquisition Editor

D75-107 DSR Staff (Cancel)

B76-84 Sr. Lib. Asst. IV

The following positions are on HOLD pending final decision:

B76-84 Sr. Lib. Asst. IV

A76-1 Admin. Staff

C75-35 Tech. Asst.

A75-56 Admin. Staff

## POSITIONS AVAILABLE

This list includes all non-academic jobs currently available on the MIT campus. Duplicate lists are posted on the women's kiosk in Building 7, outside the offices of Special Assistants for Women and Work (10-215), and Minority Affairs (10-211), and in the Personnel Office (E 19-239). Personnel interviewers will refer any qualified applicants on all biweekly jobs Grades II-IV as soon as possible after their receipt in Personnel. Persons who are not MIT employees should call the Personnel Office on extension 3-4251.

Employees at the Institute should continue to contact their Personnel Officers to apply for positions for which they feel they qualify.

**Dick Higham** 3-4278  
**Pat Williams** 3-1594  
**Carolyn Scheer** 3-1595  
(secretary — Dixie Chin)

**Virginia Bishop** 3-1591  
**Mike Parr** 3-4266  
**Ken Hewitt** 3-4267  
(secretary — Joy Dukowitz)

**Sally Hansen** 3-4275  
**Lewis Redding** 3-2928  
**Richard Cerrato** 3-4269  
(secretary — Susan Bracht)

**Sponsored Research Staff, Staff Scientist**, in the Neurosciences Research Program to work on conceptual problems at various levels of brain research (molecular, cellular, neural, behavioral). PhD and sufficient related research experience to be able to critically evaluate scientific literature required. Applicants should have strong capability for creative conceptualizations and theoretical work. Appointment (beginning 7/1/76) is for 1 year but may be extended. D76-30, 31, 32. (3/17).

**Sponsored Research Staff, Computational Physicist**, in Research Laboratory of Electronics to develop numerical analysis of problems in experimental and theoretical programs in plasma physics. PhD in Physics with good knowledge of main theoretical methods in plasma physics, excellent familiarity with use of computers to solve complex and analytical problems required. D76-33 93/17).

**Sponsored Research Staff, Project Coordinator** to work with Director of the Energy Laboratory. Duties include acting as liaison between Program Directors and Faculty Coordinators, contact with contracting agencies and industry. Coordination of report preparation, and of technical planning of new projects; assist Director in technical management and long-range

# Employment Q & A

**Q:** Twice a year now, Biweekly employees utilize a semi-annual performance evaluation form to initiate a discussion between themselves and their supervisor. I prefer to talk to my supervisor on a more informal basis and find the forms distasteful. Does an employee have the option to forego this formalized procedure if he/she prefers?

**A:** During the period preceding a semi-annual performance evaluation for Biweekly employees each Administrative Officer (or designate) is asked to give each eligible Biweekly employee the choice between the two communication forms (Form A or Form B). The forms themselves were designed to facilitate an open discussion between Biweekly employees and their supervisors and to provide an opportunity for discussion at least twice a year. The formal review periods are not intended to replace informal discussion between employees and supervisors which ideally would occur on a continuing basis.

It should be stressed that the forms were conceived to promote open discussion, not to act as a barrier in any way. Therefore, the forms themselves need not be used at all at the option of the employee if he/she is uncomfortable using them. If neither of the forms is to be used, one set of forms should be signed by both the supervisor and the Biweekly employee to indicate the opportunity for their utilization existed at the time of the review.

**Q:** If a member of my family is hospitalized and uses blood, how do I get it replaced by MIT?

**A:** Because the record of the Institute employees as donors to the Red Cross Blood Bank has been outstanding, the Red Cross will supply blood when available to you or to a member of your immediate family. The Red Cross does not charge MIT employees or students for the blood, although a hospital may charge for administering transfusions.

You are invited and encouraged to give blood during the Institute's blood drives to help maintain the Institute's past superior record. However, you may still receive blood even if you are not able to donate. To arrange for blood transfers, call Norma Loomis at the Medical Department, x3-4371. At Lincoln Laboratory, contact Phyllis Giusti, First Aid Room, x7156.

**Q:** What involvement did the Working Group on Office/Clerical Issues have in planning this year's Biweekly Review procedures, if any?

**A:** The basic features of this year's Biweekly Review were set by the Working Group's recommendations last year, as modified by the evaluation conducted by the Working Group following last year's review.

Those features were: (1) publication of the funds available for the review; (2) incorporation of general and merit components into the Review Salary Increase; (3) equal access by Biweekly personnel and supervisors to information; and (4) encouragement of discussions about the job and individual performance.

As a result of opinions expressed in last year's evaluation, the Working Group recommended a formula calling for a greater amount for merit than for general increases.

Prior to the Review this year, the entire Working Group on Office/Clerical Issues met twice with representatives of the Personnel Office to discuss plans for the current Review resulting in decisions to continue the basic format and communications procedures this year. The Performance Evaluation Task Group, a subgroup of the Working Group, held additional meetings to make suggestions for modifications of the 1976 Review. Their recommendations included making provision for increases to be expressed in amounts less than whole dollars, and the Review instructions permitted this option. They also recommended general guidelines for evaluating an employee's performance. These were specifically reviewed and approved by the entire Working Group and included in John Wynne's memo of Review Instructions of February 9, 1976.

The Working Group did not decide the sliding scale by which the budget allocations were made and which resulted in allocations ranging from 6.2% at the higher end of the Biweekly scale to 9.8% at the lower end. While the Working Group was informed in advance of the sliding scale, the decision to adopt it was part of the total plan for salary administration for MIT this year, which was influenced by the sharp drop in inflation to an annual rate of under 7% for 1975 and by the constraints of the Institute's financial position.

# Mining in Space Possible

(Continued from page 1)  
asteroids, Professor McCord said, would be to choose a metal-rich asteroid about one kilometer in diameter, attach to it some impulse-generating device (a rocket, a nuclear impulse device, etc.) and gradually move the asteroid to an orbit closer to earth.

The trip might take about 450 days; one could coordinate it with the motions of the earth and the moon, to take advantage of gravitational attraction.

Once near the earth, hunks of the asteroid would be melted down to ingots. The "furnace" used could be heated by light from the sun.

The next problem would be to safely transport the metal to earth. One technique, Professor McCord said, would be to inject the material with gas and let it cool rapidly, to create a kind of foam.

This "foam" would be like the pumice created by volcanoes, Professor McCord said. It would be extremely light but not mushy or sponge-like: a solid mass filled with the shells of bubbles, from which the gas escaped.

This material could be shaped into a vehicle that could be glided into the atmosphere and directed to a specific landing site in the ocean.

Such an operation could involve a score of space workers, or self-sustained colonies of thousands of miners, Professor McCord said.

Supplies of metals that could be

obtained this way are so plentiful that one problem would be to avoid flooding the market, he said.

He and Dr. Gaffey have calculated that one cubic kilometer of nickel-iron from an asteroid could supply the earth with enough iron for 15 years, and enough nickel for 1,250 years, as well as plentiful amounts of cobalt and copper.

At current prices, the gross value of such a haul would be about five trillion dollars, or about five times the US gross national product.

"It should be apparent," they said, "that such a return cannot be realized in an actual market place, since the supply would far exceed the demand."

But they estimate that if 650,000 metric tons of iron and 135,000 metric tons of nickel were delivered to earth each day, the annual supply would be worth at least 140 billion dollars.

Other gains would not be simply financial, they say: an abundant supply of metals from space would safeguard our standard of living, and would eliminate the need for mining techniques that are increasingly destructive to the environment.

In addition, limitless supplies of the metals would eliminate international competition over scarce resources, which are perhaps located in only a few places.

Moreover, they say, it may be possible to extend such an operation to mining other materials, such as carbon compounds (for fuel), which are abundant on some asteroids, and titanium, which exists in the lunar soil.

# Lincoln Satellites Launched

(Continued from page 1)  
another toward positions suitable for subsequent satellite-to-satellite crosslink communication experiments. Finally, the many electronic communication and control subsystems aboard the satellites must be activated and their performance evaluated and monitored.

Orientation and stabilization were accomplished within about an hour and other activities are well underway with very encouraging initial results.

Lincoln Experimental Satellites LES-8 and LES-9 are a pair of experimental communications satellites designed and built for the Air Force by the MIT Lincoln Laboratory in Lexington, Massachusetts. LES-8 and -9 are designed to operate in near-synchronous orbit and to communicate crosslink from satellite to satellite as well as with surface terminals. Each satellite weighs about 1000 pounds and has an overall length of about 10 feet.

At synchronous-orbit altitude, each satellite has a ground-visibility area about 8000 miles in diameter. With crosslink communication between the satellites, which may be spaced thousands of miles apart, a single pair of satellites could provide communications among terminals anywhere in an area covering more than 3/4 of the surface of the earth.

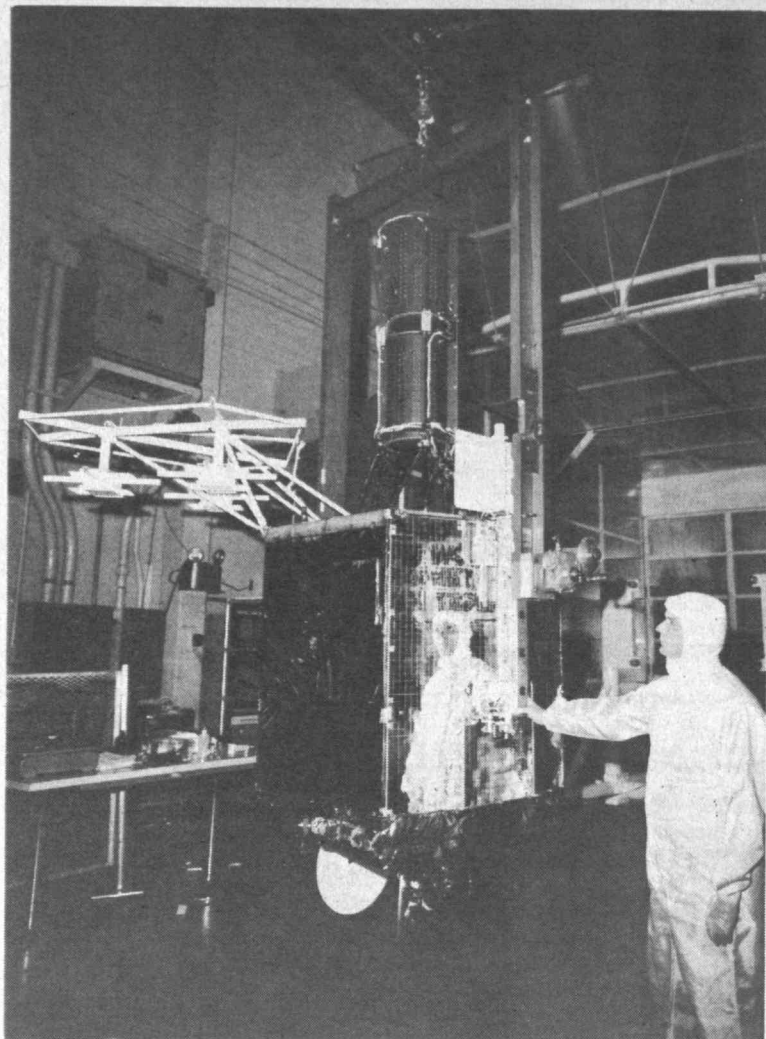
LES-8 and -9 are designed for use by small, mobile terminals as well as by transportable or fixed ground terminals. Associated surface terminals—to demonstrate communications among ground terminals, aircraft, and ships at sea—are being designed and constructed by Lincoln Laboratory for use with the satellites.

Three-axis stabilization systems keep one end of each satellite pointed at the earth and a crosslink antenna system pointed at the other satellite. The orientation of each satellite is maintained by a momentum wheel that operates like a big gyroscope, in combination with attitude-control thrusters to adjust or change the orientation of the satellite body.

In addition, each satellite carries a single-axis gyroscopic experiment developed for the Air Force by the Charles Stark Draper Laboratory of Cambridge, Mass. This experiment could lead to highly stable, long-lifetime, completely self-contained attitude-control systems for future satellites.

Crosslink communications are at K-band frequencies considerably higher than any previously employed for satellite communication. Up- and down-link communications are at K-band and in the military UHF band (225 to 400 MHz).

LES-8 and -9 have also been designed to demonstrate and evaluate techniques to help satellites survive and continue dependable operation in a hostile environment. Electric power is provided by radioisotope thermoelectric generators (RTGs) rather than by solar cells, which are particularly susceptible to radiation damage, and electronic components are carefully shielded against radia-



LINCOLN EXPERIMENTAL SATELLITE LES-8 ready to be hoisted up and mounted on the payload support structure in preparation for launch. This is one of a pair of spacecraft (LES-8 and LES-9) designed and built by the MIT Lincoln Laboratory in Lexington, Mass., for the US Air Force to demonstrate and evaluate new techniques for military satellite communications. At the bottom of the spacecraft in this photo is the K-band crosslink antenna system that can relay messages from one satellite to the other. At the top is a pair of radioisotope thermoelectric generators (RTGs) that supply electrical power for the spacecraft. (The shiny checkerboard panels are not solar cells; they are thermal control panels, to radiate off into space excess heat generated in the electrical circuits inside the body of the satellite.) The white structure at the upper left is the UHF-band dipole array, one of several antennas for communication with earth-terminals, including aircraft in flight. Shown with LES-8 is Thomas N. Farrell, Lincoln Group 72.

tion. Signal processing circuits aboard the satellites are designed to resist electronic jamming.

Development and construction of the LES satellites is sponsored by the US Air Force; experimental prototype terminals are being developed for the Air Force and for the Navy.

LES-8 and -9 and the associated terminals are elements in a continuing Space Communications Program at the MIT Lincoln Laboratory, directed at developing and demonstrating techniques and equipment that will provide new capability to meet important military communication requirements. Primary emphasis is placed on the development of improved methods for maintaining voice or digital-data circuits among a number of widely separated terminals, circuits that will continue to function dependably in the face of natural or hostile interference or other disruptive influences.

A series of Lincoln Experimental Satellites (LES) has been designed

and built by Lincoln Laboratory as a means of testing realistically, in orbit, new components and techniques developed in the Laboratory. LES-6, the most recent satellite in this series, launched in September 1968, has provided valuable service in experimental and operational functions well beyond its 5-year design lifetime. (LES-7 was partially developed but not completed because of program revision.)

As an essential complement to the satellite work, attention has been given to the development and testing of ground terminal techniques and equipment. Particular emphasis has been directed to multiple-access operation of reliable, broadband satellites by relatively small transportable and mobile terminals, in order to provide a higher degree of flexibility and resistance to physical attack than can readily be achieved with large, fixed terminals.

## SOLRAD Also Aboard Launch

Launched aboard the same rocket with LES-8 and LES-9 were two Naval Research Laboratory satellites, SOLRAD 11A and 11B, carrying instruments for more than 20 studies of solar phenomena.

Among the SOLRAD instruments are instruments designed and built at MIT to study the solar wind, a dilute flood of charged particles escaping from the sun at speeds of a million miles an hour.

The instruments were designed in part by a group of former undergraduates, under the direction of Dr. Alan Lazarus, senior research scientist in the Department of Physics and the MIT Center for Space Research. Dr. James Roberge, associate professor of electrical engineering, directed the electronics design and Daniel H. Galvin, Jr., of the Center's Laboratory for Space Experiments directed mechanical design and construction.

A more complete account of the experiment appeared in the March 3 issue of *Tech Talk*.

Dr. Lazarus said that the instruments would be turned on about a week after the launch.

# Lactose Test Questioned

(Continued from page 1)  
and loose stools may occur.

But the standard method of determining lactose intolerance has been to determine blood glucose levels of children given test doses of lactose.

These blood glucose tests showed that lactose intolerance existed in many of the black children studied: 11 percent of those four to five years old, 50 percent of those six to seven years old, and 72 percent of those eight to nine years old.

But when the same children drank an eight-ounce glass of milk, no adverse reactions were detected.

Twelve ounces of milk produced mild reactions in six percent of the black children six to seven years old, and 15 percent of the black children eight to nine years old.

Sixteen ounces of milk—half a quart—produced mild or moderate adverse reactions in eight percent of the black children four to five years old, 12 percent of those six to seven years old, and 20 percent of those eight to nine years old.

But the researchers pointed out that "all the children studied viewed the 480 ml. (16 ounce) portion of milk as an unusually large amount to

drink at one time."

None of the white children studied showed any adverse reactions to milk.

The researchers concluded that "extrapolation from results of standard lactose tolerance tests that usual quantities of milk will cause adverse symptoms, or that milk protein will not be utilized, are unjustified by most published data, and by the present findings . . ."

Milk programs for young children "need not be limited to considerations of primary lactose intolerance," they said.

Dr. Garza and Dr. Scrimshaw also found that the lactose-intolerant children did in fact drink as much milk as the lactose-tolerant children—although their parents drank less milk than parents of lactose-tolerant children.

## Sales Tax Notice

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