Massachusetts Institute of Technology

TECH TALK

March 1, 1972
Volume 16
Number 34

Blood Drive to Begin Next Week

The Red Cross Bloodmobile arrives on campus next Tuesday, March 7, for the Institute's nine-day Blood Drive in the Sala de Puerto Rico. Donors are still needed if we are to reach the goal of 2,500 pints of blood.

More than 1,000 members of the community have already filled out registration forms and they can expect to receive appointment cards within the next few days. Jay Anderson, drive chairman at Technology Community Association, reports that computer runs will be made regularly throughout the drive, so there is still time to sign up.

About 80 percent of the Institute population are eligible to donate blood, so there's no reason why we shouldn't meet this year's goal if everyone participates. It takes about 65 minutes to go through the entire donating process, including the medical screening, a hemoglobin check, taking a unit of blood, and refreshments in the canteen.

Blood is a living tissue and cannot be manufactured. It must be given. Human blood is needed every minute of every day to replace blood lost because of injury, childbirth or disease, to treat shock, burns or anemia, and to make blood components for medical research. It's surely worth an hour and a unit of blood to help keep someone alive. Most of us have about 12 pints of blood and our bodies can replenish the missing unit within 48 hours of donating.

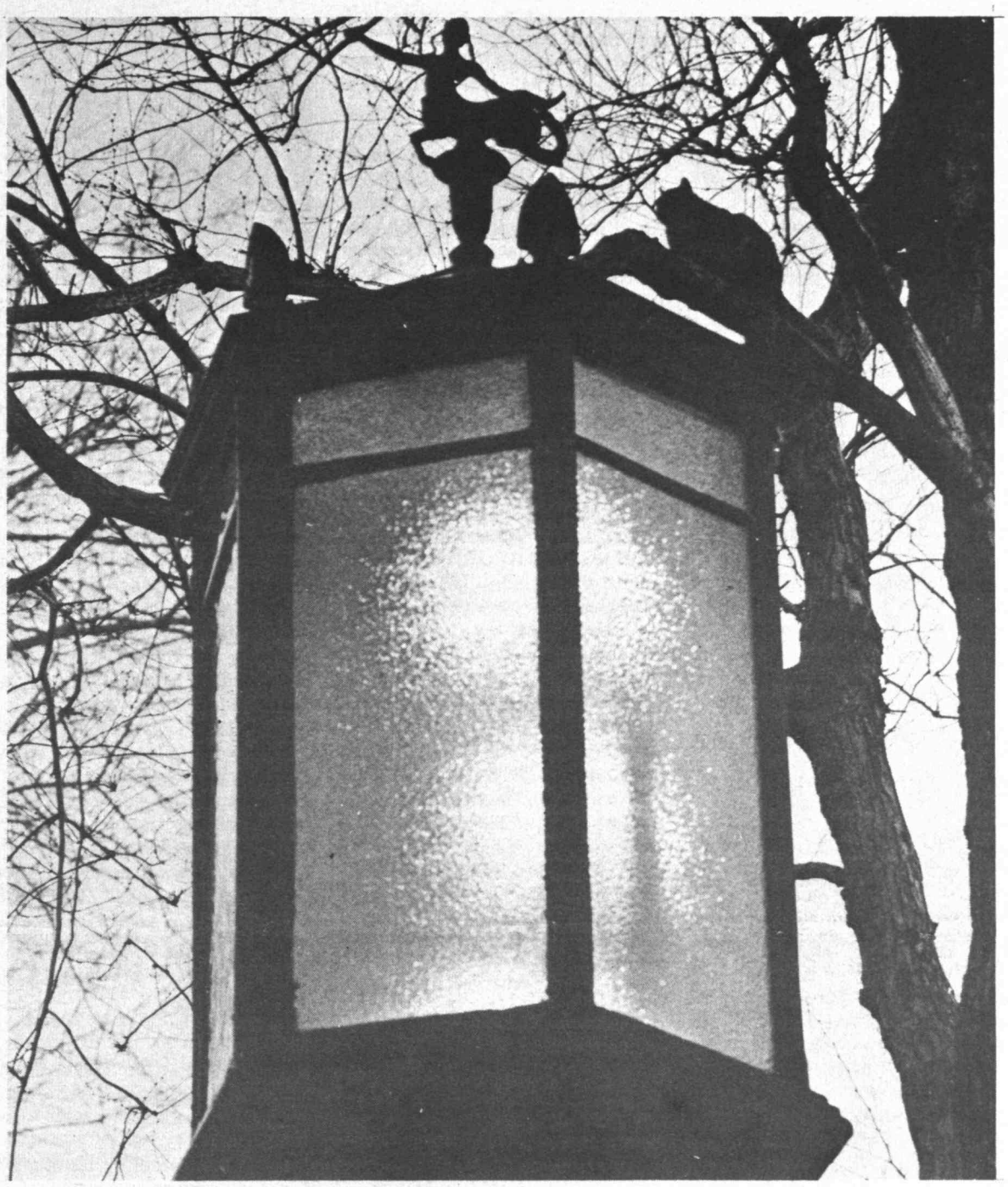
Giving blood is simple and painless. Population growth and new medical discoveries for uses of blood make donating blood everybody's business, so sign up now. Any questions about the Blood Drive should be directed to Ext. 7911.

Referral File Is Available in 5-104

The Institute offers a variety of counseling resources for the community; ranging from faculty advisors to religious counselors, psychiatrists and social workers.

One resource of particular interest is a "referral file" kept in the Office of the Dean for Student Affairs in Room 5-104. Intended for use by anyone in the community, this card file contains an extensive list of free or low-cost service agencies in the metropolitan area.

The referral file covers just about any kind of personal problem that exists. A sample listing includes: abortion, alcoholics, animals, crash pads, draft, drugs, ecology, elderly, free food, halfway houses, homophile, hotlines, legal, medical, police, pregnancy counseling, psychiatric, suicide, traveling and venereal diseases.



A squirrel (top right) finds companionship with the Centurion atop one of the lights in the Great Court.

Joint Center Study Discloses Federal Housing Inadequacies

As much as half of federal housing subsidies are siphoned off by various middlemen and never reach the poor families they are intended for.

This is the conclusion reached in a working paper released today by the Harvard-MIT Joint Center for Urban Studies. The paper, written by Bernard J. Frieden, director of the Joint Center and professor of Urban Studies and Planning at MIT, is based on a summary report prepared for a Congressional subcommittee on housing.

"Federal housing aid to low- and moderate-income families typically passes through several intermediaries before it reaches the consumer," Professor Frieden states. "To estimate the diversion of funds to the intermediaries, we obtained data on those federal programs that are used in the city of Boston. In most of these programs, we estimate that between one-fifth and one-half the total federal subsidy does not reach the residents, but goes for federal and local administrative expenses and for tax benefits to investors.

Dr. Frieden.

"Many of the defects in present housing programs result from the circuitous routes by which the subsidies reach the families for whom they are intended. These defects are serious enough to warrant Congressional attention."

Professor Frieden's paper was one of several working papers on various aspects of housing policy released by the Joint Center March 1. Others are by professors Lisa Peattie, Martin Rein, and Arthur Solomon, all of the Department of Urban Studies and Planning at MIT. Also released were three papers by three of the Department's doctoral candidates: Victor Bach, David Stern, and James Wallace. All of the papers just released are available to members of the MIT community on request from the Joint Center. The Center is also starting a series of summaries of those dealing with housing policy written by students at Harvard and MIT, and these too will be available on request at the Center.

Professor Frieden's report, which incorporates findings from a series of studies conducted by a research team in the MIT Department of Urban Studies and Planning, states that local intermediaries have other effects on federal housing programs besides absorbing allocated funds. Intermediaries influence the location of subsidized housing, he reports. "In fact, most low-income

(Continued on page 7)

Northgate Rent Raise Gets OK

MIT-affiliated tenants occupying Northgate Community Corporation apartments in Cambridge, Somerville and Arlington, and tenants in Eastgate and Westgate have been notified of rent increases to take effect April 1.

Northgate tenants holding leases, as well as Northgate tenants-at-will, will be required to pay the monthly amounts announced in July 1971 for the lease year beginning September 1, 1971.

The rent increases are consistent with the regulations of the federal Cost of Living Council as published in January 1972. The rent increases were announced by letters to MIT-affiliated Northgate tenants. The letters said in part:

"Because of the intervention of local and federal controls most of Northgate's rents are presently at levels set in the summer of 1969. Since 1969, however, Northgate's expenses have increased drastically, to the extent that Northgate is currently losing approximately $25,000 per month. Because it will be impossible for Northgate to continue to function with losses of this magnitude, each regulation, ruling and interpretation issued by federal and local authorities has been examined to determine proper ways for Northgate to charge the rents necessary to meet its expenses.

"The Regulations of the federal Cost of Living Council now in effect, specifically, Section 101.34(b) of Title 6 of the Code of Federal Regulations, exempt the rent charged for your unit from the Regulations of the federal authorities governing rent charged under Phase II of the Economic Stabilization Program. Therefore, Northgate now can charge the rent which was announced last July 30 to become effective September 1, 1971 and which was foreclosed by the President's freeze order of August 15, 1971. However, there will be no retroactive increase in rent for any period prior to April 1, 1972."

The federal exemption also applies to Eastgate and Westgate. In similar letters to the on-campus tenants of family dwelling units, rents were raised to the levels in effect at the time of the August 15 freeze.

Eastgate and Westgate provide on-campus housing for married students and for some faculty and staff. Northgate Community Corporation was created by MIT to provide off-campus housing for faculty, staff and students on a non-profit basis.

Approximately two-thirds of Northgate's 470 apartments are occupied by MIT-affiliated persons. Eastgate and Westgate provide more than 400 apartments, all of which are occupied by MIT-affiliated tenants.

Some Lines

To put no finer point on it, we know what we like. And we liked what we saw at Hayden Gallery last week when we went around to see how the installation of Sol LeWitt's show of wall drawings was coming along. Advance billing had it that the Gallery's walls had been freshly sanded and painted for Lewitt's drawings, that the drawings would not necessarily be executed by Lewitt's own hand, and that Lewitt was a "conceptual artist." In our view, all this bore looking into.

Our first look was through the Gallery's glass door. Beyond a sign saying that the Gallery was closed until the show opened February 28, we saw a lot of lines--chalked blue lines in variety and abundance covering the Gallery's walls in an array that could not quite be called a pattern. Accustomed as we have been to the eye-popping siren song of op-art and hard-edge painting, we were pleased with these lines. They were just here.

So was Sol LeWitt, as we discovered when we asked a man who was making notes at a table just inside the Gallery's main entrance where we might find the artist. "I'm he. . . him," replied Mr. LeWitt, acknowledging the fact in a pleasant voice. He was making, he explained to us, a diagram of the identity and location of each of the wall drawings. "Without knowing the idea the work resulted from," he said with an engaging smile, "the viewer is apt to think it all looks a bit like kindergarten scribblings. I'm really happy with the way the space worked out. There are just 150 possible combinations of two crossing lines in this particular system and we came within one of using them all. Exactly 149 drawings just fill the entire space. That's quite remarkable, I think. If it doesn't bother you, I'll go on diagramming while we talk because I promised to finish this today."

That struck us a restful way of doing things, and as LeWitt continued to inspect the walls and note down what he found there, we studied the matrix from which the drawings were derived. It consisted of an array of 20 numbered squares in each of which was one variation of five different kinds of lines. The first vertical row of squares contained arcs drawn from the corners, the second arcs drawn from the sides, while the remaining three rows contained straight lines, lines not straight, and broken lines. These were the only lines used in this work, Le Witt told us.

"Which one didn't make it," we asked him. "I don't know yet," Lewitt said. "We haven't quite finished getting them all on the walls, and since they were placed at random I'm not sure yet which of the remaining pairs will be left out. But I do know there's just enough wall space for 149." He went on to say that the Hayden Gallery's modular walls, which are formed from standard four-by-eight-foot panels, had made a natural background for the two-foot squares in which each pair of crossing lines were drawn.

At the far end of the Gallery, we noticed one of LeWitt's helpers, a young man in sneakers, carefully painting out a pair of lines with white paint. As the lines vanished we wondered aloud if that was to be the missing pair. "That's just a mistake we're correcting," LeWitt said. "Somehow when we were drawing the lines originally, we duplicated some and, of course, left out others. Because we put them on randomly it was perhaps a little confusing. We took them one by one out of this box." He handed us a small flat box that said "Cigaren" on one side and "Amsterdam-Micron" on the top. We opened it to peep inside and found a little snow flurry of paper bits, on each of which, we saw, there were two crossing lines.

"Why *two* lines?" we wanted to know. "I had to find a way of limiting the number of drawings," said LeWitt matter-of-factly. "You'll see from the matrix that not all of the lines will cross each other if they are placed in pairs in the squares. If you select only those that cross, it just happens that you get 150 pairs." A fast mental check showed us that if every line were paired with every other line there would be 400 pairs, and we agreed that would have been rather a lot, even for Hayden's spacious walls.

"Why *lines*?" we asked. LeWitt looked up from his diagram and stared thoughtfully at the ceiling. He is a middle-aged man of all but conspicuously unremarkable appearance, whose round and likeable face is lined only by frequent smiles. He was wearing a rough purply shirt, open at the neck, a very dark brown leather vest, and levis. After a moment, we remarked helpfully that we ourself had always thought of a line as a shortest distance between two points. "Or the longest," said LeWitt suddenly ceasing his scrutiny of the Galley's upper reaches. "It depends on which way you want to go."

"Lines," he continued, "are after all purely an invention of the mind, an idea. There are no lines in nature. Lines are human. What I was after in this show are simply some very basic kinds of line. When lines are done directly on the wall, their two-dimensionality is maintained. They don't appear as an object at all. The work, then, is an idea, not an object. It can't be moved. Either it stays in place or is obliterated. I got interested in this sort of idea for wall drawings when I was faced with an enormous wall in a show I did in Milan, when I was in Italy one summer not long ago. I just hated not to use that wall. So I figured out a system to make use of it. This show here at MIT, though, is the first one in which I've tried to use the entire available space. And it's the first that the work has filled so nicely."

We asked LeWitt how he became an artist. "It seemed to be the least destructive thing to do, of society and of myself," he replied. "Of course, I didn't know that at the time I began." He went on to say that he had gone to art school at Syracuse University, and after getting out of the Army and Korean War had done commercial art and teaching, neither of which he had liked very much, although he still teaches one course at New York University. "I noticed no one ever really starves now," he remarked, "so I just began to work. I wasn't in a hurry to show and in fact I was 35 when I had my first show, which is rather old as things go nowadays."

LeWitt thinks the New York gallery is not about art but about merchandising objects, and he was not eager to get involved in it. He does do a good many shows in other places around the country. "I'm lucky in that I can do as many shows now as I want. Even more than I want," LeWitt said with a laugh. We thought this testified well to the appeal of his work and asked him what he thought people liked about his art. "I couldn't possibly say what people like," he said in mild reproof. "If I started thinking about that, I'd be through as an artist. I'd wind up thinking about how to please people."

About those who don't like his work, LeWitt was more explicit. "A lot of people just hate it," he told us cheerfully. "They want art to be aesthetic and willful. But aesthetic art seems a kind of tyrrany to me, and aesthetic artists--Wyeth is an example--just go on painting the same work over and over again. I prefer to work systematically, allowing the idea to generate what happens. Another thing people don't like is that I don't do all the drawings myself. They still have the essentially romantic notion of the artist as a craftsman. But in conceptual art, execution is a perfunctory affair. Some of my Japanese helpers in New York happen to draw lines better than I do. The reason I'm the artist is that I thought it up."

"Shakespeare is a good example," LeWitt remarked when we mentioned that touchstone of the artistic process. "He would introduce one variation into the system--incest, say, or greed, or what have you--and then just allow events to work themselves out. The same was true in Greek tragedy, where the tragic flaw worked systematically to create the drama. As I once wrote about this sort of approach: The idea becomes the machine that makes the art."

That struck us as a good line to leave on; and we took off.

ACS Elects Prof. Wick to Food Post

Dr. Emily L. Wick, professor of food chemistry, has been elected 1972 chairman of the American Chemical Society's Division of Agriculture and Food Chemistry.

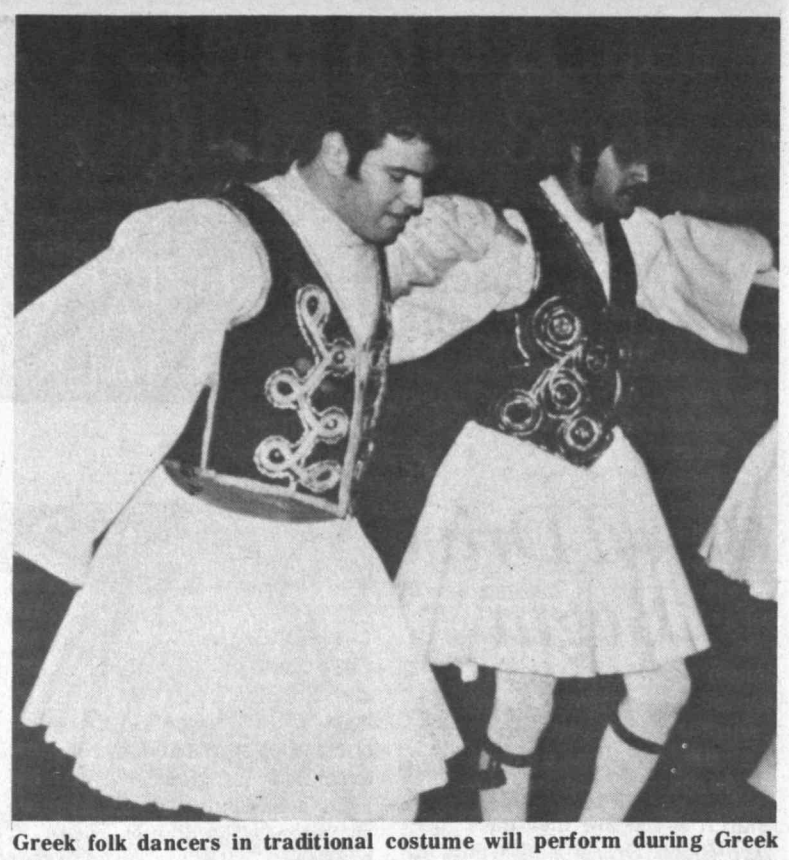
A member of the American Chemical Society since 1943, Professor Wick is a specialist in flavor chemistry, particularly the isolation and identification of trace components responsible for aroma and flavor in foods. She plans to expand her work to include studies of potentially hazardous materials in foods and foodstuffs.

Premed Meeting

Dr. Marion Mann of Howard University Medical School will meet with premedical students on Tuesday, March 7, at noon in Room 16-139.

Wilson Seeks Black Ph.D.s for Internships

Black graduate students who are within a year or two of completing their Ph.D.s and are interested in a teaching career may apply for Teaching Internships from the Woodrow Wilson National Fellowship Foundation. Details about the internships are available in the Graduate School Office, Room 3-134.



Greek folk dancers in traditional costume will perform during Greek Weekend.

Greek Weekend Brings MIT Hellenic Culture

The Hellenic Student Association will sponsor Greek Weekend Friday evening and Saturday, March 3 and 4, in Kresge and the Student Center.

The Greek students planned for an attendance of 400 at last year's Greek Night and were nearly overwhelmed when some 1,600 people turned out for an introduction to Hellenic culture. Plans for this year's event have expanded to include a wider spectrum of activities.

Movies will be offered in a double feature on Friday night. Scheduled are "Phaedra," in English with Melina Mercouri and Tony Perkins, and "Electra," in Greek with English subtitles, starring Irene Pappas. The movies begin at 7:30 in Kresge. Admission is $1.50.

On Saturday, the Sala will be the site for a Grecian bazaar of sorts, where Greek food, wine, sweets and jewelry will be available. Posters and movies will present a background of picturesque and famed scenes of Greece. Admission is free.

In Kresge on Saturday evening there will be a variety show featuring singing, folk dancing, a play, fashions and belly dancing. This will be followed by live music and dancing in Lobdell, where members of the Hellenic Student Association will be pleased to give instruction in traditional Greek folk dancing. Admission to each of these events is $1. Proceeds from Greek Weekend will go toward the establishment of a Greek Scholarship Fund.

IPC Offers Mini Courses

The Information Processing Center (IPC) is offering four short, non-credit computer courses this month.

"Job Control Language Tutorial" will provide users with a working knowledge of Job Control Language as applicable at the IPC. Programming experience in a compiler level language is required. This course will be given daily from March 13-17, at 11am. A $5 fee covers computer costs.

"The Fast FORTRAN Course" is designed for people with some knowledge of computers who want to learn the FORTRAN IV programming language. The course will include lectures, reading assignments and problems. Held daily from March 13-17 at 2pm to 3:30pm, the class will be limited to 30 persons. A $5 fee will be charged.

"Intermediate PL/ I Programming" will cover such topics as stream I/ O, record I/ O; based variable and list processing; on units, conditions and signaling; ANSI Standard PL/ I; Multics Version 2 PL/ I; and the IBM Optimizing Compiler PL/ I. This class will meet daily at 10am to 11am on March 20-24.

Advanced PL/ I Programming" will include internal PL/ I control blocks for IBM PL/ I; internal flow of control; reading core dumps; debugging; and Assembly language interfaces. The course will be held March 27-31 from 10am to 11am.

Preregistration for the four courses is required. Interested persons should see Mrs. Susan Litten in Room 39-427.

TECH TALK
Volume 16 Number 34
March 1, 1972

Editor
Joanne Miller

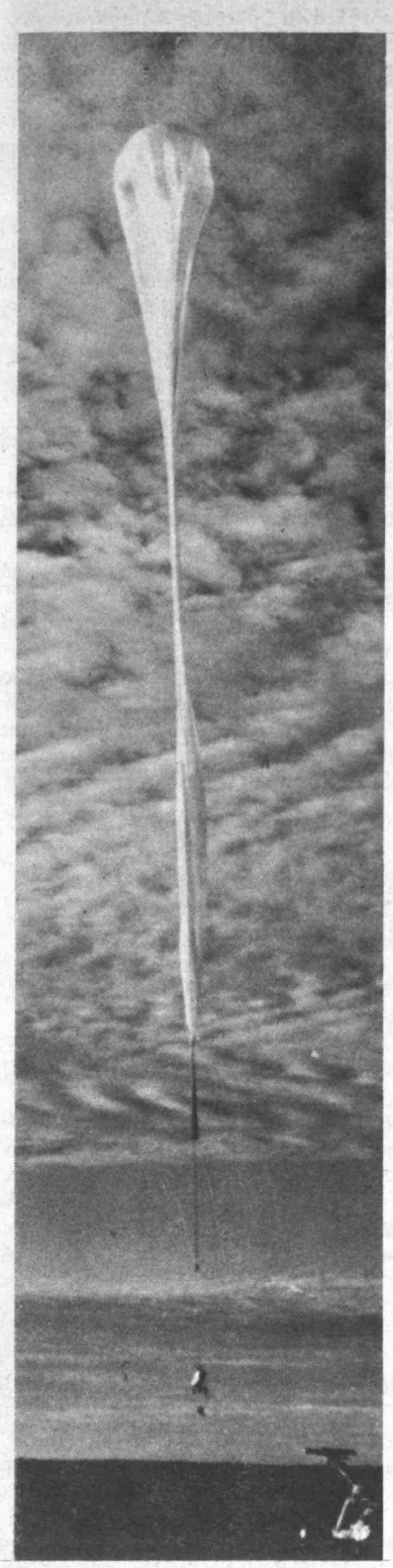
Staff
Robert M. Byers
Peter M. Close
Linda Omohundro
Ty Rabe
Peter Spackman

Business Manager
Paul E. Johnson

Tech Talk is published 50 times a year by the Institute Information Services, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, Mass. 02139, and distributed free to all members of the MIT community. Additional copies are available in the Information Center (Room 7-111) or in the News Office (Room 5-105). Large numbers of additional copies should be requested within two weeks of the issue date.

Mail subscriptions are $7.50 per year. Checks should be made payable to Bursar, MIT, and mailed to the Editor, Room 5-111, MIT, Cambridge, Mass. 02139.

Please address all news and comment to the editorial office, Room 5-111, Ext. 3277.



Balloon ascent.

X-Ray Astronomers Plan Record Balloon Launch

X-ray astronomers from MIT are enroute to a remote desert location in central Australia where, if everything works as planned, the largest balloon ever successfully flown will carry their unmanned x-ray telescope to the "top" of the earth's atmosphere for a long, leisurely look at the x-ray-rich southern sky.

At the moment of launch at ground level, the uninflated ribbon-like balloon with just a small amount of helium in the upper end will reach to a height of nearly 1,000 feet--almost as high as the Eiffel Tower in Paris. At an expected maximum float altitude of 150,000 feet, the helium will have expanded to give the inflated balloon a volume of 46.1 million cubic feet and a diameter of about 500 feet.

Purpose of the expedition is to find out--by prolonged observations of up to 30 hours or more--if a handful of strongly fluctuating x-ray sources in space already known to scientists do their flickering in a regular and periodic way.

A finding of regular periodicity would be evidence of recurring or repeating events--such as spinning--and would serve as an important clue in deducing what kinds of celestial bodies--fast rotating neutron stars, eclipsing binary star systems, black holes, etc.--are responsible for the x-ray emissions that were first discovered only slightly more than a decade ago.

Heading the MIT team is Professor Walter H. G. Lewin of Winchester, professor of physics and a staff member at the Center for Space Research. Professor Lewin has been a pioneer in the emerging field of x-ray astronomy and is a veteran of numerous balloon-borne experiments in the US and Australia. Others in his group are Dr. George Ricker of Cambridge, Dr. Jeffery McClintock of Winchester, and Michel Gerassimenko of Waltham, a graduate student, all members of the staff of the Center for Space Research.

The team is heading for Alice Springs in Australia's Northern Territory, a small settlement (population 3,000) at the foot of the McDowell mountain range in the heart of the Australian continent. Immediately to the east and south is the scorching Simpson Desert while to the west are vast stretches of forbidden territory reserved to Australia's aborigines.

Depending on where the balloon's payload lands, recovery could be adventurous, hazardous and difficult. If it comes down to the west in the Aboriginal lands, Professor Lewin and his party will have to be led in by Aborigine guides and escorts to help them avoid upsetting native customs or violating sacred taboos. If the landing site is to the east or south, the recovery team will face temperatures of up to 130 degrees and vast stretches of trackless desert.

"Ballooning can be full of excitement and surprises," Professor Lewin says.

The super giant balloon, made of polyethylene 1-200ths of an inch thick, was manufactured by Winzen Research, Inc. A slightly larger Winzen balloon, but with a skin only half as thick, was launched as an experiment at Hollomon Air Force Base, N.M., a year ago, but tore apart at 40,000 feet when caught in the riptide forces of the jet stream.

MIT scientists believe the chances that their large balloon will work as planned are only about 50 percent. For this reason, they are taking along a 36.4 million cubic foot balloon and will launch their 1,000 pound x-ray telescope with it first on or about March 20. The "smaller" balloon is in its own right a giant--equal to a 1970 launch in Australia that is so far Professor Lewin's largest--but chances of success with it are about 70 percent. By using the smaller balloon first, then recovering the telescope and launching it again with the super giant, the scientists will improve the odds that their expedition to Australia will yield some x-ray data. If the first launch goes well, the second will take place during the first or second week of April.

The launchings will be made from the Alice Springs airport and will be carried out by a crew of specialists from the Australian government's balloon-launching facility at Mildura in Northern Victoria.

Expedition sponsors are the National Aeronautics and Space Administration, The National Science Foundation and the Office of Naval Research. Two ONR observers will be on hand. Representing the balloon manufacturer, Winzen Research, Inc., will be J. R. Nelson of Minneapolis.

Still another member of the party will be Donald Brooks of the National Center for Atmospheric Research's balloon launching facility at Palestine, Texas, who will be in charge of flight terminations. Brooks is a specialist in triggering by radio command the explosive squibs that separate a balloon from its payload, permitting the payload to fall back to Earth by parachute for recovery by a ground team. In one of Professor Lewin's earlier flights from Mildura, termination mechanisms failed and the payload fell into the Tasman Sea. It washed up a year later in New Zealand, damaged and its data only partly recoverable. Brooks will try to see that this does not happen again.

Professor Lewin selected Alice Springs as the site for this series of flights because its central location in the heart of Australia will permit the balloon to remain at a float altitude gathering data for the longest possible time. From Alice Springs, the oceans are 1,000 miles southward--an unlikely direction of flight--and 1,500 miles eastward and westward.

Professor Lewin picked this time of the year for the observations to take advantage of Australia's peculiar "turn around" winds which should improve still more his chances for an extended float time. At this time of the year, and again in October the usual 100-mile-an-hour east-west winds aloft over central Australia reverse direction gradually, slowing down to speeds as slow as 10 mph at the balloon's operating altitude of 150,000 feet.

If the larger balloon reaches altitude without being sheared apart on the way and if the winds aloft are not unduly erratic, Professor Lewin believes his telescope has a chance of remaining in operation at float altitude for 30 to 40 hours before flight termination near a coast--in all probability the east coast. The longest balloon float obtained by rofessor Lewin's group so far was 17 hours with a launch in 1967 from Page, Arizona, that terminated near Columbus, Ohio.

Scientists use balloons to loft their detection equipment above most of the Earth's atmosphere. It is the atmosphere that absorbs incoming x-rays and makes x-ray astronomy from the ground impossible. At 150,000 feet, Professor Lewin's telescope will be above 99.9 percent of the atmosphere.

Balloons are not the only means, however, by which x-ray astronomers escape the blinding effects of the atmosphere. The first x-ray sources--there are now more than 125 known, many in space as seen from the southern hemisphere--were discovered with sounding rockets. These rockets rise to heights clear of the atmosphere, but remain there only for a few minutes before falling back. Since observation times are short, sounding rockets are aloft only long enough to detect the more plentiful low energy x-rays--those below 15,000 electron volts--and are not up long enough to detect the rarer high energy events up to 150,000 electron volts. It is these that Professor Lewin is after and it is these that scientists require in their efforts to explain the celestial mechanisms that generate x-ray emissions.

Professor Lewin.

Satellites are still another method of launching x-ray detectors. Only two satellites have as yet been launched with x-ray counting equipment. Professor Lewin and his group are involved in the construction of x-ray telescopes to be launched by satellites in 1973 and 1975. Until the second of these, the 12,000-pound High Energy Astrophysical Observatory (HEAO) is orbited in 1975, however. Professor Lewin says scientists likely will continue using balloons for high energy x-ray observations.

X-ray findings are a part of an array of new non-optical astronomical techniques--radio astronomy is another--that in recent years have called into question established theories about the universe. One explanation for x-ray emissions, for example, is that they could be generated when matter is pulled together by some super gravitational influence--perhaps black holes where gravitational forces become so strong no energy of any kind can escape. Still other theories suggest that x-ray emissions come from stars that spin extremely rapidly--hence the importance of measuring their periodicity.

The field of view of Professor Lewin's telescope is variable. During at least one flight it will operate with a slit-type aperture giving a field of view 13 degrees long and 1.5 degrees wide. Commanded by electronics and direction-finding devices, the telescope will be programmed to scan back and forth in the direction of several known strong x-ray sources--in the constellations Vela, Norma, Centaurus and Sagittarius--and record the direction and intensities of incoming x-ray events on special film. Observations also will be made of the Small Magellanic Clouds.

In later analysis, the recorded data will be used to pinpoint the source locations and produce a detailed profile of fluctuations in intensities.

Erratum

The date and time of "The Restless Earth" were erroneously listed in last week's Tech Talk. The documentary was shown on February 28 and will be repeated at 7pm Saturday, March 4 on Channel 2.

Don't Throw Paper Away, Use It Again

From David Wilson of the mechanical engineering faculty comes the ecology and economy-minded suggestion that we take at least a second look at the pieces of paper which come across our desks.

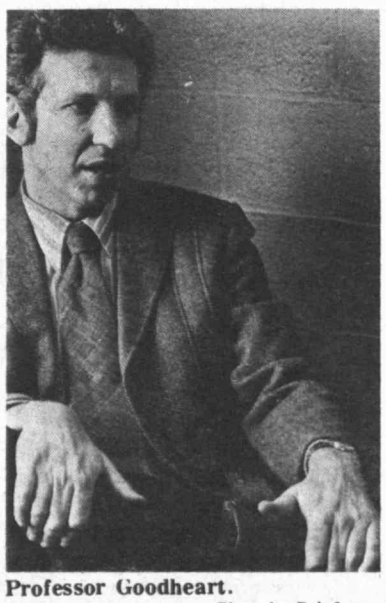
"If you look at it closely, that piece of paper has writing on only one side of it in 90 percent of the cases," he says. "So hold on and don't throw it away. Half its useful life remains. Use the other side."

For uses Dave suggests sending notes to colleagues on 100 percent recycled paper, draft paper, and stapling several half used sheets together for a scratch pad.

He also notes that many envelopes can be used more than once. This is particularly true of internal envelopes which could be used several times if the users would tuck in the flaps rather than licking them.

As a measure of his sincerity, Dave sent his message to Tech Talk on the back of a table of National Transportation Data.

Humanities' Goodheart, Kibel Are Princeton, Wesleyan Visitors



Professor Goodheart.
--Photo by Bob Lyon

Dr. Eugene Goodheart, professor of literature in the Department of Humanities, will present two Christian Gauss Seminars in Criticism at Princeton University this term.

Professor Goodheart, whose special interest is the literary mind and political life after the French Revolution, will speak on "Utopia and the Irony of History" on Thursday, March 2, and on "Imagination and the Temptations of Politics" on March 9.

A colleague of Professor Goodheart in the Humanities Department, Professor Alvin Kibel, also of literature, is serving as a Fellow of the Advanced Center for the Humanities at Wesleyan University this term.

The Christian Gauss Seminars in Criticism are given periodically throughout the year at Princeton, and take the form of one-hour lectures by guest speakers, followed by discussion sessions. They are named in honor of the late Christian Gauss, an eminent scholar and member of the faculty at Princeton for many years.

Professor Goodheart is a graduate of Columbia College, and received his Ph.D. from Columbia University in 1961. He came to MIT in 1967 as an associate professor and was appointed full professor in 1970. He spent last year in Paris as a Guggenheim Fellow.

Professor Kibel is a graduate of Columbia University, where he received his Ph.D. in 1963. He was an assistant professor at Wesleyan before coming to MIT in 1967.

THE INSTITUTE CALENDAR

March 1 through March 10

Events of Special Interest

Greek Weekend*
Hellenic Student Association. **Friday, March 3**: movies in Kresge, **Phaedra** at 7:30pm and **Electra** at 9:30pm, $1.50 for double feature; **Saturday, March 4**: Greek food, wine, sweets, giftshops, etc in Sala de Puerto Rico from 2pm-midnight; live singing by **J. Manos**, Greek play, folk dancing, belly-dancing in Kresge, 7:30-9:30pm, admission $1; music, songs and dancing by **Ta-Helidonia** in Lobdell, 9pm-midnight, admission $1.

Pot Luck Coffeehouse**
Poetry reading by **Prof. Barry Spacks, Bob Cava** and **Kathy Ortoleva,** Friday, March 3. Music and singing with guitarist **Dave Barrington,** Saturday, March 4. Coffeehouse is open 8-12pm, Student Center Mezzanine Lounge.

Institute Blood Drive
Red Cross Bloodmobile will conduct nine-day drive in Sala de Puerto Rico from Tuesday, March 7 through Friday, March 17. Appointments made from 9:45am to 3:30pm. For information and registration forms, consult department solicitors or call X7911.

Technology and Culture Seminar*
Prof. Victor F. Weisskopf, Institute Professor and head of Department of Physics, will discuss "The Significance of Science." Tuesday, March 7; lecture: 5:15pm, Rm 9-150; buffet dinner: 6:30pm, Student Center Mezzanine Lounge; respondents and discussion: 7-9pm, Rm 9-150.

MIT Club of Boston**
Luncheon meeting with **Professor Emily C. Wick,** former dean of women, discussing "What are women doing at MIT?" Thursday, March 9, 12:15-1:30pm, Aquarium Restaurant, 100 Atlantic Ave, Boston. Luncheons are $3.50, payable at door.

Child Care Forum*
Family Day Care Program meeting for parents and others interested in child care at MIT, discussion on toys and baby development with speaker **Frances Ackerly.** Thursday, March 9, 7:30pm, Student Center West Lounge. Call Kathi Mahoney, X4973.

Peace as an Attainable Goal*
Dr. Kenneth Boulding, former research director of Center for Research in Conflict Resolution, now teaching at University of Colorado. Lecture Series on World Peace. Friday, March 10, 8pm, Lobdell.

Seminars and Lectures

Wednesday, March 1

Women's Forum
Subcommittee for lab technicians, technical assistants, librarians, programmers and others. 12n-1pm, Rm 37-187 (off Vassar St).

Pattern Recognition of Leukocyte Images*
Dr. William Bisignani, electrical engineering, Rutgers. CIPG Seminar. 12n-1pm, Rm 20B-224.

Transportation Planning in Transition*
Walter Hansen, project director, Boston Transportation Planning Review. Civil Engineering Transportation Seminar. 3-4:30pm, Rm 1-390. Followed by refreshments.

Microbial Membranes*
Dr. Loretta Leive, Laboratory of Biochemical Pharmacology, National Institute of Arthritis and Metabolic Diseases. Oral Science Seminar. 3-5pm, Rm E18-301.

Coal, Iron and Steam: Beginnings of the Industrial Revolution in the United States*
Prof. Alfred I. Chandler, Jr., Harvard Graduate School of Business. History of Technology Seminar. 4pm, Rm 14E-304.

Allosteric Enzyme Mechanisms: Half Site Reactivity and the Induced Fit Hypothesis*
Sidney Bernhard, Institute of Molecular Biology, University of Oregon. Biology Seminar. 4:30pm, Rm 16-310.

Thursday, March 2

Women's Forum
Subcommittee for bi-weekly and administrative staff. 12n-1pm, Rm 10-105.

A Systems Dynamics Model of Heroin Addiction in the Community*
Prof. Edward B. Roberts, Sloan School of Management. Operations Research Center Seminar. 4pm, Rm 24-307. Refreshments following, Rm 24-219.

Photography of Birds of Paradise (and others) with Electronic Flash*
Crawford Greenewalt, chariman of the Finance Committee, E. I. duPont de Nemours & Co., Inc. Electrical Engineering Seminar. 4-5pm, Rm 6-120.

Women in Physics*
Dr. Vera Kistiakowsky, physics. Physics Colloquium. 4:30pm, Rm 26-100. Tea, 4pm, Rm 26-110.

Transient Sounds Due to Implosions of Simple Structures Under Hydrostatic Pressure*
Dr. Wayne T. Reader, Naval Ship Research and Development Center, Dept of the Navy. Acoustics Seminar. 4pm, Rm 5-314. Coffee, 3:30pm, Rm 1-114.

The Role of the Insulin/Glucagon Ratio*†
Dr. Walter Muller, Joslin Clinic. Nutrition and Food Science Seminar. 4:30pm, Rm 16-134. Coffee, 4:15pm.

Systems Analysis and Defense Planning*
Dr. Arthur Herrington, consultant to the National Security Council and Defense Department. ASME Student Section monthly meeting. 5pm, Rm 10-105. Refreshments, 4pm.

Friday, March 3

Women's Forum
Subcommittee for faculty, research staff and others in academic roles. 1-2pm, Rm 3-310.

Medical Education Using the Computer as a Patient Simulator*
Dr. G. Octo Barnett, director, Laboratory of Computer Science, Massachusetts General Hospital. ERC Colloquium. 12n, Rm 10-105.

Liquid Flow through Microporous Solids*
A. Schneider, graduate student, chemical engineering. 2pm, Rm 10-105.

Developments in Man-Computer Controlled Manipulators*
Prof. Daniel E. Whitney, mechanical engineering. ME Seminar. 3pm, Rm 3-270. Coffee, 4pm, Rm 1-114.

Restricted Diffusion of Macromolecule in Porous Media*
C. Lai, graduate student, chemical engineering. 3pm, Rm 10-105.

Phase and Amplitude Bunching in Travelling Wave Interactions*
Dr. J. A. Armstrong, IBM Watson Research Center. Materials Science and Engineering Colloquium. 4pm, Rm 9-150. Coffee, 3:30pm.

Current Assessment of MHD Power Generation*
Prof. J. F. Louis, aero and astro. Plasma Dynamics Seminar. 4pm, Rm 26-214.

Monday, March 6

Women's Forum
Discussion of "Legal Handicaps of Working Women" with **Prof. Susan Kannenberg,** MIT alumna. 12-1pm, Rm 1-105.

Nuclear Engineering Doctoral Seminars*
P. Bailey, Variational Derivation of Modal-Nodal Difference Equations in Spatial Reactor Physics; **J. Kollas,** Investigation of the Existence of Equivalent Diffusion Theory Parameters; **C. Lai,** Light-Scattering Measurement of Concentration Fluctuation in Binary Liquid Mixture Near the Critical Point. 3-5pm, Rm NW12-222.

Perturbation Theory in Very High Order*
Dr. C. M. Bender, mathematics. Applied Mathematics Colloquium. 4pm, Rm 2-390.

Analytical Model for Time-Averaged Circulation in Estuaries*
John S. Fisher, civil engineering. Water Resources and Hydrodynamics Seminar. 4-5pm, Rm 48-316. Coffee, 3:30pm, Rm 48-410.

Tuesday, March 7

Collapsed Objects vs. Black Holes in Our Galaxy*
Prof. Remo Ruffini, Princeton University. Astrophysics Seminar. 4pm, Rm 37-252.

Some Problems in Ship Maneuvering*
Prof. N. H. Norrbin, ocean engineering. Departmental Seminar. 4pm, Rm 3-270. Coffee, 3:30pm, Rm 5-314.

Wednesday, March 8

National Sea Grant Office Site Visit**
Annual site visit and program evaluation of the MIT Sea Grant Project. Wednesday and Thursday, March 8-9, Rms 37-257 and 272. Call Sea Grant Office, X7041.

A Psychological Approach to Character Recognition*
Prof. Barry Blesser and **R. Schillman,** electrical engineering. CIPG Seminar. 12n-1pm, Rm 20B-224.

Reflections on National Transportation Planning*
Prof. Paul Shuldiner, University of Massachusetts. Civil Engineering Transportation Seminar. 3-4:30pm, Rm 1-390. Followed by refreshments.

Mechanisms of Cleft Palate Formation*
Dr. A. Carl Verrusio, Division of Developmental Biology, American Dental Association. Oral Science Seminar. 3-5pm, Rm E18-301.

Ultramafic Nodules in Basic Rocks: A Discussion of Their Origin and Relationship to the Upper Mantle
Prof. Fred A. Frey, earth and planetary sciences. Department Colloquium. 4pm, Rm 54-100.

A Linear Programming Model for Short-Term Financial Planning*
Prof. Gerald A. Pogue, management. Operations Research Center Seminar. 4pm, Rm 24-307.

Air Pollution Control in 1972—for the Year 2000
Dr. Irving J. Selikoff, Mount Sinai School of Medicine and Environmental Sciences Laboratory at City University of New York. New England Consortium on Environmental Protection. 8pm, Burden Hall, Harvard Graduate School of Business. Free tickets available from Lynn Lipman, Rm 12-189, X4574.

Thursday, March 9

Improved Access to Airline Service*
K. H. Schaeffer, Transportation Systems, Department of Transportation. Flight Transportation Seminar. 4pm, Rm 35-225. Coffee, 3:30pm, Rm 33-412.

The Use of the Immobilized Enzyme in Chemical Analysis: Enzyme Ecectrodes and Fluorescence*
Dr. G. G. Guilbault, chemistry, Louisiana State University. Nutrition and Food Science Seminar. 4:15pm, Rm 54-100. Coffee, 4pm.

The Origin of the Solar System*
Prof. John S. Lewis, chemistry and earth and planetary science. Physics Colloquium. 4:30pm, Rm 26-100. Tea, 4pm.

Friday, March 10

Combustion of Solid Fuels*
J. Rogers, graduate student, chemical engineering. 2pm, Rm 10-105.

A Problem in Fire Safety: Flame Spreading Across Liquid Fuel Spills*
Prof. Irvin Glassman, aerospace and mechanical sciences, Princeton University. Mechanical Engineering Seminar. 3pm, Rm 3-270. Coffee, 4pm, Rm 1-114.

The Performance of a Continuous Ice Crystallizer*
A. Garcia, graduate student, chemical engineering. 3pm, Rm 10-105.

Magnetic Excitons in Rare Earth Metals—A Dilemma*
Dr. Robert J. Birgeneau, Bell Telephone Labs. Material Science and Engineering Colloquium. 4pm, Rm 9-150.

Resonant Heating of Electrons
Dr. D. C. Schram, Research Laboratory of Electronics. Plasma Dynamics Seminar. 4pm, Rm 26-214.

Day Care vs. Family Support Systems: A Psychologist's View*
Prof. Urie Bronfenbrenner, Dept of Human Development and Family Studies, Cornell University. ERC and Psychology Dept Colloquium. 4:30pm, Rm 10-105.

Student Meetings

Student Information Processing Board Meeting
Every Monday, 7:30pm, Rm 39-200.

Thursday Staff Meeting**
Every Thursday, 8pm, 2nd floor, Walker.

Technique Staff Meeting
Every Saturday, 11am, Student Center Rm 457.

ERGO Staff Meeting
Every Sunday, 6pm, Student Center Rm 443.

MIT Club Notes

Students for Lindsey**
Meeting for interested students and faculty. Thursday, March 2, 5pm, Student Center West Lounge.

Formosan Club*
Panel discussion on Taiwan problem. Friday, March 5, 7-11pm, Kresge.

White Water Club*†
Pool session. Tuesday, March 7, 8-10pm, Alumni Pool.

ogy Action*
eral meeting. Wednesday, March 8, 5:15pm, Student er Rm 002.

a Phi Omega**
ting. Wednesday, March 8, 7:30pm, Student Center Rm

Dames
erine Hinds will discuss "Make-up and Facial Care." nesday, March 8, 8pm, Student Center Mezzanine nge.

er House SPAZ Jogging Club**
y, 10:45pm, Baker 2nd Floor West.

by Shop**
n weekdays, 10am-4:30pm, duPont Gym basement. students, $6/term or $10/year; community, $15/year. X4343.

T/DL Duplicate Bridge Club**
ry Sunday, 2:30pm, Walker Blue Rm. Every Tuesday, n, Lobdell.

dlywinks Association*
ry Monday, 8-11:15pm, Student Center Rm 491.

ring Association**
st and third Mondays every month. 7:30pm, Student ter Rm 473.

o Club**
ry Monday, Wednesday, Friday, 5pm; every Saturday, n. duPont Gym Exercise Rm. Beginners welcome.

ing Club*
ry Monday, Thursday, 5pm, Student Center Rm 473.

ncing Club**
ry Tuesday, 6-9pm, duPont Fencing Rm.

e Club**
ry Tuesday, Wednesday, Thursday, 5-6:30pm, Kresge. w members, especially tenors, welcome. Call Cyril ffin, 247-8691.

ssical Guitar Society**
ssical guitar classes, group or private. Every Tuesday and rsday, 5-8pm, Rms 1-132, 1-134, 1-136.

ban Vehicle Design Competition
lunteer meetings. Every Wednesday, 3pm, Rm E42-50.

ble Tennis Club***
ctice session, every Wednesday, 7:30-10:30pm, T-Club unge, duPont.

ciety of Sigma Xi**
ormal coffee hour. Every Thursday, 4-5pm, Student nter Rm 407.

dent Homophile League*
eting and mixer meets Thursdays this month, 7:30pm, ssion Church, 33 Bowdoin St, Boston. For gay help onymous) at MIT, call the student gay tutor, 492-7871 ytime.

ence Fiction Society*
ery Friday, 5pm, Rm 1-236.

CBL Duplicate Bridge*†
idge Club. Every Saturday, 1:30pm, Student Center Rm 3. Members, free; non-members, 75 cents.

ess Club**
ery Saturday and Sunday, 1:30-5:30pm, Student Center n 491.

ixers

uddy Charles Pub**
in your friends at the Muddy Charles Pub, 110 Walker, ily 10:30am-7:30pm. Call X2158.

iday Afternoon Club**
usic, conversation and all the cold draft Budweiser you n drink. Featuring folk singer Rich Holloway. Every riday, 5:30pm, Ashdown basement Games Rm. dmission: men $1, women 50 cents. Must be over 21.

Movies

low Instabilities and Turbulence*
Fluid Mechanics Films. Thursday and Monday, March 2 and , 4-5pm, Rm 3-270.

Borsalino**
LSC. Friday, March 3, 7 and 10pm, Rm 26-100. Admission, 0 cents, must show ID.

ules et Jim
Humanities Film Series. Friday, March 3, 2pm, Rm 4N-0615.

Pretty Maids All in a Row**
LSC. Saturday, March 4, 7pm and 9:30pm, Rm 26-100. Admission 50 cents, must show ID.

SANGAM*
Raj Kappor's greatest film, sponsored by Sangam. Sunday, March 5, 3:30pm, Rm 26-100. Tickets: $1.50 members, $2 non-members

Shoot the Piano Player*
LSC. Sunday, March 5, 8pm, Rm 10-250. Admission 50 cents.

The Smile of Reason*
Kenneth Clarke's Civilisation Series. Monday, March 6, 8pm and 9:15pm, Sala de Puerto Rico. Free admission.

Way Down East*
Film Society. D. W. Griffith Series with piano accompaniment. Monday, March 6, 8pm, Rm 10-250. Tickets $1.

La Dolce Vita
Humanities Film Series. Tuesday, March 7, 8pm, Rm 10-250.

The Worship of Reason*
Kenneth Clarke's Civilisation Series. Tuesday, March 7, 8pm and 9:15pm, Sala de Puerto Rico. Free admission.

In the Year of the Pig
Humanities Film Series. Wednesday, March 8, 6pm, Rm 2-190.

Shaft**
LSC. Friday, March 10, 7pm and 9:30pm, Kresge. Admission 50 cents, must show ID.

Music

Classical Guitar Recital by Ronald Murray*
Program will include works by Dowland, Bach, Tarrega, Albeniz, Garnados, and Scarlatti. Sponsored by the Classical Guitar Society. Wednesday, March 1, 8:15pm, Little Theatre. Admission $1.

Noonhour Concert*
Harpischord concert "Far from the Straight and Narrow" featuring **D. Angel** and **John Cook**. Thursday, March 2, 12n, Chapel.

Noonhour Concert*
"No Dogs Allowed" with clarinetists **Ray Jackendoff** and **Stephen Umans**, bassoonist **Thomas Stephenson**, guest soloist **Sue Ellen Kuzma**. Thursday, March 9, 12n, Chapel.

Theater and Shows

Musical Theater Guild*
Auditions for Spring Show. Wednesday and Thursday, March 1-2, 7-11pm, and Saturday, March 4, 12n-5pm, Kresge Rehearsal Rm B; Sunday, March 5, 12n-5pm, Kresge Rehearsal Rm A.

Community Players*
General business meeting and series of semi-staged readings. Monday, March 6, 8pm, Faculty Club Penthouse. Cocktails, 7pm, Faculty Club Lounge.

Dance

Folk Dance Practice*
Turkish Students Club. Every Sunday, 4-7pm, Student Center Rm 407.

Folk Dance Club*
International folk dancing. Every Sunday, 7:30-11pm, Sala de Puerto Rico (exceptions to be posted).

Modern Dance Technique Class**
Elementary/Intermediate. Every Monday, Wednesday, Friday, 5:15pm. Every Sunday, 1pm. McCormick Gym.

Tech Squares*
Every Tuesday, 8-11pm, Rm 10-105. Call dorm X0888 or 492-5453.

Folk Dance Club*
Folk dancing. Every Tuesday, 7:30-11pm, Student Center Rm 407.

Folk Dance Club*
Israeli folk dancing. Every Thursday, 7:30-10pm, duPont Gym T-Club Lounge.

Exhibitions

Photographs by Eadweard Muybridge*
Displayed in the Hayden Corridor Gallery through March.

Sol LeWitt
Work in Process. Artist Sol LeWitt, assisted by four Boston artists, will produce walldrawings on the Hayden Gallery walls.

The Art of Rigging and Buoy System for Air-Sea Studies*
Hart Nautical Museum, Bldg 5, 1st floor.

Main Corridor Exhibitions*
Presented by students and departments. Bldgs 7, 3, 4, 8.

Athletics

Freshman Squash*
St. Paul's School. Wednesday, March 1, 3:30pm, duPont Squash Courts.

Gymnastics*
New Englands. Saturday, March 4, duPont Gym.

Religious Services and Activities

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

Tech Catholic Community**
General elections meeting, all campus Catholics invited to attend. Sunday, March 5, 6:30pm, Interface (between Ashdown and McCormick).

Roman Catholic Mass*
Every Sunday, 9:15am, 12:15pm, 5:15pm, Chapel.

Christian Worship Service*
Every Sunday, 11am, Chapel.

Christian Discussion Group*
Bible study and discussion of Christianity today. Every Sunday, 9:30-11am, McCormick Seminar Rm A. Call Ron Gamble, X6712 or 547-4279.

Hillel Religious Servies*
Monday-Friday, 8am, Rm 7-102; Fridays, 7:30pm, Chapel; Saturdays, 9:30am, Chapel.

Tech Catholic Community Bible Study Program*
Weekly series of informal Bible discussions. Every Monday, 7:30pm, Student Center Rm 441.

Christian Science Organization*
Meeting includes testimony of healings. Every Tuesday, 7:15pm, Rm 8-314.

Latter Day Saints Student Association**
Religious seminars. Every Tuesday, 8am, Student Center Rm 473.

Christian Bible Discussion Groups*
Every Wednesday, 12:30pm, Rm 4-343; every Thursday, 12:30pm, Rm 20B-222. Call Prof. Schimmel, X6739, or Ralph Burgess, X2415.

Tech Catholic Community Discussion Series*
Informal discussions with **Father Stanley MacNevin** on issues of current religious interest. Wednesdays, 7pm, McCormick Green Rm.

Christians for Dinner*
United Christian Fellowship. Every Thursday, 6-7pm, Walker Dining Hall (under sign of the fish).

Praying, Singing, Sharing Meeting*
United Christian Fellowship. Every Thursday, 7-8pm, East Campus Lounge.

Islamic Society Prayers*
Every Friday, 1pm, Kresge Rehearsal Rm B.

Vedanta Services*
Every Friday, 5:15pm, Chapel; discussion hour, 6pm, Ashdown Dining Hall.

Free Draft Counselling*
Hillel, 312 Memorial Drive, X2982. Call or visit 10am-5pm.

***Open to the Public**
****Open to the MIT Community Only**
*****Open to Members Only**
†Freshmen encouraged to attend

Send notices for March 8 through March 17 to the Calendar Editor, Room 5-111, Ext. 3279, by noon Friday, March 3.

High-Energy Physics Project Deciphers Particle Interactions

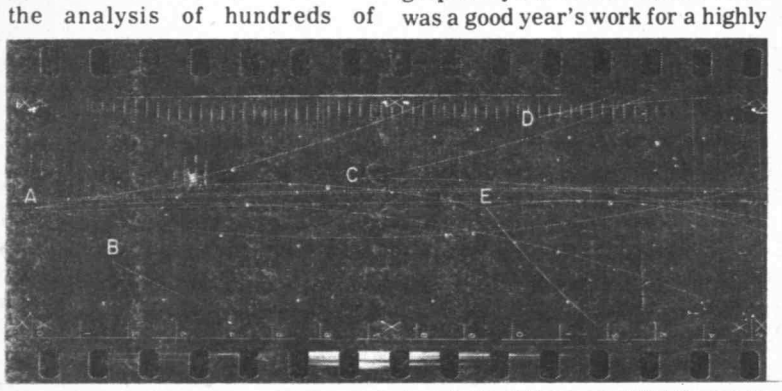
In "The Adventure of the Dancing Men," Sherlock Holmes deciphered a complex series of messages by using the process of elimination and a decoding method based on the statistical frequency of certain letters. Dr. Watson professed amazement--but it was, after all, elementary.

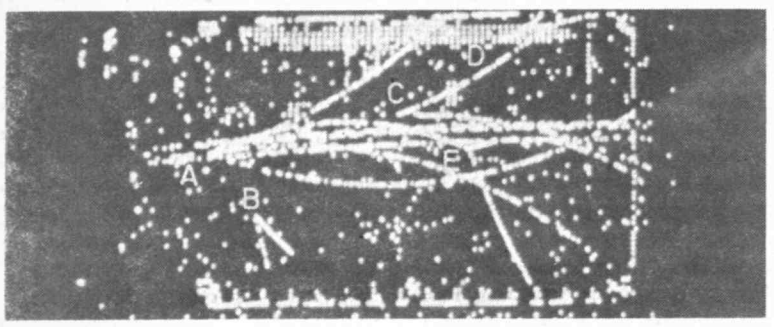
In the realm of high-energy physics scientists use similar methods to detect the complex interactions of subatomic particles, although the particles themselves, because there are too many of them, are no longer "elementary." With an array of subatomic objects that now numbers over 90, physicists arrange the known statistical properties of particles in a variety of patterns in the hope that these will provide clues to an underlying symmetrical order.

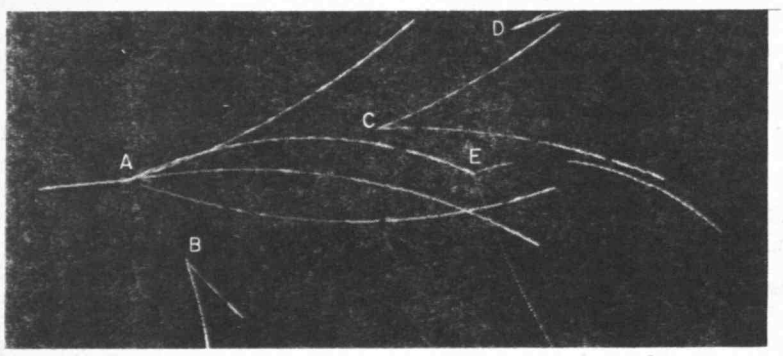
Since these tiny fragments of material reality cannot be detected directly, nuclear sleuths track the footprints of their elusive quarries across the strange turf of the bubble chamber. And when your average layman remarks casually of a Sunday morning, "Well I see they've discovered a new sigma particle," what he means to say is that a bubble-chamber photograph has recorded the curving path of a passing particle that matches no path previously seen. Behind every new nuclear discovery there lie tens of thousands of hours of patient laboratory spade-work in the analysis of hundreds of thousands of photographs.

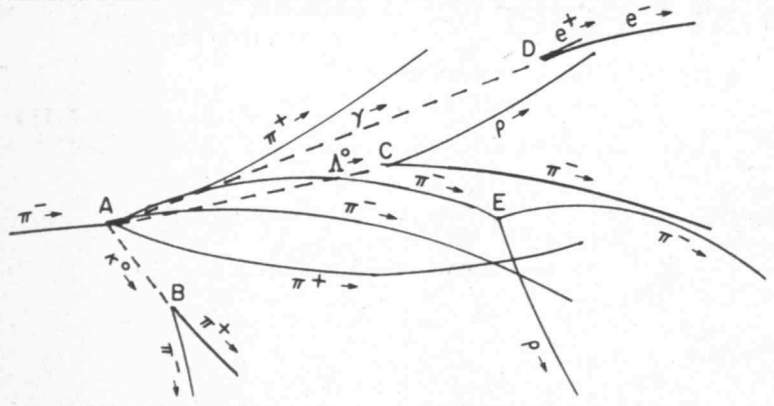
In the past few years, a device that greatly speeds the analysis of bubble-chamber tracks has been conceived, developed, and built in the Laboratory for Nuclear Science at MIT by a research group under the direction of Irwin Pless, professor of physics and director of the Accelerator Physics Collaboration. Called PEPR (for Precision Encoding and Pattern Recognition), the device consists of a cathode ray tube, a lens, and a photomultiplier controlled by a specially designed and programmed computer which automatically analyzes the special film used in bubble-chamber experiments. It follows the bubble tracks of events of interest while ignoring others, and measures the particles' paths to an accuracy of one micron.

"Both speed and accuracy are extremely important" Dr. Pless points out, "because the situation in physics today is one of almost discouraging richness. A good deal of the prospecting work is now done, and what one wants is tremendous amounts of data on the properties of known particle-states, the varieties of decay-modes, interactions, and so forth. A high-energy experiment will typically produce 200 to 300 thousand reactions and the big accelerators are now generating better than four million photographs a year. Some 16,000 events was a good year's work for a highly trained analyst; 160,000 events--by no means untypical of the number you'd want to search through for a series of complex interactions--would take 10 man-years by the old methods of manual measurement. It's very precise work because particle identification depends on close correlation of four measurements--angular momentum in three dimensions, and energy. Consider the classic example: because the observable tracks in film emulsions did not account for all the energy that went into certain events, Enrico Fermi was able to conclude that some small neutral particle must have been stealing away with the missing energy and thus 'discovered' the neutrino. Bubble chambers, incidentally, are simply latter-day improvements on emulsions and cloud chambers and today 99 percent of all visual technique high-energy experiments employ them as detecting devices. When a high-energy beam hits the target, usually beryllium or tungsten, an enormously complicated debris is knocked out, and the particles of interest are transported to the bubble chamber much as the image in a film is transported to the movie screen. The bubble chamber, filled with liquid hydrogen to provide protons, is contained in a magnetic field of known strength--up to 35 kilogauss at the Argonne National Laboratory, for example, or 18 kilogauss at the linear accelerator at Stanford. Charged particles are then bent into curved paths by the field, depending on their momentum, which can be determined by careful measurement of the track of bubbles the charge creates passing through the chamber. With PEPR we're able to analyse experimental results in a matter of days rather than months, an enormous saving."







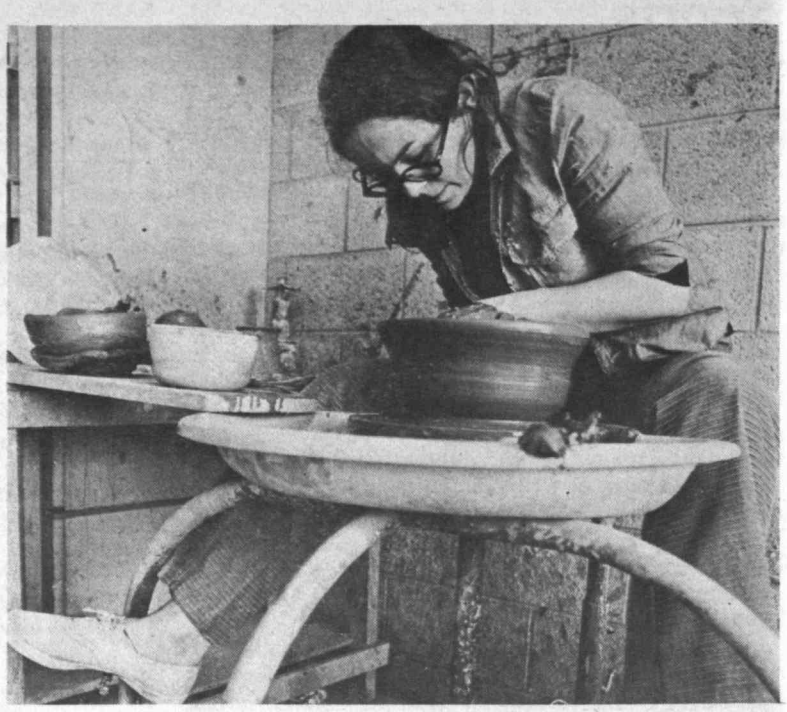


A SPECTACULAR EVENT: **Four views of a single event in an experiment conducted by MIT's Accelerator Physics Collaboration on the 2-mile linear accelerator at Stanford. From top to bottom: photograph of the actual event within the bubble-chamber; PEPR's rough scan of the event, which presents all tracks on the operator's CRT screen; PEPR's final tracing of only the interactions of interest, measured to an accuracy of one micron; and a schematic interpretation.**

Dr. Pless conceived of PEPR in 1961, and after a couple of year's search for funding (support has come from the Atomic Energy Commission), development began, with Bernard Wadsworth of the Laboratory for Nuclear Science as overall project engineer. Hardware turned out to be less of a problem than did teaching PEPR'S computer to recognize the complex patterns of bubble-chamber tracks. As the system now works, filmed events are pre-digitalized--measured manually with an input device which tells PEPR where on each frame to look for the tracks of interest. When the film is placed between PEPR'S cathode ray tube and photomultiplier, a beam of light records the irregularities caused by the tracks, and the computer plots the tracks on an x-y coordinate grid. PEPR separately measures each film from the three cameras that photograph an event from different angles, and then integrates the results to form a three dimensional record.

The PEPR project's engineers have recently finished the design work on an improved version, and Dr. Pless hopes soon to find the funding to build a new model capable of measuring all three sets of bubble chamber film at once. "The new PEPR would increase by another order of magnitude the speed at which events could be analyzed," he says.

At all events, PEPR has been accorded the sincerest form of flattery: no less than 10 PEPR-like devices are now in use at universities throughout the country.



Kathleen Fox is enthralled as she fashions a bowl in the Student Art Association potting studio. –Photo by Margo Foote

Art Is 'Way of Life' for Busy Kathleen Fox

"I can't remember when I started painting--I've always done it."

Kathleen Fox, a secretary in the assistant provost's office, is interested in all art forms--painting, pottery, weaving, embroidery, rug making, and beadwork are a few. She says, "If you apply the term 'art' to the results of constant visual perception of the world, then art is my life--the way I perceive everything. I can't think of myself as an artist with a capital A. But I enjoy exploring my environment visually with color, design and texture. In that sense, I am an artist."

Kathleen's primary interest is abstract painting with watercolors--the first box of paints made quite an impression. She studied fine arts at the University of Connecticut, developing both her interest and talent. After graduation she worked at the Yale University Art Gallery and came to MIT last September.

While painting is her "serious attempt at artistic development," Kathleen's second love is pottery. She spends several hours a week working in the Student Art Association's studio. She comments, "I'm still learning. I throw a pot or bowl, squash it and start over again. Working with the potter's wheel is good discipline and I think discipline is needed before doing free form work."

Kathleen is caught up in the present crafts revival and has tried just about every craft there is, always experimenting with new materials and techniques. Unlike many craft enthusiasts, however, she makes use of her artistic talents and designs all of her craft work.

"It's too easy to buy a rug kit, complete with the canvas, design, yarn and hook," she says. "Kits leave nothing to the imagination and are mass-produced besides. I get bored unless everything I do is my own work from beginning to end, including the design. I always start with an idea rather than a total design. Then as I work, the design grows and changes along with the idea."

Kathleen's apartment is her studio. "She says, "my apartment is a jungle of plants, paints, brushes, material, patterns, beads, yarn and sketches, not to mention a large loom and neurotic cat."

Kathleen spends all of her free time working on paintings or crafts, which are more relaxing. She makes things for friends and almost always uses her handcrafts--woven handbags, suede vests, shawls, wall hangings and rugs--for presents. She would like to hold a one-woman watercolor show.

"I am by no means an accomplished artisan," Kathleen notes. "I'm always learning and looking for new ideas and techniques. This summer I'm going to England and Ireland, hopefully to learn more about contemporary ceramics and weaving."

Placement Bureau Lists Schedule of Recruiters

The following companies and their representatives will be recruiting in the Placement Bureau this week and next week:

Wednesday, March 1: Corning Glass Works; Eaton Corporation; General Radio Company; Motorola, Inc.

Thursday, March 2: Corning Glass Works; Alan M. Voorhees & Associates; General Dynamics Electric Boat Division; General Dynamics Electro Dynamic Division; General Dynamics of Quincy; Schlumberger Well Services; TRW Systems Group.

Friday, March 3: Alan M. Voorhees & Associates; General Dynamics Electro Dynamic Division; TRW Systems Group; Hazeltine Corporation; RCA; United Nuclear Corporation; W.R. Grace & Company.

Monday, March 6: Honeywell, Inc.; General Electric; US Coast Guard.

Tuesday, March 7: Honeywell, Inc.; Martin Marietta Corporation; Intermetrics; American Smelting & Refining Company; General Electric; Bell Labs.

Wednesday, March 8: Raytheon Company; Naval Missile Center; Copperweld Steel Company; Martin Marietta Corporation; Itek Corporation; Souza & True, Inc.; General Services Administration; Bell Labs; Boston College.

Thursday, March 9: Bethlehem Steel; Hughes Aircraft; Raytheon Company; Honeywell, Inc.; US Army Materiel Command; Mobil Oil Corporation.

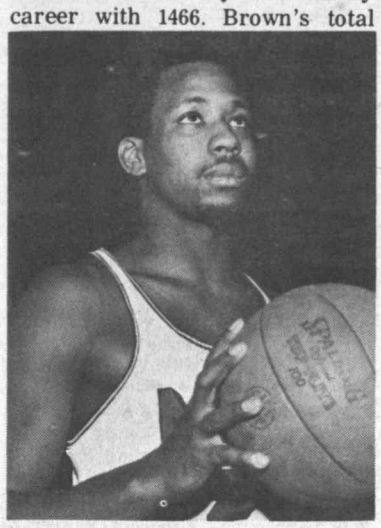
Friday, March 10: Hughes Aircraft; Mobil Oil Corporation; Dana Lab, Inc.

Students interested in talking with any of these companies should visit the Placement Bureau in Room E19-455 to sign up for an appointment.

Sports

Brown Cracks Scoring Mark

In a wild week of basketball, MIT's senior co-captain Harold Brown established an all-time Tech career scoring mark in his last varsity game. Brown, a 6'3" forward, needed 18 points in the last game of the season against Suffolk University, but got 26 and ended his three-year varsity career with 1466. Brown's total surpasses assistant varsity coach, Dave Jansson's, four-year old record of 1457 points. Although everything ended happily for Brown and MIT against Suffolk, the combination of bad weather and a diminishing schedule, nearly cost Brown his chance at the record.



Harold Brown

With three games remaining, Brown needed 65 points, slightly better than his 20.7 points per game average, to break Jansson's record. Then Mother Nature snowed out the Middlebury game and almost wiped out the next to last contest of the season, Bates. Harold scored 21 in an 87-70 upset win over the University of Rochester and then closed in on the record with 26 points in an 81-80 victory over Bates. With Brown only 18 points from the record, Coach Jack Barry, who also serves as Tech's intercollegiate sports scheduler, got Brown another chance by persuading nearby Suffolk University to fill in MIT's hoop slate.

The game was played last Saturday afternoon in front of practically no one but coincidental passers-by and friends of the players. Harold, obviously nervous, was shooting a poor 5 for 24 from the floor in the first half. Bothered by a double-teaming Suffolk five, Brown was held at bay until 10:24 remained in the second half, when he hit on a short jumper for his 18th point of the game and 1458 in a career. The contest was stopped and Brown was presented with the game ball by retiring coach Jack Barry. With all the records out of the way, Brown poured in 8 more points for a 26 game point total as MIT closed out its season with a 95-75 victory and a final 13-10 record.

MIT to Host Gymnastics

MIT will add a little of its own flavor to Saturday's (March 4) Fifth Annual New England Collegiate Gymnastic Championships. The engineers, who will host the event starting at 11:00 a.m. in du Pont Gymnasium, will attempt to feed play by play judges' performance scores into a million dollar PDP-10 computer in Braintree, Massachusetts, and receive back instantly, in Cambridge, the up-to-date scores and standings of the meet. The computer's services are being loaned by Interactive Science Corporation of Braintree, and the sender-teletype has been donated by Computer Identics of Westwood.

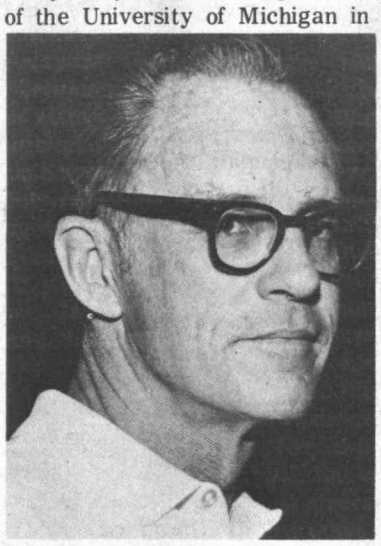
In addition to all the added attractions, the meet promises to be a great one. Teams from 18 New England colleges and universities, including Springfield College, Southern Connecticut University, Dartmouth, Harvard, Yale and Coast Guard, will be vying for the gymnastic team title.

In addition, spectators could be treated to an Olympic preview by Southern Connecticut's John Crosby. Crosby is a winner of eight medals in the 1971 Pan American Games and should be the United State's best chance for a medal in Munich this summer.

Barry Steps Down from Coaching Post

Jack Barry, the winningest basketball coach in MIT history, announced his retirement from the game last Sunday. Barry's engineer hoop teams posted a 162-122 won-lost record over thirteen seasons. Barry will continue his administrative duties as assistant director of athletics at MIT.

Barry's coaching and administration in athletics covers a thirty-one year career. A graduate of the University of Michigan in 1941, Barry began his coaching career at Groveton High School, New Hampshire, in 1941. From 1932-46, he was a member of the US Army Air Force where he played and coached basketball while stationed in Andrews Air Force Base, Washington, D.C. From 1946 to 1951 he coached basketball, baseball and football at Newport High School in New Hampshire. From 1951-59, he coached at Methuen High School, Metheun, Massachusetts.



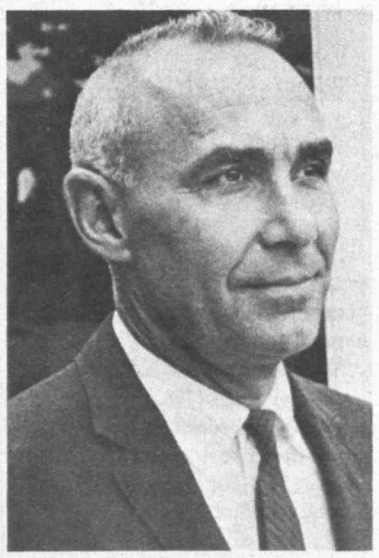
Coach Barry

In 1959 he moved into the head basketball and baseball coaching spots at MIT and was named a professor in the Physical Education Department. Barry's first varsity hoop season at Tech saw the engineers win only one game out of sixteen. From 1960-1968, however, Barry-coached Tech basketball teams posted eight straight winning seasons and raised MIT to one of the top college division teams in New England. After the 1961-62 season in which Tech posted a 17-4 mark, Barry was named the New England College Division Basketball Coach of the Year. In 1966-67, the team compiled a 19-4 record and was named the Eastern Collegiate Athletic Conference Division III Basketball Team of the Year.

MIT will announce Barry's successor within the week.

Jim Smith to Head Eastern College Athletic Conference

Professor Ross H. "Jim" Smith, MIT's director of athletics, has been elected president of the Eastern Collegiate Athletic Conference, the largest collegiate athletic conference in the nation.



Professor Smith

Professor Smith has been in coaching and athletic administration for 25 years, the past 11 as athletic director at MIT. Under his guidance MIT's athletic program has expanded to include 21 varsity sports (a national high), as well as 12 club and 19 intramural sports.

Professor Smith has also served as president of the Eastern Association of Rowing Colleges and the New England College Athletic Conference. He was chairman of the NCAA College Division Football Championships in 1965 and 1966 and a representative on the US Olympic Rowing Committee for the 1968 Olympics.

Professor Smith is a graduate of Springfield College and received his Master's degree from Rochester University.

Professor Lee to Speak at Transportation Forum

Professor Tunney Lee of urban planning will speak at a forum on "Transportation and Your Future in Cambridge" tomorrow night, March 2, at 8pm in the Transportation Systems Center, 55 Broadway, Cambridge. The public is invited to attend.

Other speakers at the forum, which is sponsored by the Cambridge League of Women Voters will include Professor Brian Cudahy of Boston College and Representative Charles Flaherty, Jr. The discussion will be moderated by Barbara Ackerman, Mayor of Cambridge.

Ecology Action and ZPG Open Information Center

MIT Ecology Action and MIT Zero Population Growth today opened their new information center in the Student Center (W20-002).

The center's schedule for the first two weeks will be noon to 1 pm and 3 to 6pm daily. During that period, members of the two groups will be compiling information on issues concerning the environment and population. The office files will be open to all members of the community.

The groups also hope to offer an information retrieval system in conjunction with other similar organizations throughout the area.

Members of the community are urged to bring in any material they may have which is relevant to the center. A bulletin board will be available for posting coming events and numerous periodicals and information bulletins will be kept up to date in the center.

The two groups still need volunteers to man the center and expand its operating hours. They have scheduled a meeting for Wednesday, March 8 at 5:15pm in the center to discuss plans and schedules. For more information, call Fred Gross, 864,8160, or the center on Ext. 7922 or Dorm line 9178.

Federal Middlemen Criticized in Study

(Continued from page 1)

states are undersupplied in relation to need while high-income states are over-supplied. If families in need of housing aid are to have equal opportunities to get it wherever they may live, the present system is clearly inefficient in reaching this goal."

Intermediaries also tend to raise housing costs and limit consumer choices, Professor Frieden states. Citing city planner Charles Abrams' study of housing in Philadelphia, he writes: "Abrams found that some Philadelphia neighborhoods had a good supply of older row houses in move-in condition which could be bought for $2,000 to $5,000. In his view, these houses could have made it possible for many low-income families to become homeowners, particularly if federal mortgage assistance had been available. Instead, the Philadelphia Housing Authority bought and renovated many of these houses, and made them available for renting. In the process, the total cost per house rose to more than $12,300. The result was a permanently subsidized, permanently supervised, and permanently dependent tenantry."

Unlike tenants in private housing, Professor Frieden notes, tenants in public housing cannot move without great loss if they are dissatisfied. "The tenant in a federally assisted development--whether under public or private management--must give up his subsidy if he leaves, since the subsidy is linked to a specific house rather than to the family. This special vulnerability helps account for the bitter disputes that have arisen between public housing tenants and management."

Professor Frieden also believes that the current housing program contains serious inequities in the subsidy formulae that determine which families are eligible for aid. he writes: "Our calculations, based on typical costs under the section 235 program of the 1968 Housing Act, show that a family of five with a gross income of $5,000 is confined to housing with a maximum purchase price of $8,700; while a family of five with an income of $7,000 can purchase a house up to a maximum value of $13,000. If these families buy houses at the maximum price permitted and receive the maximum subsidies allowed, the family with an income of $7,000 receives a federal subsidy one-and-one-half times greater than the family with an income of $5,000.

"Similarly, larger families are limited to lower purchase prices. A family of five with an income of $7,000 is eligible to receive twice the subsidy available to a family of eight with an income of $5,000. These inequities help explain why the 235 program has been serving primarily small families with incomes above $5,000, many of whom could probably afford decent housing on the private market."

The reason for these systematic inequities, Professor Frieden adds, is that "subsidies are not based primarily on family income and size, but rather on the production cost of the housing."

Herein, Professor Frieden thinks, lies the basic dilemma of the nation's housing policy. "Many of the weaknesses we have identified in present subsidy programs result from the fact that they have been designed to work toward two different objectives: increasing the production of housing, and providing financial aid to low-income families. These objectives are often in conflict. They assign a large role to intermediaries because the intermediaries are needed as agents of production; but the intermediaries then absorb a large share of the subsidy dollars and restrict the choices open to low-income families."

Professor Frieden's report concludes with recommendations for long-term planning that would create both high production of new housing and high assistance for those in need of housing. As part of an overall package, he believes, subsidy to middle-income families for new housing would be justified. "This could extend the market for new construction by giving additional purchasing power to families whose incomes fall just below the level needed to pay for new construction. And the success of such program would help lower-income groups by releasing a stock of older central city and suburban housing now occupied by middle-income families, which these groups could afford if aided by housing allowances.

"We make this suggestion with some hesitation, however, for we believe there is a danger that middle-income programs could divert attention and resources away from housing assistance for the poor. We want to emphasize that aid for middle-income production is justifiable only as part of a total strategy."

May Join AAUP

Graduate students who hold appointments as research assistants, teaching assistants, or instructors are eligible for graduate student membership in the American Association of University Professors at an annual dues rate of $3. Students wishing to take advantage of this opportunity should contact: Mr. Bertram Davis, American Association of University Professors, One Dupont Circle, Suite 500, Washington, D.C. 20036.

Environment Study Needs Researchers

Governor Sargent's Task Force on the Environment is accepting applications for volunteer research positions studying the effects of lead poisoning and rat prevention in our environment. The project is one of investigation and education in these two troublesome areas.

Research positions are open to both graduate and undergraduate students who have a background in liberal arts or the sciences. The program will require at least 10 hours per week. Anyone interested in participating should send a resume to: Governor's Task Force on the Environment, Room 2108, Saltonstall Building, 100 Cambridge Street, Boston, Mass. 02202. The application should indicate which area you would prefer to work on and must be submitted prior to March 5.

Band to Present Annual Winter Concert Sunday

The MIT Concert Band, directed by John Corley, will present the annual Winter Concert on Sunday, March 5, at 3pm in Kresge.

The concert will feature "Werk," an electronic music composition by Paul Earls, a fellow at the Center for Advanced Visual Studies. Combining live orchestration with taped electronic music, "Werk," was premiered during the Concert Band's winter tour in January.

The all-student, 85 piece symphonic band will perform H. Owen Reed's "La Fiesta Mexicana," accompanied by the Jan Veen Theater of the Dance, a group of dancers from the Boston Conservatory. In addition, the concert program will include works by Hindemith, Holst and Jenkins.

Admission is free and the public is invited to attend.

Council on Arts Offers Aid for Creative Work

The Massachusetts Council on the Arts and Humanities is offering small grants to support creative projects by groups within the Commonwealth. Student and faculty groups at the Institute are eligible and may apply for financial assistance by submitting a proposal to the Council before March 15.

The funds may be used only for direct costs of the project, and not for general operating budgets or capital expenses. Selection will be made on the basis of artistic merit, financial need, and the ability of the applicant to carry out the project. For more information, call or write the Council office at 727-3668, 3 Joy Street, Boston, 02107.

Club Latino Sponsors Charter Flight to S.A.

The MIT Club Latino is sponsoring a charter flight to South America during spring vacation, as reported in Tech Talk last week. A few facts about the trip need to be clarified, however.

One chartered Boeing 707 Jet will leave New York City on March 31 and will make stops in Miami, Florida, Panama City, Panama, Lima, Peru, and Santiago, Chile; connecting in Santiago with another flight to Buenos Aires, Argentina.

Individually each passenger may choose to stay in any one of these five cities, and return any time he wishes within 45 days. The roundtrip rate is $395, based on GIT fares. Club Latino will be happy to help passengers make individual return reservations upon request.

Anyone interested in reserving a seat on the departure plane should send his name, address, telephone number and destination, together with a $50 deposit check (refundable if you decide not to go), payable to Club Latino, to Club Latino, c/o Luz Maria, PO Box 363, Cambridge, Mass. 02139, as soon as possible. Major credit cards are acceptable and airline credit plans are available. For more information on credit terms and flight schedules, call Luz Maria at 864-8427 after 8pm.

Wellesley Hosts Dance Group

The Olatunji Dance company, directed by Nigerian-born Michael Babatunde Olatunji, will perform traditional African dances on Friday evening, March 3, at 8pm in Alumnae Hall at Wellesley College.

The dancers are accompanied by percussion instruments and drums and perform in full native dress. In addition to directing the dancers and playing the drum, Olatunji will explain many of the classic songs and dances.

Olatunji's performance at Wellesley is sponsored by Ethos, the black student organization on campus, and is open to the public without charge.

CLASSIFIED ADS

Ads are limited to one per person per issue and may not be repeated in successive issues. All ads must be accompanied by full name and extension or room number. Ads may be telephoned to Ext. 3270 or mailed to Room 5-105. The deadline is noon Friday.

Effective immediately members of the community who advertise in Tech Talk will be required to list only their Institute extensions. This is being done as part of an effort to secure a second-class mail permit from the United States Postal Service. Members ofthe community who have no extensions, mainly students, may submit ads with outside telephone numbers by coming in person to the Tech Talk office, Room 5-111, and presenting Institute identification.

For Sale, Etc.

Hart skis w/bndgs, $20; orange bread box, $4.50; 2 new Lenox "Wyndcrest" place settings + 3 sauce dishes, $40. Dennis, X7333.

Yashica 1C camera, model Lynx 14E, exc cond, $75. Arthur, X2720.

Boy's ice skates, used 3 times, sz 3, $7. Heady, X4177.

AM radio, gd cond, $10. Randy, X8568 dorm.

New VW bike rack, $15; used ski rack, $3; both for '67 VW. Mary, X6487.

Infant/toddler's sled, w/push handle, runners, & retractable wheels for bare spots, $10; Hankscraft vaporizer, runs 12 hrs, $8. Gary, X6363.

Philco stereo phono, gd cond, $30. Ron, X6610.

Wood clarinet. Lore, X6235.

Pampers paper diapers, 310 newborn size, $12. Steve, X5842 Linc.

Webcor hi fi, 3 spd w/stand, $40, orig $214. Helen Morgan, X3501.

GE port cassette tprcdr, less than yr old, $20 or best; man's skis, 5' 9", poles, sz 8 boots, boot tree, $30 or best; lady's skis, 5' 6", poles, sz 8 boots, boot tree, $30 or best. X5411 Draper.

Austrian metal skis, 5' 11", step in bndngs, used 4 times, $50. Wally R., X112 Millstone.

Telescope lenses, exc cond, 4mm Orthoscopic & 38mm Richest Field Kellner, standard mount sz. Charlie, X7174.

Skis, 205cm, w/bndgs & poles, boots, 10, $65; VW ski rack, $15. X5657.

Corner horn spkr w/Stephens 12" woofer, JBL 8" midrange, Stephens multicellular horn tweeter, $35. Paul, X7511 Linc.

Xenith X540-1 4-spd port stereo, $10. Jim, X1812.

Lang Dynamic 70 215cm skis w/ Nevada bndgs, new this yr, $125 or $100 w/o bndgs. Dorm X9629.

Old Singer port straight stitch elec sew mach, $20. X1822.

Panasonic stereo rcrd player, fair, $10; wd skis, poles, boots, $45, negotiable; 92X telescope, exc cond, $50. Les Klein, X5831, lv msg.

Frigidaire elec dryer, 4 yrs old, perf cond, $60; 60" dia tbl, 10 legs, nds attention, handsome, $60. X6957 or X7954.

Dolnet alto sax, exc playing cond, $100; Lafayette dynamic mike, $10. Dorm X0598.

Phillips m bike w/basket, nvr used, $35; Adm port stereo, exc cond, $15; Frigidaire 6000BTU air cond, exc cond, $30; port Adm 19" TV w/std, gd cond, $5, etc. Marie, X5315 Linc.

Realistic TR101 auto revers tape rcdr w/spkrs; rcrds & plays both directions, retails, $270, wl haggle. X3207.

Desk, 6', 2-drw file cab, classic desk chr, wl sell together or sep, $35 total. X5700 Linc.

Whitney down jacket w/hood, navy, mo old, med-sm, list $48, asking $38. Sue, X1458.

Gretsch elec guitar w/Gibson case & Gretsch amp, orig $300+, asking $175. X5338.

Sleeping bags, 2, $20. Mark, X2920.

Grundig 4-trk mono tape rcrd, exc cond, $35. Eric, Dorm X0573.

Hand made mahog wall cab, 36"x16"x15½", $20; odd assort green Russel Wright dishes, $10; 3½ yd 48" wide hvy wh cotton w/multicolor dots, $7. X401 Linc.

Woman's bl waterprf boots, 7, nvr worn, $10 or best. X3373.

Free: 2-section sofa w/slipcover. Doug, X4170.

Moving: all types hsehold items, furn, reas. Call 395-8751.

Pr snow tires, 5.50x12, used 2 seasons, $5 ea. X6261.

Vehicles

'65 Matchless-Norton G15CS scrambler 750cc, w/Norton Atlas 60HP eng, completely reblt w/finest all-new equip, 120mph top end, $900. John Peters, X5019.

'68 Volvo 144, stereo FM/AM, air cond, exc cond, $1475. X3131.

'68 Ford Galaxie 500, metallic green, 4-dr, gd cond, very clean, $1200. Al, X419 Draper.

'69 Volvo 142A, beige, 2-dr, exc cond, auto, AM-FM, rf rack, studded snows + extra pr tires used 3K, $1895 or wl swap for pickup truck. X7054.

'69 Pontiac Firebird, V-8, p st, auto, console, AM-FM, 2 new snows, exc cond, 20K, warranty left, $2000. Nanci, X0 Bedford Flight.

'70 Chevelle 2-dr, exc cond, snows, $2000. Mike, X7388.

Housing

Billerica, 3BR duplex, $225, avail 3/25. Marsha, X5451 Linc.

Camb, off Cent Sq, 1-BR furn apt, avail now, $240/mo or best offer. X4478.

Camb, 5 min to Harv Sq, 4-rm apt sublet 3/15-8/31 w/opt, cpls only, no children. X2108.

Chstnt Hill hse for rent to cpl, nr T & shopping, 7/1-12/31/72, 15 min to MIT, $350 + util. Prof. Rein, X2027.

Jay Peak, Vt, lkside ski lodge on 200 acres, sleeps 11, all util, plowed, very reas. Denny, X2430.

Northgate, 2-BR apt, nr Inman Sq, w-w carpet, dish & disp, air cond, avail 4/1, $230/mo + util & pking. Shirley, X7236.

Som, LR, BR, K & B, w-to-w carpet, dishwash, pking, nr Porter Sq, $165/mo, sublet 3/1-8/31 w/opt. Goldsmith, X4204.

Southern NH, isolated country cott, 1½ hrs from Camb, avail monthly now to June. X3375.

Animals

Cats, 2 big, healthy, neutered males, 2 yrs old. X2640 afternoons.

Alaskan Malamute puppies, purebred, no papers, born 1/11. X584 Draper 7.

Wanted

MIT grad nds ride from Camb to Brandeis every Tues for 10am class, can return to Camb anytime before 6pm, wl share expenses. Barbara, 354-8189.

Someone for lght hskeeping. X6262.

Fem rmmate to share lg, beaut N Camb apt, own rm. Roberta, X4405 or X4414.

Male aide or medic for pt time care of elderly male recovering from stroke, minimal nursing but strong back necessary. Call 277-2220.

Bicycle, 26" m or f, gd cond, wl pay up to $25. Margaret, Dorm X9392 or lv msg at X5961.

Calligrapher to prepare documents in Gothic script. Marv, X7096.

Musically untrained staff for short, people controlled computer music games, results to be used for thesis. Rod Corlin, X3161, lv msg.

Miscellaneous

Hardwood floor sanding, refinishing, staining to specs, free estimate. Denny, X2430.

Wl do brickwork, frplcs, bars, bar-b-qs, bkcases, stairs. Ed, X5317.

Research associate & wife want to house sit or sublet apt or house, Mar-June. Call 235-8449.

Honor BA grad in French & now tching at UMass Boston wl give priv or group lessons. Barbara or Pierre, X6997.

Exp typist w/BS in biology wl typ theses, manuscripts & tapes. X2756.

Wl do gen typg on SCM elec. Ron, X7273.

Mature woman wl care for children or elderly in yr home, 2 nights/wk. Kathy, X5831.

Positions Available

The Office of Personnel Relations is seeking individuals from within the institute to fill the following openings.

Secretary IV familiar with medical terminology and dictaphone. Will work with researchers, patients and office accounts.

Secretray IV for Administrative Officer (Academic department) will maintain departmental records of contracts, grants and personnel. Shorthand required. Experience with dictating equipment, keypunch, and computer operations helpful.

Secretary IV for small research group dealing with industrialization of building. Applicant should have at least two years of secretarial experience, excellent typing, writing and editing skills, knack for figures and organization.

Please call Office of Personnel Relations, Ext. 4251