

## Danger: *Blood Drive Failing*



Debra Deutsch, a sophomore in biology from Brooklyn, N.Y., was one of the MIT Symphony Orchestra members who helped provide live entertainment at this year's Blood Drive.

—Photo by Margo Foote

The Annual Spring Blood Drive, now in progress in the Sala de Puerto Rico, is in serious danger of not meeting its 2,500 pint goal. In fact, unless donations increase dramatically, the Blood

Drive will fall short of collecting 2,000 pints.

Only 1,135 pints were collected during the first week of the drive and fewer than 500 donors were scheduled this week. In recent

Lincoln Laboratory will hold its annual Blood Drive on Monday and Tuesday, March 19 and 20, in Lincoln Room A-166. It will be conducted by the Lexington Chapter of the American Red Cross.

years more than 2,000 persons have donated blood during the Spring Drive.

"Response to the Institute's Spring Blood Drive has been disappointing so far," President Jerome B. Wiesner said. "In the few days remaining, I hope donations will increase substantially. The need is great and the time is now."

The lack of response has been widespread but it is particularly noticeable among faculty, staff and employees. Ironically, it is this group which uses most—84 percent—of MIT's yearly blood supply. Blood Drive organizers are investigating reasons for the decline in donations.

In its 25 year association with the Red Cross, the Institute has donated more blood than its members have used. As a result, the Red Cross will supply blood, free of charge, to any member of the community or his immediate family. This "full coverage" program may be reviewed because of the decline in donations. To insure future coverage, MIT blood reserves must be maintained.

Some 1,000 pints of whole blood are used in Massachusetts every

day. The blood collected during MIT's drive is usually used within three or four days after donation. In fact, many major surgical operations are scheduled during the MIT drive when adequate amounts of blood are expected to be available.

The Blood Drive will continue through Friday, March 16. Appointments are available at 15-minute intervals from 9:45am to 3:30pm. Because of generous Red Cross staffing, some 375 people can be handled each day with little or no waiting. New donors as well as loyal regulars are needed.

Sign up now—call Ext. 3-7911—and help save a life.

## Mudd Fund Grant Aids New Center

The Seeley G. Mudd Fund has made a \$1,775,000 grant to MIT for a building to house MIT's major new Center for Cancer Research.

The building will be named the Seeley G. Mudd Building in memory of the late Dr. Seeley G. Mudd, the physician, educator

and philanthropist who died in 1968. During his lifetime Dr. Mudd contributed more than \$10 million to colleges and universities and, under the terms of his will, established the Seeley G. Mudd Fund for the benefaction of higher education.

Announcement of the grant was made by MIT and the Seeley G. Mudd Fund.

In the announcement, Howard W. Johnson, chairman of the MIT Corporation, said, "Dr. Mudd's professional life and philanthropic activities were characterized by a personal dedication to health and education, and by a warm interest in people. We are delighted that his name will be associated with a new Center of national significance. We are very happy that the Seeley G. Mudd Fund has so promptly brought to completion the effort we initiated last December to provide new facilities for the Center for Cancer Research.

Commenting on the grant, MIT President Jerome B. Wiesner drew a parallel between Dr. Mudd's career and MIT's growing efforts in biomedical engineering and science and health-related activities.

"The career of Dr. Seeley G. Mudd has a remarkable relevance for the MIT community as a whole, for the large and increasing number of our students who are setting out on careers in medicine, and to the outstanding group of researchers who will be carrying out the pioneering work of the Center. Dr. Mudd earned degrees in both engineering and medicine and maintained a lifelong interest in the practice and management of medicine," he said. "The Seeley G. Mudd Building will be a dis-

(Continued on page 2)

## Professor Gilliland Dies at 63

Funeral services were held Tuesday (March 13) in Belmont for Dr. Edwin R. Gilliland, Institute Professor and Warren K. Lewis Professor of Chemical Engineering, who suffered a heart attack and died Saturday (March 10).

Dr. Gilliland, 63, an international authority on fractional distillation of petroleum and on pro-



Professor Gilliland.

cesses for demineralizing salt water, was stricken at his home in Belmont Saturday morning and died later at Sancta Maria Hospital in Cambridge.

Born in El Reno, Okla., Dr. Gilliland received the B.S. degree from the University of Illinois in 1930, the M.S. degree from

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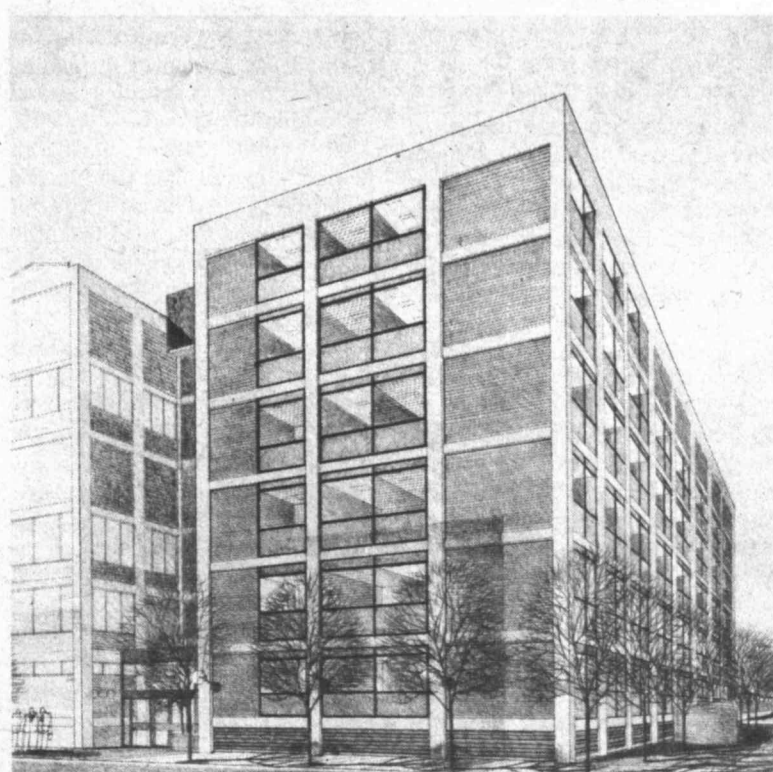
## Alumnae Plan Centennial

Katharine Graham, publisher of the *Washington Post* and Admiral Elmo R. Zumwalt, Jr., Chief of US Naval Operations, will be featured speakers at a two-day Centennial Convocation of the Association of MIT Alumnae (AMITA), June 2 and 3.

The convocation, entitled "Focus on the Future: The Challenges and the Opportunities," will celebrate the 100th anniversary of the first MIT degree awarded to a woman.

The first woman degree recipient was Ellen Swallow Richards

(Continued on page 6)



Architect's rendering of the Seeley G. Mudd Building.

### Special Report

A Report on the Wellesley-MIT Exchange is included as an eight-page supplement in the centerfold of this week's Tech Talk. The Wellesley-MIT Exchange will be discussed at the regular meeting of the faculty on March 21.

# Lehmann, Knight Promoted Within Alumni Association

Frederick G. Lehmann, 42, of Boxford, Massachusetts, has been appointed financial vice president and Treasurer of the Alumni Association of the Massachusetts Institute of Technology in Cambridge, Massachusetts. In this position he is responsible for the overall financial management of the Alumni Association and becomes Director of MIT's three million dollar annual Alumni Fund of over 22,000 donors; he continues as a member of the Board of Directors. He will be succeeded as Secretary of the Alumni Association by Richard A. Knight, 50, of Beverly, Massachusetts, who is currently Associate Secretary.

As Director of the Alumni Fund, Mr. Lehmann assumes leadership of one of the top university annual funds in the nation. Founded in 1940, it involves over 2,500 volunteer workers annually in personal, telephone, and direct mail solicitation and last year increased its number of donors for the ninth consecutive year—an achievement not equaled by any other major fund during this period.

Mr. Lehmann is a 1951 graduate of the Massachusetts Institute of Technology and a native of Hinsdale, Illinois. He has been a member of the MIT Alumni Association staff since 1959 and has been Secretary of the Alumni Association and a member of the Board of Directors since 1962.

He is currently Chairman of the Long Range Planning and Standards Committee of the Massachusetts



Mr. Lehmann.

Governor's Advisory Council on Comprehensive Health Planning and is Chairman of the Trustees of the Boxford, Massachusetts, Town Library. He is former Director and Chairman for Continuing Education for the American Alumni Council. He has been a member of the Development Division Visiting Committee of Carnegie-Mellon University and is a former Deacon of the First Church Congregational in Boxford, where he resides with his wife, the former Betty Ann Ferguson. They have four children.

Mr. Knight joined the Alumni



Mr. Knight.

Association in September 1972. After graduation from MIT in 1947 he worked in various administrative capacities at the Institute. In the twenty years before returning to MIT he was engaged in industry. Most recently he was Vice President in charge of multi-plant manufacturing operations for MSL Industries Inc., based in Racine, Wisconsin, and then a consultant to the presidents of several medium-sized companies on operations, sales, and financial controls.

Mr. Knight resides in Beverly, is married to the former Joan Woodbury, and has three children.

# Mudd Fund Makes \$1.7M Grant To Center for Cancer Research

(Continued from page 1)

tinguished addition to our campus."

The Seeley G. Mudd Building will be on MIT's East Campus at the site of the present Building E18, which will undergo complete reconstruction.

Dr. Salvador E. Luria, Nobel Prize winning biologist who is Director of the Center, said the action of the Seeley G. Mudd Fund "will greatly accelerate the initiation of our long research program into the causes of cancer."

"This grant," Dr. Luria said, "will make it possible for us to complete excellent facilities for the Center and to provide to some of the most distinguished cancer researchers in the country a suitable environment to carry out studies from which a cure for cancer may ultimately emerge."

Dr. Luria, who is an Institute Professor and Sedgwick Professor of Biology, was the 1969 recipient of the Nobel Prize in Medicine or Physiology for his research into virology.

The Seeley G. Mudd Building will be a modern six-story structure with a distinctive facade and lobby. The building will be strategically located near many facilities housing research and teaching in medically related disciplines, including several departments in the School of Science, the developing program for Health Sciences and Technology, the Department of Psychology and many biomedical activities in the Department of Chemical Engineering.

The grant from the Seeley G. Mudd Fund is an addition to grants and funds announced by the Na-

tional Cancer Institute at the time of the establishment of the Center in December, 1972, and subsequent awards. They include grants totalling \$3,150,000 for construction and \$136,376 for operating costs for the first preparatory year. A commitment has also been made by NCI for an additional three years of operating support for a total of \$1,891,000, subject to availability of funds.

Seeley G. Mudd was born in 1895, one of two sons of Seeley W. Mudd, a prominent mining engineer who accumulated substantial mining interests, including the Cyprus Mines Corp., now a publicly owned corporation with world-wide interests. The other son was Harvey S. Mudd for whom Harvey Mudd College was named in 1955.

Seeley G. Mudd received a bachelor of science degree in engineering from Columbia University in 1917. He received the M.D. degree cum laude from the Harvard Medical School in 1924. After three years at Massachusetts General Hospital, where he was a Dalton Fellow and resident physician in cardiology, he moved to California to enter private practice in cardiology. In 1934 he joined the faculty of the California Institute of Technology as professor of radiation therapy and worked under the renowned Dr. Robert A. Millikan. Dr. Mudd spent most of his professional career in experimental medicine at Cal Tech as a member of the cancer research staff. In 1941 he was named Dean of the University of Southern California Medical School.

In addition to his research, Dr. Mudd expressed his strong interest in higher education through

participation as a trustee of Pomona College, Stanford University, California Institute of Technology, the University of Southern California and the Carnegie Institution in Washington, D.C. He was a trustee of the National Fund for Medical Education, a member of the advisory committee on aviation medicine of the National Research Council and the advisory council of the Life Insurance Medical Research Fund. Besides his many memberships in professional medical groups, he was also a member of the Mining and Metallurgical Society of America.

In his will, Dr. Mudd established the Seeley G. Mudd Fund with instructions to its trustees to distribute the Fund's assets of \$40 million for construction of buildings bearing his name—a practice he did not permit during his lifetime—on campuses of leading colleges and universities across the nation.

When the Cancer Research Center is in full operation in the fall of 1975, it will house a force of 12 principal investigators from the foremost ranks of cancer research specialists. Among them will be Dr. David Baltimore, who last February received a \$1,159,000 grant from the American Cancer Society toward support for the rest of his professional career in cancer research. As a lifetime ACS Professor of Microbiology, Dr. Baltimore will maintain his virus research laboratory in the MIT Biology Department and will also head up the tumor virology group in the Center for Cancer Research.

The other principal investiga-

# Edwin R. Gilliland Dies March 10

(Continued from page 1)

Pennsylvania State University in 1931 and the Sc.D. degree from MIT in 1933.

Dr. Gilliland became a research fellow in chemical engineering at MIT in 1933, an instructor in 1935, and was appointed assistant professor in 1936. He was promoted to associate professor in 1938 and to professor in 1944.

In 1945, he served for a year as deputy dean of engineering at MIT and in 1946 was named associate director of the Laboratory of Nuclear Science and Engineering, a post he held until 1952.

Dr. Gilliland was chairman of the MIT faculty from 1952 to 1954. Between 1951 and 1961 he served three times as acting head of the Department of Chemical Engineering, and in 1961 was named head of the department, serving in that post until 1969.

In 1969 Dr. Gilliland was appointed the first Warren K. Lewis Professor of Chemical Engineering. In 1971 he was named an Institute Professor.

Prior to World War II at MIT and in close association with the petroleum industry, Dr. Gilliland was instrumental in work which led to the development of the vertical fluidized bed technique of catalytic cracking of petroleum products. The first commercial plant using this technique went on stream in early 1942, making a vast contribution to the US wartime effort. It was this technique that made possible the production of 100 octane aviation gasoline on a large scale. All gasoline made in this country and much of that made abroad even today is produced using this technique.

During World War II he directed a National Defense Research Committee project on oxygen production and later, as a prominent expert on rubber, he was named to the Rubber Administration where he served as assistant director in charge of research. During this assignment he developed processes for separating butadiene from hydrocarbons which first allowed for the production of synthetic rubber on a significant commercial scale.

Later he served as chief of the US Navy's Jet Propulsion Panel, deputy chairman of the Guided

## Concert Rescheduled

The concert of the Glazer Duo has been rescheduled for Wednesday, March 21 at 8pm in Kresge Auditorium.

Pianist Gilda Glazer and violist Robert Glazer, faculty members at the Hartt College of Music at the University of Hartford, will present the premiere performance of "Fantasy Variations of Solo Viola," written in 1964 by David Epstein of the MIT music faculty.

Also on the program are works by Telemann, Webern and Hindemith.

tors will also hold dual appointments in the Center and in the MIT department of their specialty. The Center, which will report to MIT Provost Walter A. Rosenblith, will support them with an eventual staff of about 60 professional and technical assistants and a total work force of about 150 persons.

Missiles Committee of the Joint Chiefs of Staff and chief of the Office of Field Service. He was former vice-chairman of the NASA's Fuels and Lubricants Subcommittee, consultant to Brookhaven National Laboratory, N.Y., chairman of two panels of the Federal Development Board Committee on Fuels and Lubricants and member of the Fuels Committee, and Office of the Secretary of Defense.

Since 1961 he had been a member of the President's Science Advisory Committee and consultant in the President's Office of Science and Technology and since 1965 member of the Saline Water Committee of the Department of the Interior.

Dr. Gilliland was the author of *Elements of Fractional Distillation*, and co-author of *Principles of Chemical Engineering*, in addition to numerous articles in chemistry and chemical engineering.

Among his honors, Dr. Gilliland was the first to receive the Bachelard Medal and Award for Achievement in Chemistry from the North Jersey Section of the American Chemical Society. In 1959 he received the ACS Industrial and Engineering Chemistry Award. Dr. Gilliland also received several awards from the American Institute of Chemical Engineers: the Professional Progress Award (1950); the William H. Walker Award (1954), the Warren K. Lewis Award in Chemical Engineering Education (1965), and the Founders Award (1971). He was elected a Fellow of the Institute in 1971.

Dr. Gilliland's memberships included the National Academy of Sciences, the National Academy of Engineering, the American Academy of Arts and Sciences, the American Institute of Chemists, the American Association for the Advancement of Science, the American Society for Engineering Education, the Society of Chemical Industry, Tau Beta Pi and Sigma Xi.

Dr. Gilliland is survived by his wife, the former Ann F. Miller; one daughter, Mrs. Gail A. Corbett; and one grandchild, all of Belmont; and a sister, Mrs. Thomas Hughes of New Jersey.

### TECH TALK

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Please address all news and comment to the editorial office, Room 5-111, Ext. 3-3277.

# Campus, Wellesley Concerts Preview

## MIT Symphony's Nationwide Tour

# Retirees' Seminar Dates Set

The Benefits Office has announced a series of pre-retirement seminars to begin later this month.

Seminar topics will include Social Security, Medicare and Medex, estate planning, health, Institute retirement benefits and the American Association of Retired People (AARP).

Departments will distribute letters to those persons who are scheduled to retire this year and, in some cases to those between 62 and 65, who are planning early retirement. Persons contemplating early retirement who have not been invited to the seminars are urged to call the Benefits Office, Ext. 3-4271, for further information.

Because of the large numbers of people eligible for retirement, the Benefits Office cannot accommodate all those over 55 as originally intended. However, plans are being made to schedule an additional series of seminars in the fall.

Seminars for faculty and staff members will be held March 27, April 3, 9, 17 and 24, from 3-5pm in the Dreyfus Building Norris Room (18-290). Seminars for hourly, bi-weekly and exempt personnel will be March 29, April 4, 12, and 19, from 3-5pm in the same room.

Dates for Lincoln Laboratory are April 26, May 1, 7, 15 and 22 from 9:30-11:30am for staff members, and May 3, 10, 17 and 24 from 2-4pm for bi-weekly and exempt persons. All will be held in Room A-166.

Specific topics for each seminar will be listed in the announcement to be distributed.

The pre-retirement seminars were started a year ago to familiarize Institute personnel with what to anticipate in retirement.

## Draper Wins IEEE Medal

Dr. Charles S. Draper, president of MIT's Draper Laboratory, will receive the Lamme Medal of the Institute of Electrical and Electronics Engineers at the IEEE's annual awards banquet in New York City March 27.

Dr. Draper, a Fellow of the IEEE, will be cited "for outstanding contributions to vehicle guidance, control and instrumentation through his pioneering development of inertial navigation systems." The Lamme medal, first presented in 1928, is awarded annually on an IEEE member for meritorious achievement in the development of electrical or electronic apparatus or systems.

The MIT laboratory Dr. Draper founded and heads has been a world leader in developing inertial guidance, navigation and control systems.

Wellesley must have the flexibility to meet diverse life styles needed to encourage professional development of women.

Among specific educational programs to be strengthened, Mrs. Newell listed continuing education, education research, international programs and urban and community internships.

Wellesley will celebrate its centennial in 1975.



TUNING UP: Steven M. Haflich, a graduate student in electrical engineering from Belmont, rehearses for the upcoming concerts and tour of the MIT Symphony Orchestra. —Photo by Marc PoKempner

*Metamorphoses* (Five Pieces for Small Orchestra), composed by Barry Vercoe, assistant professor of music at MIT and director of the MIT Experimental Music Studio, will be given its Boston premiere by the MIT Symphony Orchestra at a concert March 17 in Kresge at 8:30pm.

Two *Nocturnes* by Debussy, *Symphony No. 2 in D Major* by Brahms and the *Concerto in E Flat Major for Two Pianos* by Mozart will also be included in the program. David Epstein, a noted composer and a professor of music at MIT, will conduct the program. John Buttrick, director of music at MIT, and Robert Freeman, a member of the MIT music faculty and the recently appointed director of the Eastman School of Music, will be the soloists in the Mozart piece.

An identical concert will be presented on March 20 at Wellesley College's Houghton Chapel at 8pm.

The two local concerts will be preludes to the Orchestra's first national tour, beginning March 23, which will take the musicians to Philadelphia, Dallas, San Francisco, Los Angeles and Chicago for concerts in major halls. During the tour, which is being sponsored by the newly formed Council for the Arts at MIT, the 90 some orchestra members from MIT and Wellesley will be honored at receptions given by MIT and Wellesley alumni. High School students in each of the five cities will be invited to the concerts and will be given an opportunity to meet the Orchestra members.

*Metamorphoses* is a set of five contrasting pieces which grew out of a single musical idea in five

different ways," said Professor Vercoe. "The basic theme, or kernel, of the set retains its most original form in the central expressive movement where it can be heard as a lyrical melodic line of 12 notes.

"The five pieces form a symmetrical pattern; the outer movements are in the nature of prelude and postlude to the inner three, which are themselves carefully proportioned to seek their center of gravity in the Adagio."

*Metamorphoses* was premiered

in 1965 by the Cincinnati Orchestra under Max Rudolf.

In addition to this instrumental piece, Vercoe has composed works for orchestra, choir and computer, and is the author of Music 360, a language for digital sound synthesis.

No more advance tickets are available for the March 17 concert, but a few tickets will be sold at the door for \$1. Tickets are not required for the March 20 concert at Wellesley which is open to the public free of charge.

## Wellesley Fund Drive

Wellesley College has launched a \$70.7 million, ten-year, centennial development drive to strengthen its educational programs for women.

In announcing the campaign, Wellesley President Barbara W.

### New Exhibit

## 'Souls' Sculpture and Indian Miniatures Shown in Gallery

The luminescent sculptures of California Artist Harold Paris's "Souls" and glowing Indian miniature paintings from the collection of John Kenneth Galbraith will be displayed in a double show in Hayden Gallery March 16 to April 7.

Professor Wayne Andersen, director of exhibitions and chairman of the MIT Committee on the Visual Arts, under whose auspices the show will be presented, said: "Both Paris's sculpture and the 18th century Indian paintings evoke an intimate experience for the viewer. They have in common a smallness of scale and delicacy of beauty that arouse feelings at once intense and personal."

Paris's "Souls" are flat constructions less than a foot square, varying in height from two to three inches, and are intended to be looked at up close. The Indian miniatures, vivid paintings reminiscent of illuminations, were originally intended to be viewed in portfolios, intimately, as one reads a book.

The 24 Paris sculptures are divided into two types. Twelve, called "Untouchable Souls," are plexiglass boxes containing a variety of objects and space modulators. The others, called "Soft Souls," are transparent cast silicon rubber slabs with collage and color and phosphorescent

pigments. These will be exhibited in a darkened portion of Hayden Gallery, where their glowing, changing colors, which are periodically reactivated by light, can be best appreciated.

Some of the Souls point to inner mystical states, such as "Ting Dynasty Soul" and "Untouchable Burnt Soul Crying." Others are dedicated to people, such as Chagall, DeChirico and W. C. Fields; still others portray the anguish of departed souls, such as "Kiss Before Dying My Lai Child Soul."

Harold Paris, an innovator in metal-casting, plastics and graphics, was born on Long Island, N.Y., in 1925, the son of an actor in the Yiddish Art Theatre. His first solo show was in New York in 1951, and he has since exhibited internationally, showing graphics, bronzes, ceramic walls, plastic vacuum-formed pieces and entire environments. He has received numerous awards and fellowships, including Tiffany, Guggenheim and Fulbright. Since 1960 he has taught at the University of California, Berkeley.

The Indian miniature paintings are from the collection of Professor Galbraith, the Harvard University economist, begun when he was US Ambassador to India from 1961 to 1963.

Some 30 miniatures, part of the

collection Professor Galbraith has recently given to the Fogg Museum, will be on display at Hayden Gallery. With one exception from the late 17th century, they are 18th century works from small kingdoms in the Punjab region of India at the foot of the Himalayas, where a number of court artists fled to escape Nadir Shah, the Persian invader, in 1738.

The miniature paintings, done in vibrant color, represent court activities and personalities, sports, flora and fauna, and erotic subjects.

### 3rd ABC Show

"New Hopes for Health," the third in the series of monthly television programs being produced at MIT by ABC News in association with the Institute, will be seen in the Boston area at 10:30pm Friday (March 16) on WCVB-TV Ch. 5.

The program will cover varieties of ways in which technology drawn from engineering, physical science, computer science and management are being coupled with medical science nationwide in efforts to improve health care quality and delivery.



Mrs. Newell. —Photo by Margo Foote

Newell said, "This is capital which we will use to gamble on the thesis that Wellesley will have the vigor, the talent and the commitment to provide national leadership in women's education."

Mrs. Newell said that two-thirds of the money will be used for education and one-third for construction. Included in the construction plans is a \$14 million science complex which, she said, "will be equal to any in a liberal arts college in the country."

Mrs. Newell listed increased financial aid as a high priority in educational funds. One third of Wellesley's students now receive financial aid. The number is expected to rise to fifty percent.

Other funds will be spent for faculty development. Women constitute fifty percent of the Wellesley faculty and, Mrs. Newell said,

# THE INSTITUTE CALENDAR

March 14  
through  
March 23

## Events of Special Interest

**The Architecture of Bernard Maybeck**  
Photographs of the work of the California architect. 3rd Floor Balcony, Bldg 7 Lobby, Mar 5-19.

**Spring Blood Drive**  
Red Cross Bloodmobile will be in the Sala de Puerto Rico through Friday, Mar 16. For an appointment, call X3-7911. Don't miss the live entertainment—music and strobe show.

**Advisory Committee on Shareholder Responsibility**  
Thurs, Mar 15, 5pm, Rm 10-300.

**APO Book Exchange**  
Last chance for people to claim their books or money from the APO book exchange. Thurs, Mar 15, 7-8pm, APO office, Student Center.

**Open House for Freshmen Interested in Earth and Planetary Sciences**  
Meet with the department's faculty and present students to learn about careers and programs in this field. Informal, no lecture. Tues, Mar 20, 3-5pm, Rm 54-923. Refreshments.

**Engineering Open House**  
Meeting for all women students interested in engineering. **Dean Alfred A. H. Keil, Robert Weatherall**, and a panel of women in engineering will speak. Thurs, Mar 15, 3-5pm, Rm 10-105.

**Poetry Reading by Robert Peters\***  
The Humanities Department presents Mr. Robert Peters who is teaching in the Writing Program at the University of California at Irvine. Wed, Mar 21, 7pm, Rm 14E-304.

**Tech Wives Bake and Book Sale**  
Will be held in the Main Lobby of Bldg 10, Thurs, Mar 22, 8am.



The Department of Humanities will feature Robert Peters reading from his poetry on Wednesday, March 21, at 7pm in Room 14E-304.

Peters, who is currently teaching in the writing program at the University of California at Irvine, has given some 100 public readings of his work, including four lengthy eastern tours. He has published five books of poems and his work has appeared in over thirty journals and magazines in the US, England and Switzerland.

The poetry reading is open to the public.

## Seminars and Lectures

### Wednesday, March 14

**Electronic Aids for Community Dialog and Education: Demonstration with Audience Participation**  
Prof Thomas B. Sheridan, mechanical engineering. Education Division Colloquium. 12n, Rm 37-252.

**High Level Sound Propagation in a Duct with Absorbing Walls**  
Dr. A. G. Galsaitis, Prof. D. B. Stickler and S. C. Bates, aero/astro. Energy Conversion and Propulsion Colloquium. 1pm, Rm 31-261.

**Aerodynamic Impact Sounds**  
D. Graham Holmes. Aero/Astro Doctoral Thesis Seminar. 3pm, Rm 37-478.

**Aspects of Actinomyces Viscosus Pathogenicity in Oral Disease\***  
Dr. Harold Jordan, Forsyth Dental Center, Boston. Oral Science Seminar. 3pm, E18-301.

**Will LMFBR's Produce Economical Power?**  
Dr. Bert Wolfe, nuclear engineer. General Electric. Nuclear Engineering Seminar. 3:30pm, NW 12-222. Coffee, 3pm.

**Brittle Fracture of Steel**  
Prof. A. M. Hasofer, civil engineering. Civil Engineering Career Development Seminar. 4pm, Rm 1-353.

**The Fate of Trace Metal Constituents in Sewage Outfalls**  
Dr. Francis Morel, research fellow, California Institute of Technology. Water Resources and Hydrodynamics Seminar. 4pm, Rm 48-316. Coffee, 3:30pm, Rm 48-424.

**Library Operations Research**  
Dr. Phillip M. Morse, physics. Operations Research Center Seminar. 4pm, Rm 24-307. Coffee.

**Career Opportunities at McDonnell Douglas Aircraft**  
Mr. Stanley Landgraft, chief engineer, McDonnell Aircraft. AIAA. 4pm, Rm 39-500.

**Why the Pomeran is so Close to the Froissart Bound**  
Prof. Huan Lee, Northeastern University. Joint Theoretical Seminar. 4pm, CTP Seminar Rm. Coffee, 3:30pm.

**Science and Mystery in the Study of Human Language**  
Prof. Noam A. Chomsky, linguistics. Respondents: Phillip Morrison, physics; Ned J. Block, philosophy. Technology and Culture "Images of Man" Series. 5:30pm, Kresge. Followed by buffet dinner and discussion.

**Jewish Problems at Home: Mattapan and Dorchester**  
Steven Morse, attorney for the Jewish Community Council. Student Jewish Appeal and Hillel Society. 7:30pm, Student Center West Lounge.

### Thursday, March 15

**The Availability Crisis\***  
Dr. George N. Hatsopoulos, MIT. Thermodynamics Seminar. 4pm, Rm 3-343. Coffee.

**Constraints and Tradeoffs in the Design and Operation of High Volume Manufacturing Systems**  
Louis Quagliata, Draper Lab. Production Automation and Manufacturing Seminar. 4pm, Rm 37-212.

**The Cost of Noise Reduction in Helicopters**  
Dr. Henry Faulkner, aeronautics. Interdepartmental Acoustics Seminar. 4pm, Rm 3-370. Coffee, 3:30pm, Miller Rm 1-114.

**Deformation of the Ceramic Earth\***  
Prof. C. Goetze, MIT. Ceramic Seminar Series. 4pm, Rm 31-161. Coffee, 3:40pm.

**Electrolytic Behavior of a Polystyrene Ion Exchange Resin**  
Mr. Lawrence Shore, MIT. Analytical Chemistry Seminar. 4pm, Rm 8-105.

**Fundamental Aspects and Applications of High Voltage Electron Microscopy\***  
Dr. R. M. Fisher, U.S. Steel Research Labs. Physical Metallurgy Seminar. 4pm, Rm 13-2101.

**Microbiological Processes in Water Pollution Control**  
Dr. Ralph Mitchell, applied biology, Harvard. Nutrition and Food Science Seminar. 4:15pm, Rm 54-100. Coffee, 4pm.

**Studies on Brain Amino Acid Metabolism**  
Dr. Adelbert Ames, Massachusetts General Hospital. Nutrition and Food Science Seminar. 4pm, Rm 16-310.

**Some Relations between Planetary Science and 'Pure' Science, and their Historical Development**  
Dr. Stephen Brush, University of Maryland. Technology Studies Workshop. 4pm, Rm 14E-304. Coffee, 3:45pm.

**Rutherford Revisited: Neutron Distributions in Nuclei from Alpha Particle Scattering**  
Prof. Aron Bernstein, physics. Physics Colloquium. 4:30pm, Rm 26-100. Coffee, 4pm, Rm 26-110.

**Engineering Education in India\***  
Prof. Peter Griffith, mechanical engineering. Sangam Lecture Series on India. 6pm, Rm 16-134.

**Information in 1984**  
Dr. K. Teer, Philips Research Lab, Eindhoven, Netherlands. Electrical Engineering Colloquium. 8pm, Rm 9-150.

**Life Planning Exercises**  
Dr. Richard Beckhard, Sloan, director of Richard Beckhard Associates, N.Y.C. Technology Wives Organization. 8pm, Student Center West Lounge.

### Friday, March 16

**Chemical Engineering 10.992 Seminars\***  
B. Bratzler, "The Hydraulic Permeability of Aortae," 2pm; W. Porteous, "Super Heating of Liquid Natural Gas," 3pm, Rm 10-105.

**Plasma Heating by Intense Relativistic Electron Beams**  
Prof. Ravi Sudan, Cornell. Plasma Dynamics Seminar. 4pm, Rm 26-214.

**Recent Advances in the Study of Atom-Surface Interactions on Solids**  
Prof. Thor Rhodin, Cornell University. Physics Colloquium. 4pm, Rm 9-150. Coffee, 3:30pm.

### Monday, March 19

**Structure of Liquids by Energy Scanning X-Ray Diffractometer**  
James Prober, University of Delaware. Chemical Engineering Seminar. 10am, Rm 12-150.

**What Makes the Arms Race Run?**  
John P. Ruina, electrical engineering. Technology and Culture Seminar. 12n, Student Center, Dining Rm 3. Lunch \$2.

**Nuclear Engineering 22.911/22.912 Doctoral Seminars**  
P. Furtado, title to be announced. D. Gwinn, "Neutron Interferometry." 3-5pm, Rm NW12-222.

**Influence of Particle Size and Orientation on Deformation Mechanisms in Glassy Polymers**  
Jacques N. Sultan, civil engineering. Joint Polymeric Materials Program. 4pm, Rm 3-133.

**Strengthening of Nickel Base Alloys by Ordered Tetragonal Precipitates**  
Dr. John Oblak, Pratt & Whitney Research Lab, Middletown, Conn. Physical Metallurgy Seminar. 4pm, Rm 13-2101.

**Submerged Multiport Diffusers for Waste Heat Disposal**  
Dr. Gerhard Jirka, civil engineering. Water Resources and Hydrodynamics Seminar. 4pm, Rm 48-316. Coffee, 3:30pm, Lounge 48-424.

**The Southern Hemisphere and the Future\***  
Erwin D. Canham, editor-in-chief, *The Christian Science Monitor*. Christian Science Organization, MIT. 5pm, Rm 3-133.

**Reality or Fiction: The News Media**  
Edith Efron, author of *The News Twisters*. LSC. 8pm, Rm 26-105.

### Tuesday, March 20

**Operational Experience with the L-1011**  
Willis M. Hawkins, Lockheed Aircraft. Aero/Astro General Seminar. 4pm, Rm 3-270. Coffee, 3:30pm, Rm 33-411

**Propulsion Control Systems for Large Marine Gas Turbine Ships**  
Mr. J. Dor, head of control systems George Sharp Inc, Washington D.C. 4pm, Rm 3-446. Coffee, 3:30pm.

**Radio Structure and Polarization of Quasars with Large Red Shift**  
Dr. Jay Wardle, physics, Brandeis. Astrophysics Colloquium. 4:15pm, Rm 37-252. Coffee, 4pm.

**Mitochondrial Genetic System in HeLa Cells: Anatomy of a Small Eukaryotic Genome**  
Dr. Giuseppe Attardi, biology, California Institute of Technology Pasadena. Biology Colloquium. 4:30pm, Rm 6-120. Coffee, 4pm, Rm 56-520.

### Wednesday, March 21

**An Evaluation of Dental Implant Research**  
Leonard I. Linkov, D.D.S., New York, New York. Oral Science Seminar. 3pm, Rm E18-301.

**Telecommunications and Education at MIT**  
Prof. Ithiel Pool, political science, and a panel. Education Division Colloquium. 12n, Rm 37-252.

### Thursday, March 22

**System Dynamics**  
Prof. Jay W. Forrester, management. Seminar Series on System Analysis. 2-3:30pm, Rm 3-270.

**Analytical Chemistry at Kodak**  
Dr. Carl Zuehlke, head, Methods Research and Technical Service Division, Eastman Kodak Co. Analytical Chemistry Seminar. 4pm, Rm 8-105.

**A Model for Carbon Monoxide Emissions from an Industrial Gas Turbine Engine**  
Alan R. Morr, graduate student. Mechanical Engineering Doctoral Thesis Seminar. 4pm, Rm 3-343.

**On Johnson's Model of Quarks**  
Prof. Jeffrey Mandula, California Institute of Technology, Pasadena. Applied Mathematics Colloquium. 4pm, Rm 2-338. Tea 3:30pm, Rm 2-349.

**Polycrystalline Ceramic Lasers**  
Dr. C. Greskovich, GE. Ceramic Seminar Series. 4pm, Rm 31-161. Coffee, 3:40pm.

**Status of the IBM Webber-Type Gravity Wave Detection Experiment**  
Dr. James L. Levine, IBM Thomas J. Watson Research Center. Physics Colloquium. 4:30pm, Rm 26-100. Coffee, 4pm, Rm 26-110.

**Some Organic Chemistry of Molybdenum and Tungsten**  
Prof. M. L. H. Green, Oxford. Inorganic Chemistry Colloquium. 5pm, Rm 4-370. Coffee, 4:30pm, Rm 6-321.

### Friday, March 23

**Chemical Engineering 10.992 Seminars**  
A. LaMotte, "Immobilization of ATP Regenerating Enzymes," 2pm; C. Lai, "Diffusion of Macromolecules in Porous Media," 3pm, Rm 10-105.

**Nuclear Engineering 22.911/22.912 Doctoral Seminars**  
R. Chin, "Deplesyn: A Three-Dimensional, Time Dependent Synthesis, Depletion Code." D. Hutchinson, "Apparatus for Temperature Measurement of a Hot Dense Plasma." 3-5pm, Rm NW12-222.

## Community Meetings

**Technology Matron's Seminar**  
Prof. J. Herbert Hollomon, director of the Center for Policy Alternatives, on "MIT and National Policy Planning." Wed, Mar 14, 11:30am, Rm 10-105.

**MIT Faculty Club**  
Sea Food Buffet. Wed, Mar 14, 6:30pm, \$6.95. Happy hour 4:30pm.

**Graduate Student Council**  
Agenda meeting. Thur, Mar 15, 12:30pm, Muddy Charles.

**American Musicological Society--New England Chapter**  
General meeting. Sat, Mar 17, 10am & 2pm and Sun, Mar 18, 10am Student Center West Lounge.

**The Faculty will hold a regular meeting on Wed, Mar 21 at 3:15pm in Rm 10-250.**

**Graduate Student Council**  
Meeting. Wed, Mar 21, 5:30pm, Walker Dining Rm. Dinner provided.

**MIT Faculty Club**  
Greek-Nite. Wed, Mar 23, 6:30pm, \$6.95. Happy hour, 4:30pm.

## I. An Introduction By The Presidents

Barbara Newell  
President of Wellesley College

Jerome B. Wiesner  
President of MIT

The report that follows is an attempt to describe an educational arrangement that I believe has provided many Wellesley and MIT students with invaluable experiences. Its approach to the question of the continuation and expansion of the program cannot be unbiased because the members of the Joint Committee writing the report are very aware of the positive aspects of the Exchange, and of its support by faculty and students at both institutions. The cross-registration program alone, without any of the incidental kinds of interaction that have developed because of it, has broadened the range of curricular offerings at both schools to an extent that would be impossible to match by hiring additional faculty.

There have been criticisms leveled at the Exchange that must be recognized. The report tries to deal honestly with these criticisms and discusses alternative policies that may be delegated to a task force for further study, but not necessarily answered here.

I know that I speak for most members of the Wellesley College community when I recommend that the Exchange not only be continued, but expanded to draw the two schools more closely together in the areas of educational research and joint use of community and academic resources.

The Joint Committee for the Wellesley-MIT Exchange, representing both institutions, and responding to the strong indications of support on each campus, concludes that the Wellesley-MIT Exchange is clearly fulfilling its stated purposes. We believe that each campus has acquired enlarged intellectual resources through this cooperation. At a time of fiscal pressure, students have access to instruction and richer cultural experiences on both campuses—benefits which could not be available to either school without increased expenditures and additional faculty appointments. We believe that the life of classrooms and seminars involved in the Exchange has acquired a widening of perspective, viewpoint and intellectual experience which leads inevitably toward richer circumstances for learning. The Joint Committee concludes that the experimental period has yielded significant advantages to both institutions, and makes the following recommendations to the Academic Council at Wellesley College and to the Committee on Educational Policy at MIT:

The Joint Committee recommends continuation of the cross-registration program between the two institutions. The Committee feels that the experimental five-year period has increased the diversity of educational experiences and environments available to students at both institutions and should no longer be considered an experiment, but a regular part of the programs of both institutions. Faculty members and students should be involved in formulating policy for the Exchange, evaluating its usefulness, and in making regular reports to the faculties of Wellesley and MIT. The Committee also recommends that the residence exchange be reinstated on a necessarily limited basis. We feel that the residence exchange is a valuable part of the program, and recognize that some difficulties in implementation indicate the need for careful planning and for consultation with those students most directly affected by such a program. Finally, the Joint Committee recommends the development of new joint activities between Wellesley College and MIT in the future.

During the past five years, MIT and Wellesley College have been engaged in a program of providing for students at each institution the opportunity to become actively engaged in the life of the other. As the fifth year of the Wellesley-MIT Exchange draws to a close we take the opportunity to review both its successes and its difficulties, and to assess the ways in which collaboration might best continue.

I commend this report to the attention of both faculties, for it aptly sets out for us the details of a program in which many of our students and faculty have been engaged. And this particular program through its five years of experiment, readjustment, and compromise, has touched on issues central to the success of undergraduate education in these times.

One such issue is the dilemma every college has always faced: whether growth should be primarily extensive or intensive—that is, whether to expand to become a general-purpose institution, satisfying in some measure a broad range of intellectual concerns, or whether to retain and strengthen its own special interest and unique capabilities, drawing on the resources of complementary institutions to provide balance. The Wellesley-MIT Exchange is an experiment in the latter course.

A second central issue which the Exchange illuminates is the need for, and one way of providing, opportunities for real intellectual challenge in a variety of settings, so that individual concerns and styles can be explored. Both MIT and Wellesley students have exceptional intellectual and personal force, are impatient in their search for the first-rate, and wield considerable influence in shaping our world when they leave us. They deserve the best, and most varied and challenging education we can provide.

The special advantages of the Wellesley-MIT Exchange have not been developed without costs, and these costs must be seriously weighed in considering the program's future. Furthermore our collaboration to date has barely exploited the endless means for providing new opportunities for students and faculty and for economies in the operation of the two institutions. An exploration of the potential for growth should be an important part of the review. Regardless of the particular outcome of that deliberation, the five-year experience of those students and faculty who have participated in, and thought carefully about the program, should provide all of us with new insights about our goals for undergraduate education and the ways in which we might fulfill them.

## II. History Of The Exchange

### A. Introduction

During the 1960's many colleges and universities—in response to the growing diversity of educational goals and interests among students and faculty—expanded their curricular and research programs to meet as nearly as possible the full spectrum of these talents, interests and objectives. Other schools—MIT and Wellesley among them—sought to expand the educational options available to their students while at the same time retaining their unique strengths and the special focus of their own academic programs. Cross-registration and exchange programs offered opportunities for schools to give their students access to a broader range of resources than any one institution could provide, while allowing each school to maintain, and even strengthen, its own special talents and sense of purpose.

It was in this context that Presidents Ruth Adams of Wellesley and Howard Johnson of MIT began exploring possibilities for cooperative educational activities between their two institutions. At MIT it was also expected that the presence of more women on campus would strengthen the position of the small but growing number of MIT women students. The Wellesley-MIT Exchange Program was announced in the Spring of 1967 to capitalize on the increased educational opportunities that could result from cooperation between two schools having distinctive curricula and environments: MIT—a large, urban, coeducational university with exceptional strengths in the sciences and

Submitted by the following people:

### Wellesley College

- \* Barbara Newell  
President of Wellesley College
- \* Robert E. Garis  
Acting Dean of Wellesley College—  
Co-chairman
- \* Sheila M. Berniard  
Class of 1974
- \* Alona E. Evans  
Department of Political Science
- Helen Falkson  
Exchange Coordinator at Wellesley College
- \* S. Beth Farmer  
Class of 1974
- Diane H. Flasar  
Administrative Assistant to the Dean of  
Wellesley College
- \* Irina Lynch  
Department of Russian
- \* Norton Rubenstein  
Department of Biological Sciences
- \* Kathy Woodward  
Class of 1974

### Massachusetts Institute of Technology

- \* Jerome B. Wiesner  
President of MIT
  - \* Robert A. Alberty  
Dean of the School of Science—Co-chairman
  - \* Edward B. Allen  
Department of Architecture
  - \* Janice Benson  
Class of 1974
  - \* Richard M. Douglas  
Head of the Department of Humanities
  - \* Carola B. Eisenberg  
Dean for Student Affairs
  - \* Roy Lamson  
Department of Humanities
  - Kathryn Lombardi  
Analytical Studies and Planning Group
  - \* Jerome H. Saltzer  
Department of Electrical Engineering
  - \* Harvey M. Sapolsky  
Department of Political Science
  - Jane Sauer  
Exchange Coordinator at MIT
  - \* James D. Silverman  
Class of 1973
  - \* Constantine B. Simonides  
Vice President
  - \* Steven R. Taylor  
Class of 1973
- \* Members of the Joint Committee on the  
Wellesley-MIT Exchange

engineering, an orientation toward professional education, and with a history of pursuing and disseminating knowledge responsive to the needs and goals of society; Wellesley—a liberal arts college for women, located in a country setting, with a tradition of preparing its students to integrate knowledge from various fields in the arts and sciences, and to combine their regard for scholarship with a concern for contemporary social problems.

The two institutions proposed to conduct cross-registration of undergraduate students, and a committee of faculty, students and administrators was appointed to make plans for the program which was to start formally in September 1968. To serve more immediately the student interest, however, a number of students were permitted to cross-register on an *ad hoc* basis before the official start of the program. During the spring term 1968, a total of forty-eight students cross-registered in subjects (25 from Wellesley, 23 from MIT).

In September 1968, the Exchange program officially began with the agreement that undergraduate students at each school would have the opportunity to take subjects at the other. The Exchange was set up as a five-year experiment. At MIT, the faculty responsibility for this program fell under the jurisdiction of the Committee on Educational Policy, under its charter to "encourage experimental innovation in undergraduate education with authority to approve limited educational experiments." At Wellesley, a new committee was established under the auspices of Academic Council as an MIT Liaison Committee. This same body would constitute Wellesley's representation to a joint Wellesley-MIT committee responsible for overseeing and monitoring the Exchange program. A grant from the Henry Luce Foundation provided for the special expenses of the Exchange, which consisted primarily of the provision of bus transportation for the 12 mile distance between the two campuses.

The administrative responsibilities for the program were assigned to Virginia Onderdonk, then Dean of the College at Wellesley and Robert Alberty, Dean of Science at MIT, who served as co-chairmen of the Joint Committee. This committee has overseen all aspects of the Exchange, but has been concerned primarily with academic matters. The Joint Committee has met regularly since the Exchange was announced and has discussed various issues, reviewed data on enrollment, and made periodic surveys and studies of the program. At MIT Joel Orlen, then the Administrative Officer of the School of Science, assisted with the administration of the Exchange, with Jane Sauer carrying out the day-to-day functions. When Dean Phyllis Fleming succeeded Dean Onderdonk as the administrator responsible for the Exchange at Wellesley, she brought Diane Flasar to assist with the program. Later, Helen Falkson was appointed as the Exchange Coordinator for all of Wellesley's exchange programs, and Jane Sauer became MIT's Coordinator for the Exchange.

There have been a number of developments since the inauguration of the Exchange which have extended its opportunities to more people, and encompassed more areas of interchange than were originally planned. Initially restricted to undergraduates, the Exchange is now open to graduate students as well. Students have made use of the complementarities that exist between departments in the same areas, as well as those stemming from the more obvious differences in orientation between a science-based university and a liberal arts college. The complementarities also extend far beyond the subject offerings. The Exchange has offered students personal and cultural, as well as curricular opportunities not available at their home institutions. It must also be said that the program has not been without difficulties, and that it has also highlighted some problems existing within the two schools. This report attempts to describe both the advantages and the difficulties stemming from the Exchange and to offer recommendations which will make future co-operative efforts between MIT and Wellesley more rewarding.

## B. Earlier Studies Of The Exchange Program

During the five-year history of the Exchange, there have been several studies designed to gather information on the activities, student/faculty perceptions, and impact of the program. During its first year, the program was studied by students in a class at the Sloan School of Management, taught by Professor Thomas J. Allen, Jr. In this study, a questionnaire was used to survey the attitudes of students toward the Exchange at both Wellesley and MIT. Opinions of both cross-registrants and non-participants were collected. At the time of the survey, the Exchange had been running for only one semester. MIT cross-registrants surveyed expected:

"new learning opportunities; improved social conditions; competence in the elected subject; appreciation of bucolic setting and change; an understanding of the other institution; an easy 'A'; a broad, non-analytic look at a technical subject; a different outlook on subjects in general; knowledge of a different philosophy of education; an indication of what goes into a liberal arts education; a change of atmosphere and environment; and a simulated coed atmosphere."

Wellesley cross-registrants surveyed by students in Professor Allen's class expected to gain:

"a course not offered at Wellesley; different educational perspectives; escape from sterile, unnatural en-

vironment; exposure to people with different backgrounds; new experiences; dates; participation in a course that dealt with matters of the modern world; exposure to university coeducation at an urban school; exposure to a different mental and emotional environment; an informal social experience; a reference for future graduate study; and a reason to stay at Wellesley."

Wellesley cross-registrants surveyed indicated that their primary interest in the program was for academic rather than social reasons. Most of the Wellesley participants in the survey expressed a basic dissatisfaction with their choice of college, and the authors of the report found Wellesley cross-registrants unduly critical of their own school, while MIT cross-registrants were more or less satisfied with MIT as an institution. It must be kept in mind that 1969 and 1970 were years of restless search by students everywhere for educational experiences relevant to their social or political concerns: this may account for the peak dissatisfaction with Wellesley at this time. It appears that MIT cross-registrants, undoubtedly going through some of the same feelings, were more satisfied with the academic side of their experience, but sought different experiences than those available at MIT. The researchers also observed that it was common for students to be very uninformed about the host institution.

Several terms during the Exchange, the Exchange Coordinator at MIT wrote to participating students inviting them to write to her about their reaction to their experiences in the Exchange. Periodically, she wrote to MIT faculty members with Wellesley students in their classes asking for their reactions. Similar surveys of student opinion at Wellesley have been conducted by the Exchange Coordinators at that school. This material supplemented the Joint Committee's own feedback from Exchange students and their communication with the faculty counselors appointed in each department.

During the third year of the Exchange, a subcommittee of the Joint Committee, headed by Professors Helen Padykula and Roy Lamson, prepared an interim evaluation of the program. Put into its final form by Diane Flasar, Assistant to the Dean at Wellesley, this report was distributed at the end of the fourth year, and consisted of two separate and on the whole favorable evaluations of the program from the viewpoints of Wellesley and MIT faculty and students.

In that same year, two reports were compiled by Helen Falkson at Wellesley and Richard Douglas at MIT, concerning faculty reactions to the existing program. At MIT, Professor Douglas noted that faculty discussion often focused on the value of coeducation and the complementarity of departmental offerings. It is significant to note that no unfavorable comments on the program were submitted by the MIT side. Although only one Wellesley faculty member among those consulted reported serious doubts about the program, several faculty members at Wellesley had negative comments about the performance of MIT students in their classes. Wellesley instructors have often found that they must have a different set of expectations for MIT students, who seem to be rather lax about things that Wellesley places importance on, such as regular class attendance, written assignments, and meeting deadlines for papers and examinations. We note here that the deadline dates for dropping subjects, and the customs surrounding drops are different at the two schools. MIT generally permits drops late into the semester, and with minimal explanation; Wellesley considers dropping a subject to be a major issue. As a result, Wellesley instructors are unprepared for repeated absences of MIT students without explanation.

In 1972, the Ad Hoc Committee on the Role of Women at MIT was appointed by the Dean for Student Affairs to review those aspects of the environment at MIT which affect the quality of the educational experience for women students at the Institute. One such aspect discussed in their report was the Wellesley-MIT Exchange Program. While the Ad Hoc Committee advocated a college exchange program as one means of encouraging and supporting all women who seek a scientific-technical training, it identified several problems associated with the Exchange. Specifically, the Committee felt that the purposes of the program should be more clearly formulated than they have been in the past. In the view of the Committee, many students saw the Exchange as serving primarily a social function (benefiting MIT men and Wellesley women), but this function had not been made explicit by those responsible for the Exchange. The Committee felt that this function should be openly recognized as one aspect of the program. The Ad Hoc Committee also noted that most Wellesley students did not enroll in science or engineering subjects at MIT. It was felt that because of this distribution in course selection, MIT was not being as effective as possible in providing women with scientific and technical training and that the prevalent attitude among MIT men that women are not serious professionals (especially in engineering and the sciences) was being reinforced. Finally, the Committee felt that if the Institute is committed to educating women as well as men, the Exchange with Wellesley was no substitute for the active recruitment of women as full-time MIT students. Representatives of the Ad Hoc Committee met several times with the Joint Committee in the spring of 1972 to discuss the impact of the Exchange on undergraduate women at MIT.

In the spring of 1972, Jane Sauer sent a comprehensive questionnaire to all MIT undergraduate students. Twenty-two percent of those surveyed returned the questionnaire. The results generally favored the Exchange and supported its continuation. In addition, the survey indicated that a majority of the MIT students responding to the questionnaire viewed the Exchange as having a combination of social, academic, and environmental advantages. In the fall of 1972, a similar questionnaire was sent to Wellesley students by Helen Falkson. Again, a majority of the students thought there was a combination of social, environmental, and academic benefits in the Exchange although a much larger percentage of the respondents at Wellesley than at MIT viewed the Exchange as primarily academic in nature.

## C. The Residence Exchange

In response to student requests, an experimental residence exchange was operated in 1971-72. This program allowed 25 students from each school to live on the other campus, taking as much as a full course load at the host institution.

Participants in the residence exchange, both from MIT and from Wellesley, were enthusiastic about the program which allowed them to enter more fully into the life of the host school. The program appears to have had a different effect on Wellesley students than on MIT students: while Wellesley students at MIT became more involved with the MIT departments, MIT students at Wellesley became more engaged in activities and projects outside the classroom.

Twenty-three Wellesley students during the first semester and 25 in the second semester participated in the residence exchange. For the most part, their interest was in architecture, urban studies, biology, nutrition, psychology, political science, and mathematics. In addition to their deeper involvement with MIT departments and faculty, the Wellesley students had one of their first opportunities to interact with MIT women in the dormitories and in extracurricular activities, since very few MIT women had enrolled in Wellesley courses.\* For all of the Wellesley students in the residence exchange the opportunity to spend an academic semester at a large urban university was an enriching experience both culturally and socially. All of these factors—a greater variety of courses, exposure to different educational approaches, and a general change in environment—made the experience of the Wellesley participants extremely worthwhile.

In the first semester twenty-five MIT students took part in the residence exchange; during the second term 23 students, including one MIT woman, resided on the Wellesley campus. These students found that the residence program accomplished the goals of the Exchange program while eliminating many scheduling and other procedural problems. In addition, they were able to engage more fully in such extracurricular activities as sports, music, drama, student government, and dormitory functions. As with the Wellesley students, MIT students found the intensive engagement with a different academic style and with a different cultural and social environment to be a major advantage of the residence exchange. Although it had been hoped that the MIT students would elect a full academic program at Wellesley, requirements of their major departments at MIT kept many of them busy commuting. In several instances MIT students in residence were Humanities majors or third or fourth year students in other departments meeting humanities or social science requirements for their degree. MIT students were more heavily enrolled in Wellesley's Political Science and Economics Departments, as well as in the Departments of Psychology, Sociology, History, English, Art, and foreign languages.

While the residence exchange appears to have held strong advantages for those participating in it, there were some problems for non-participants occasioned by the institution of this program. For example, some of the Wellesley students felt they should have been consulted before men were housed in their dormitories. (This reaction applies not only to the residence exchange with MIT, but to the residence programs involving men from the Twelve College Exchange Program as well.) Similarly, at MIT, the report of the Ad Hoc Committee on the Role of Women at MIT indicates that:

"Failure to include coed representation in the planning stages of the exchange program contributed to an unfortunate continuing hostility between MIT and Wellesley women. Although McCormick explicitly expressed its desire to accommodate science-oriented women who favored interaction within the living group, and to be consulted on selection, they were not contacted."\*\*

\*Enrollment lists show that an average of only 5 MIT women cross-register for Wellesley courses each semester, a number equal to only 2 percent of the cross-registrants. During the second semester 1971-72, 4 MIT women were cross-registered in Wellesley courses; second semester figures for 1972-73 indicate that 5 MIT women are taking subjects at Wellesley.

\*\*Report of the Ad Hoc Committee on Women at MIT page 42.

In addition, the Ad Hoc Committee voiced concern about the screening process for selecting participants for the residence program, and we have some cause to share that concern. Specifically, admission to the residence exchange was supposed to be based on the academic soundness of the student's proposed program, yet two MIT students living at Wellesley eventually dropped their Wellesley courses altogether.

Crowding in MIT dormitories resulted in the discontinuation of the residence program for 1972-73. It had been expected that the exchange would provide a bed for a bed, in order not to complicate an already difficult housing situation. However, many students exchanging to Wellesley came from MIT's fraternity system, creating no dormitory space for a Wellesley woman at MIT. The suspension of the program resulted in student concern and protest at both institutions. We believe that the benefits of the residence exchange to its participants recommend its reinstatement in coming years. We note that for the program to operate satisfactorily, more attention must be given to including dormitory residents in the planning stages, and MIT and Wellesley should jointly define and work out admissions standards for the program and other procedural matters.

## D. Expansion Of Exchange Activities

The goals at the outset of the Exchange were left purposefully general to allow for as much growth and as much individual initiative as possible. While most of the academic activities in the Exchange have been carried out through cross-registration in subjects, a variety of other cooperative efforts have been developed in areas of: community-related programs, libraries, student activities, athletics, the performing arts, education, faculty interaction, student/faculty research, and career placement. Some of these activities are flourishing; others are in the embryonic stage.

There are a variety of community-related educational programs and activities in which both MIT and Wellesley students participate. On balance, these programs have been extremely useful to the faculty, staff, and students in a variety of academic departments at both institutions. The oldest and, in some sense, the strongest of these cooperative efforts is the MIT-Wellesley Upward Bound Program, which provides opportunities for tutoring and working with high school students. During the academic year, Wellesley and MIT students work with Cambridge high school students as tutors and counselors; in the summer, a residential program at Wellesley provides students with an intense academic and social experience. Through MIT's Urban Action Volunteer and Resource Center, Wellesley students are participating in such community activities as Tutoring Plus, the Education Warehouse, and the Group School. In addition to working with Cambridge students, both MIT and Wellesley students have actively participated in Wellesley's East Boston tutorial project. In the summer of 1972, the Undergraduate Legal Services Program had 32 student interns, of whom 8 were from Wellesley and 24 from MIT. These students were placed in field positions in local offices concerned with social change, and were paid fulltime stipends for 12 weeks. Next summer, it is expected that up to 8 Wellesley students are likely to join the MIT Legislative Intern Program which is being developed to place students to work with members of the State Legislature. Faculty and student groups at both MIT and Wellesley have recently been discussing the potential of fieldwork offerings and their relation to academic concerns, and there appears to be widespread interest in expanding such opportunities.

The libraries at both schools are open to members of both communities, and they have extended borrowing privileges to cross-registrants. In addition, the music libraries have begun an exchange of listening tapes. MIT students have become involved in athletic activities at Wellesley, and some of the Wellesley residence exchange students at MIT last year became indispensable members of the women's crew team. As with the libraries, athletic facilities at both institutions are open to cross-registrants.

In the area of performing arts, some of the most popular activities are the music groups, such as the MIT Symphony Orchestra and Glee Club, Wellesley Choir, Madrigals, and Chamber Singers, as well as private music lessons given on a yearly basis at Wellesley. As a result of a proposal by Owen Jander at Wellesley, discussions have begun regarding the extension of academic credit for applied music. In addition to music, there has been active participation by MIT students in Wellesley's dramatic productions.

Students' opportunities for internships in teaching have been enhanced by cooperative efforts between the two schools. Peter Sipple from Wellesley has worked closely with Louis Menand and others at MIT in establishing education courses at the Institute and publicizing the new opportunities for student teaching and state certification through courses at both schools. At both schools, the undergraduate teaching intern programs have provided a way for students to earn state certification as secondary school teachers.

Faculty members from both schools have expressed interest in departmental cooperation as regards jointly offered courses, although there have been few instances of such faculty interaction to date. Early in the Exchange, MIT provided staff for a computer course taught at

Wellesley. Robert Garis of the English Department and Miranda Marvin of the Art and Classics Departments at Wellesley have taught a film and an archaeology course at MIT, and Eugene Goodheart from the Humanities Department at MIT has taught a course at Wellesley. Stephen London of Wellesley and Wayne O'Neill of MIT jointly offered a course in Urban Education at MIT, and Miranda Marvin and Arthur Steinberg are offering an archaeology course together this semester. Each of these undertakings was begun through the initiative of the individual teachers.

Students from both schools have been able to undertake research projects and individual studies with faculty at the other school. At MIT, the Undergraduate Research Opportunities Program has become one of the most popular and unique features of undergraduate education, and there has been a large demand from Wellesley students for UROP participation. Last semester some Wellesley students participated in UROP programs for credit.

In the area of career counselling, the placement offices at MIT and Wellesley have extended services to students from both schools—maintaining a file of references, providing information about on-campus or local employment, and arranging for employment interviews on campus.

The advantage of running a bus between the two campuses has provided more than transportation for cross-registrants. It serves as a connecting life-line for the entire Wellesley-MIT community, facilitating all of the efforts mentioned above. In addition, in a more general sense, the Exchange has made it easier for people on both campuses to get to know each other. These personal relationships also contribute to a student's growth and education, and cannot be viewed separately from the more formal aspects of education acquired in the classroom.

## III. Enrollment In The Exchange

The number of participants in the Exchange was initially held to 80 from each institution and was then allowed to grow as student interest increased. It was agreed that enrollment at one institution would not be allowed to exceed 20 percent more than enrollment at the other. Since students are required to apply for a place in the Exchange as well as specific courses, it has been possible to forecast to a certain extent the numbers involved and limit them as necessary. In actuality, Wellesley interest in MIT courses has almost always exceeded MIT interest in Wellesley courses, and twice in the history of the program it has been necessary to limit the number of Wellesley participants. For the second semester, 1972-73, for instance, the Exchange Office received applications for 510 courses to be taken at MIT, as opposed to 214 applications for Wellesley courses. It was necessary to eliminate all Wellesley freshmen from the program and to limit most upperclasswomen at Wellesley to one course only, as Wellesley hoped to maintain some sort of parity. (Spring 1973 enrollment figures for the Exchange show that MIT students are registered for 190 subjects at Wellesley, and Wellesley students are registered for 255 subjects at MIT.) As interest in participating in the program increases, the Joint Committee may need to reassess the agreement in terms of how many more students each institution can absorb into a classroom situation without necessitating an exchange of tuition funds.

Students from both schools have become concerned about already overcrowded classes in which enrollment is limited. In many of the limited enrollment classes at both schools, spaces have been saved at the individual instructor's discretion for Exchange students. There is some feeling that priority in these courses be given to the students from the home institution, or that all qualified students be treated with the same priority.

The basic statistics on students and subjects taken are given in the attached tables, which show that in the five-year period close to 5,000 subjects have been taken by students participating in the Exchange.

Table I shows the breakdown in enrollments for the first 4½ years of the Exchange in terms of the number of students enrolled each semester and the number of subjects taken by those students, since students may enroll in more than one course. At the outset of the Exchange, Wellesley faculty determined not to allow its students to take more than half of a semester's full course load at MIT and in any case, no more than two courses a semester at MIT. This restriction was a curricular restriction rather than one meant to curb enrollment. No such restriction was placed on MIT students, and some have taken as many as four courses per term at Wellesley. The figures for 1971-72 include subjects taken by students participating in the residence exchange. Most of the Wellesley students in the program took full course loads at MIT during this period, making that particular year atypical. A more meaningful comparison can be made between the two enrollments by considering the section entitled "Subject Distribution," which indicates that it is indeed true that Wellesley interest in MIT courses has been consistently greater than MIT interest in Wellesley courses, except in the spring of 1970 when the reverse was true.

Tables II-VII give a further breakdown of both enrollments for 1971-72 by students and additional subjects, by departments enrolled in, and by major department of the

cross-registrants. More Wellesley seniors took MIT subjects than juniors or sophomores, and they were more likely to take more than one subject. The same is true for MIT students in Wellesley courses. Seniors, of course, are more likely to have room in their programs for courses outside of their own departmental and school requirements. It should be remembered, too, that 1971-72 was the year of the residence exchange, in which students were encouraged to take full course loads.

The heaviest concentration of Wellesley interest was in the Humanities and Social Science areas (and Architecture and Planning), as was MIT interest at Wellesley. At the outset of the cross-registration program, it might have been expected that Wellesley students would be most interested in the science resources available at MIT, but the enrollment distribution has not evolved in this manner. This may be because most Wellesley students are not science majors, and that MIT's academic strengths go beyond science and engineering. In addition, both the Mathematics and Physics Departments at Wellesley place restrictions on MIT courses taken by their students, because of the difficulty involved in breaking the sequence from introductory to advanced courses at the College. It has been argued that this practice keeps Wellesley students away from science and engineering courses and thus inhibits students from taking full advantage of the complementarities of the two schools. While this development proved disappointing to those who had expected more interest in MIT's Science and Engineering Schools, several departments at one school have been able to complement the offerings of coordinate departments at the other. For example, departments such as art and architecture, political science, urban studies, economics, philosophy, and psychology, encourage students to take courses at both institutions, and have made attempts to familiarize faculty advisors with these opportunities.

Some of the ways in which Wellesley and MIT are complementary are indicated by the courses most popular with students in the Exchange. The MIT subjects with 9 or more Wellesley students registered in 1971-72 were as follows:

No. of Students		Fall
15	9.00	Introduction to Psychology and Brain Science
14	7.51	Organ and System Physiology
10	7.05	General Biochemistry
10	9.01	Physiological Psychology
9	4.051	Creative Photography
		Spring
19	17.24	Politics and Television
12	9.00	Introduction to Psychology and Brain Science
9	4.057	Creative Audience
9	9.013	Outline of Mammalian Neuroanatomy
9	11.30	Introduction to City Design and Spatial Policy
9	21.36	Women and Literature

The Wellesley subjects with 9 or more MIT students registered in 1971-72 were as follows:

No. of Students		Fall
13	EDU 100	Philosophy of Education
12	PSY 210	Social Psychology
11	PSY 212	Personality
9	POL 223	Urban Politics
		Spring
15	PSY 212	Personality
14	ENG 226	Ideas in the Novel
10	SOC 104	Introduction to Anthropology
9	PSY 207	Child Psychology
9	PSY 210	Social Psychology

At MIT the Department of Psychology is primarily physiologically oriented, while Wellesley offers more in the area of social psychology; Art at Wellesley and Architecture at MIT provide complementary programs; cooperative efforts in the area of education are enhancing the opportunities for students from both campuses to take courses and gain teaching experience necessary for state certification. These few examples indicate that it would be prohibitively expensive for both institutions to provide separately this wide a range of curricular offerings for their students.

Another way of seeing the impact of the Exchange on the academic programs of MIT students is to see how many students in a single graduating class have Wellesley subjects on their transcripts. Jane Sauer has studied the Class of 1972 and finds that 195 students in that class (approximately 20 percent of the class) took 427 courses at Wellesley. The entire list of subjects taken at Wellesley by the Class of 1972 is also a useful indicator of the extent to which the institutions are complementary. This list is available from the Exchange Office at MIT.

**TABLE I**  
Numbers of Students and Subjects in the First Four-and-a-Half Years of the Exchange

	68-69 Semester		69-70 Semester		70-71 Semester		71-72 Semester		72-73 Semester
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
<b>Student Distribution</b>									
Total participants	171	293	227	450	422	589	414	496	319
Wellesley students	91	197	127	225	270	319	238	272	185
MIT students	80	94	100	225	152	270	176	224	134
<b>Subject Distribution</b>									
Total subject applications	n.a.	354	420	674	649	995	717	783	401
Wellesley students	n.a.	235	237	310	342	510	388	426	236
MIT students	n.a.	119	183	364	307	485	329	357	165
Total MIT subjects taken by Wellesley students	99	235	143	272	370	419	356	369	236
Breakdown by percent:									
a. Humanities	30.3%	49.3%	40.6%	52.3%	33.3%	34.1%	33.5%	34.5%	26.7%
b. Social Science	21.2	23.8	17.5	21.7	25.4	27.3	18.2	25.7	23.7
c. Arch. & Planning	31.3	11.9	27.3	11.5	23.7	20.3	19.1	20.3	25.4
d. Eng'g. & Science	10.1	12.4	10.4	13.7	16.8	16.9	27.5	18.4	20.8
e. Management	7.1	2.6	4.2	0.8	0.8	1.4	1.7	1.1	3.4
Total Wellesley subjects taken by MIT students	82	119	114	274	187	340	261	331	165
Breakdown by percent:									
a. Humanities	43.0%	42.0%	53.5%	42.4%	46.5%	50.1%	45.0%	43.2%	42.4%
b. Social Science	23.0	37.0	35.0	46.3	38.5	37.5	43.1	42.5	35.8
c. Science	17.0	11.0	1.9	2.9	7.0	5.6	4.6	7.3	4.9
d. Foreign Languages	17.0	10.0	9.6	8.4	6.4	6.5	6.5	6.4	16.4
e. Other (Phys. Ed.)	-	-	-	-	1.6	0.3	0.8	0.6	0.5

**TABLE II**  
Number of Wellesley Students Taking Subjects At MIT and Number of Subjects Taken in 71-2

	Fall Term					
	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	Graduate	Total
Wellesley students	-	48	62	128	-	238
Total MIT subjects	-	68	94	194	-	356
	Spring Term					
	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	Graduate	Total
Wellesley students	22	57	89	104	-	272
Total MIT subjects	25	76	115	153	-	369

**TABLE III**  
MIT Subjects Taken by Wellesley Students in 71-2 (By MIT Departments)

	Fall	Spring
Architecture and Planning	68	75
Architecture	57	55
Urban Studies and Planning	11	20
Engineering	19	22
Aeronautics and Astronautics	-	2
Chemical Engineering	-	-
Civil Engineering	4	6
Electrical Engineering	6	6
Mechanical Engineering	3	1
Metallurgy and Materials Science	6	7
Naval Architecture	-	-
Nuclear Engineering	-	-
Humanities and Social Sciences	183	217
Economics	5	11
Foreign Literatures and Linguistics	20	16
Humanities	83	105
Philosophy	16	5
Political Science	29	40
Psychology	30	40
Management	6	4
Science	79	44
Biology	37	13
Chemistry	3	5
Earth and Planetary Sciences	6	4
Mathematics	15	9
Meteorology	-	3
Nutrition and Food Science	11	6
Physics	7	4
Undergraduate Seminars	1	7
<b>Total</b>	<b>356</b>	<b>369</b>

**TABLE IV**  
Departmental Majors of Wellesley Students Taking Subjects at MIT in 71-72

	Fall *	Spring
Humanities	64.5	74
Art	19.5	5
English	17.5	30
History	12	31
Music	2	2
Philosophy	5	1
Religion and Biblical Studies	8.5	5
Theatre Studies	-	-
Foreign Language	13.5	9
Chinese	-	-
French	6.5	4
German	2.5	1
Greek	1	2
Italian	.5	1
Latin	-	-
Russian	2	1
Spanish	1	-
Social Sciences	62	83
Economics	13	21
Education	-	-
Political Science	14.5	15
Psychology	29	35
Sociology and Anthropology	5.5	12
Science	44.5	59
Astronomy	4	2
Biological Science	26	36
Chemistry	2	5
Geology	1	5
Mathematics	7.5	11
Physics	2	-
Molecular Biology	2	-
Other	53.5	47
<b>Total</b>	<b>238</b>	<b>272</b>

**TABLE V**  
Number of MIT Students Taking Subjects At Wellesley and Number of Subjects Taken in 71-2

	Fall Term					
	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	Graduate	Total
MIT students	3	34	50	87	2	176
Total Wellesley subjects	3	43	75	136	4	261
	Spring Term					
	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	Graduate	Total
MIT students	20	49	63	90	2	224
Total Wellesley subjects	23	68	92	146	2	331

**TABLE VI**

Wellesley Subjects Taken by MIT Students in 71-2 (By Wellesley Departments)

	Fall	Spring
Humanities	117	143
Art	21	17
English	48	59
History	18	34
Music	14	8
Philosophy	11	8
Religion and Biblical Studies	4	6
Theatre Studies	-	3
Extracurricular Courses	1	8
Foreign Language	17	21
Chinese	9	6
French	-	4
German	2	-
Greek	1	5
Italian	1	-
Latin	1	2
Russian	2	1
Spanish	1	3
Social Sciences	113	141
Economics	11	14
Education	21	20
Political Science	17	20
Psychology	47	59
Sociology and Anthropology	17	28
Science	12	24
Astronomy	4	4
Biological Science	2	13
Chemistry	-	2
Geology	-	3
Mathematics	6	1
Physics	-	1
Other	2	2
Physical Education	2	2
<b>Total</b>	<b>261</b>	<b>331</b>

**TABLE VII**

Departmental Majors of MIT Students Taking Subjects At Wellesley in 71-2

	Fall	Spring
Architecture and Planning	13	15
Architecture	9	11
Urban Studies and Planning	4	4
Engineering	37	53
Aeronautics and Astronautics	7	4
Chemical Engineering	3	7
Civil Engineering	2	6
Electrical Engineering	17	23
Mechanical Engineering	6	11
Metallurgy and Materials Science	2	2
Ocean Engineering	-	-
Humanities and Social Sciences	32	36
Economics	6	5
Humanities	19	22
Philosophy	-	2
Political Science	7	7
Management	12	11
Science	36	77
Biology	12	28
Chemistry	1	9
Earth and Planetary Sciences	2	6
Interdisciplinary Science	1	-
Mathematics	11	17
Physics	9	17
Freshmen and Undesignated Sophomores	46	32
<b>Total</b>	<b>176</b>	<b>224</b>

\* For fall term 1971, figures for double majors were split between departments.



## IV. Impact Of The Exchange

### A. Impact Of The Exchange As Seen By Students At Wellesley

The Wellesley student evaluation of the impact of the Exchange is largely based on a questionnaire distributed in December 1972 to the entire student body. A total of 798 questionnaires were returned—45 percent of those distributed. This percentage of return is especially significant since the survey was made during the final examination and reading period after Christmas, when there are fewer students on campus. The high return appears to indicate a high level of concern among the Wellesley students regarding the continuation of the Exchange program.

It is interesting to note that more freshmen returned questionnaires than members of any other class. Comments by many indicate that the existence of the Exchange with MIT was influential in their decision to attend Wellesley. Some indicated that they would transfer should the program be discontinued.

Individual comments taken from the Wellesley questionnaires have been compiled, but for the sake of brevity will not be included in this report. A copy of the questionnaire, the detailed compilation of student comments, the actual student evaluation results, and the transcript of an open forum at Wellesley on February 20 will be available upon request from the Exchange Offices. These reports convey an enormous amount of enthusiasm by Wellesley students for the Exchange and discuss in more detail the student experiences with the Exchange.

In discussing major differences between the two institutions, students most often focused on the wider range of courses, a different, more quantitative and technological approach to teaching, and favored MIT's more relaxed attitudes toward deadlines, registration, class attendance, written assignments, final examinations, and grades. They noted that while these latter aspects are not unimportant in the educational process, there seemed to be more emphasis at MIT on learning rather than on meeting one particular instructor's expectations. Other comments favored Wellesley's emphasis on "academic excellence," and the personalization of education and advising that is often missing at MIT in the classroom and in relationships with faculty members and the administration. Yet others lauded MIT for encouraging individual research efforts. The remarks of students in the sciences were especially interesting. Many favored MIT as a great resource in their fields; others opposed any future reliance on MIT facilities if that would work to the detriment of science departments at Wellesley. Certainly, no consensus was evident, and remarks varied with the individual student's experience.

Enumerated below are specific conclusions taken from items on the questionnaire.

1. Most students who did not take courses at MIT did not do so because of scheduling problems, or because of Wellesley's exclusion of freshmen and first semester transfers from the program. Very few survey respondents reported that they had been prevented from participating due to the restrictions of the Wellesley department. Often cited by MIT as a factor preventing Wellesley students from enrolling in science and engineering subjects, the policy appeared to affect very few choices not to participate in the Exchange.
2. There appears to be very little hesitation about taking a course in the major field at MIT. Half of the participating respondents had; half had not. Those who had taken courses in the major were prompted by the "uniqueness of the course," "the different approach to subject matter," and "the reputation of the faculty member."
3. Since there had been some expectation that Wellesley students might avail themselves of the wide variety of science courses at MIT to meet the laboratory, and especially the non-laboratory science requirements, we asked how many had used their MIT courses to meet distribution requirements at Wellesley. A significant minority (14 percent) had done so.
4. The primary reasons given by Wellesley students for choosing electives at MIT were: "uniqueness of the course," and the overall "enrichment of the academic experience." Very few reported that they were motivated primarily by a need for coeducation, and none at all to deliberately raise their grade point averages.
5. Grades received by Wellesley students at MIT are generally equal to or higher than grades received at Wellesley.
6. Transportation, scheduling, and registration seem to be the major procedural difficulties encountered by cross-registrants.
7. A large majority of students feel that Wellesley as an educational institution is improved by the Exchange program. Yet a significant number of the non-participants (12 percent) feel it is not affected at all.
8. Most students, both participants and non-participants, feel that Wellesley as a women's institution is improved socially by the Exchange, but about one-quarter of the survey respondents see it as unaffected.

9. The large majority of Wellesley students view the Exchange as a combination of academic, social, and of a general change of environment, rather than any one aspect. If they had to choose one emphasis, many would see it as primarily academic in nature.

10. Approximately one-third of the students who cross-register at MIT take part in extra-curricular activities there, running the gamut of activities from music organizations to outside research and political activities. In addition, a large number of non-participants also join activities there.

11. Students were more or less equally divided on their impressions of the impact made by MIT students in Wellesley classes. Students often mentioned that the number of MIT students in any one class is so low that his/her presence has "no visible effect." An equal number felt that the presence of MIT students, usually men, "stimulated discussion" in Wellesley classes.

12. Wellesley students overwhelmingly favor the continuation of the Exchange.

### B. Impact Of The Exchange As Seen By Faculty At Wellesley

Our perceptions of Wellesley faculty reactions to the Exchange are based on two surveys. The first was a soliciting of comments from faculty coordinators for the Exchange, and the second, interviews with 45 faculty members conducted by Norton Rubenstein in the second semester of 1972-73. As mentioned in the Section on "Earlier Studies of the Exchange," comments from the faculty coordinators often focused on the value of coeducation in the classroom and conveyed some disappointment at the failure of many MIT students to meet instructors' expectations regarding attendance, deadlines, and the quality of written work submitted.

What follows in this section of the report is an abstract of Professor Rubenstein's survey. (Not all departments within each academic division of the College were surveyed—but only those with significant MIT enrollment. Within each department surveyed, not all faculty members were interviewed.) Faculty members were asked to characterize their impression of the impact of the MIT students on their courses. They were asked if MIT students: 1) differed from Wellesley students and if so, in what way; 2) differed from Twelve College Exchange men and if so, in what way; 3) contributed positively or negatively to classes; 4) met their class responsibilities with regard to assignments; and 5) what the instructor's general impression was of the overall impact of MIT students on their classes. The general impression gained from the interviews is that MIT students are welcome additions to the classroom. In many cases, they are welcome because as men, for the most part, they add a new dimension to class discussions. In some cases, as MIT students, their more analytical approach to the learning process and subject matter was seen as an advantage. In others, such an approach was seen as a hindrance to learning.

But in general, this sample of Wellesley faculty members regarded MIT students as individuals rather than as a characteristic group and found it difficult to generalize about the impact.

The responses are described in further detail below, divided according to the basic academic divisions of the college: Group A (Humanities), Group B (Social Sciences, including the Departments of History and Philosophy), and Group C (Mathematics and Sciences). The responses of those instructors who have had little experience with MIT students in classes have been omitted.

Group A responses were from the foreign language departments, English, Music, and Art. The English Department seemed the most pleased with the presence of MIT students, referring often to the enlivened discussions and new perspectives brought to the discussion. Comments from the Italian and Spanish Departments shared this observation about discussion, but emphasized the coeducational aspect. The Chinese Department values the analytical approach to that particular discipline, but laments the MIT custom of cutting classes. The Art Department observed that most MIT students do well in their courses, but that their impact on the class is undiscernible. Again, the different perspective brought to the subject does not necessarily relate to MIT. The Music Department has had little experience with MIT students in class, but values their contribution to the performance program.

In Group B, which has had the highest enrollment of MIT students, there are also diverse opinions about the impact on class discussion. Several instructors in various departments find MIT students more aggressive in class and more willing to contribute opinions. They find MIT students more willing to challenge the instructor's control of the learning experience and find that Wellesley students, perhaps more deferential to authority, respond negatively to this tendency. In this group, several faculty saw differences between MIT and Twelve College students that were not seen by the other two groups. Twelve College students seemed to have less diverse interests than MIT students and to be more like Wellesley students in outlook and areas of interest. Other instructors saw no discernible distinction of MIT students as a group, but welcomed, and feel that Wellesley students welcome, the individual

contribution. While several teachers expressed dissatisfaction with the casual attitude toward meeting course responsibilities, others had had experiences that led them to state their complete satisfaction with course commitments. It is significant that instructors in Group B found MIT students much less grade conscious than either Wellesley or Twelve College students. Faculty in the Economics Department found MIT students generally better prepared in that subject than Wellesley students.

Enrollment in Group C courses at Wellesley by MIT students has been low and most departmental responses are based on small samples. Geology and astronomy are the exceptions. Several instructors found MIT students better prepared than Wellesley students. Others saw no difference, except the willingness to participate in class discussion. The observation from Astronomy was that the impact on the class had been negative, based on some very real difficulties encountered with completion of term's work, yet the instructor made some positive comments about MIT students' participation in class discussion.

Additional comments from the Wellesley College Library and the Black Studies Department show a desire for continued and expanded cooperation.

Opinion is divided among faculty at Wellesley about the impact MIT students have in their own subjects. But in general, the responses were favorable. Another concern of faculty members at Wellesley involves the experience of their own students at MIT, an area not covered by this set of questions. A continuing source of concern has been the differences in grading at the two schools. Many instructors have seen what they consider to be fair-to-average students in their own departments cross-register at MIT and get "A's" for their effort there. However, most departments have come to value the complementarity that expands the experience of their own majors.

### C. Impact Of The Exchange As Seen By Students At MIT

The views in this section of the report are based on personal experience, on frequent discussions with students about the Exchange, on commentary on the Exchange by members of the Ad Hoc Committee on the Role of Women at MIT, on the results of a questionnaire distributed to MIT undergraduates in April 1972, and on preliminary results of a questionnaire sent to women students at MIT in March 1973.

From conversations and survey results, it appears that a large majority of the MIT students favor continuation of the Exchange. It should be noted that very few students feel that the benefits of the Exchange are solely academic in nature: most see the Exchange in terms of a combination of academic, environmental, and social factors.\*

The Exchange program with Wellesley has offered three major advantages to MIT students. First, it provides an opportunity for a learning experience in an environment not pervaded by technology—that of a liberal arts college in which students' primary intellectual interests tend to be in the humanities and social sciences. MIT students whose major interests are in the humanities find themselves in a minority at the Institute, and their intellectual interests are not supported by the culture of their peers outside of the classroom. At Wellesley, MIT students can take history with history majors, literature with literature majors, etc., and are generally exposed to a liberal arts education and approach to learning without having to give up their MIT identity.

A second advantage of the program to MIT students is that the Wellesley curriculum complements and extends the MIT course offerings, particularly in the social sciences and the humanities. Even in courses similar to those at MIT the instructor and students usually have different attitudes and approaches to learning, and hence provide a different learning experience. For this reason, many MIT students in the social sciences and humanities find taking courses at Wellesley to be valuable educational experiences. For this same reason many Wellesley students have considerably strengthened the classroom discussions at MIT.

The third advantage of the program, as seen by the men students at MIT, is that it has enabled them to have considerably more contact with women. Certainly this contact has enriched the dating experience of MIT men, but the benefits have accrued to their total educational experience as well. MIT is still a predominantly male institution—the number of full-time women students not being large enough to ensure a coeducational experience at the Institute. As a result of the Exchange, there are more women in MIT classes, and MIT students are able to attend

\*Of those students responding to the April 1972 questionnaire (about 20 percent of the undergraduate student body), over 80 percent thought that MIT as an educational and as a social institution had been improved by the Exchange; over half of the respondents (56 percent) viewed the Exchange in terms of a combination of social, academic and general environmental factors; 87 percent wanted the exchange to continue—the figure was even higher from those who had directly participated in the Exchange (95 percent).

classes at Wellesley. (It has been argued that there is valuable educational benefit to an MIT male in being in the minority in a classroom at Wellesley.) The faculty at MIT have indicated that women—whether from MIT or Wellesley—unquestionably improve the quality of the educational experience at MIT. The increasing participation of women in all aspects of our society makes it desirable for MIT men to have more peer group contact with women and not to see them only as weekend dates. The Exchange has certainly increased the contact of MIT men with women. However, most Wellesley participation on campus is transient, and the Exchange does not significantly increase the professional and academic association MIT men have with women.

While it appears that most MIT students strongly favor the Exchange, there are a number of problems which should be addressed if the program is to continue. Some of the problems relate to procedural and logistical factors which make participation in the Exchange difficult for a number of students. For example, differences in the academic calendars and registration procedures of the two schools inhibit cross-registration in Wellesley courses. Even if the calendars and registration procedures were synchronized, however, there are still differences in the length of classes and in the number of class hours per week that make commuting to Wellesley very costly in terms of the time involved.

In addition to procedural difficulties, the differences in academic approach at the two schools have sometimes been overwhelming to MIT students. Just as Wellesley faculty have been concerned about what they consider to be the lax attitude of MIT students in their classes, MIT students have been troubled by an overabundance of protocol and rules that seem rather restrictive in comparison to MIT. There is some sentiment among MIT students that "Wellesley makes its rules and regulations sacred." This sentiment points out some differences in expectation and attitude between MIT cross-registrants and the faculty and administration at Wellesley. The different modes of education at the two schools are not incompatible, but the potential for smooth academic integration between the schools has not been fulfilled.

There are students at MIT who view the Exchange as having either no impact or a negative one on the MIT environment, both educationally and socially. For example, a substantial number of women students at MIT have expressed strong dissatisfaction with the Exchange and what they regard as its negative impact on the position of women students at the Institute. Among their arguments are the following:

1. The Exchange is not equally beneficial to the whole MIT student community, because the women (perhaps because they lack the social motivation which stimulates the men to overcome scheduling, commuting and other procedural difficulties) have had a significantly low participation in the Exchange.
2. Many of the women see the Exchange as one (highly visible) means for increasing the number of women students at MIT. They see a considerable amount of effort and financial resources committed to the Exchange program, but almost no effort toward recruiting women as regular students at MIT. Some feel that the presence of more women on campus through the Exchange makes the need for more full-time women students less apparent to the faculty and men students at the Institute.
3. Most of the Wellesley cross-registrants do not enroll in courses in the Schools of Science and Engineering at MIT, but rather in the Humanities and Social Sciences and in Architecture. (An exception is the Biology Department.) It is felt that this distribution in enrollment reinforces in the minds of many MIT men the traditional, stereotyped image of women as not capable or interested in science and technology, and not seriously interested in professional careers, particularly in these areas.

In March 1973 all undergraduate women at MIT were sent a questionnaire asking for their opinions on the Exchange. (Questions were similar to those asked of all MIT undergraduates in the Spring 1972 survey.) Based on preliminary returns of 30 percent, the following is a summary of the responses to the three major questions. Only 10 percent of the women respondents felt that their own educational experience at MIT had been improved by the Exchange, while 62 percent felt that their MIT experience had not been affected by the program. Responding to the question of whether MIT as an educational institution in general had been improved by the Exchange, 43 percent of the respondents to the women's questionnaire felt that it had been improved, while 83 percent of the respondents to the 1972 survey of all undergraduates held that view. Half of the respondents to the survey of MIT women said that the Exchange should continue, 17 percent said it should not, and 33 percent had no opinion or no answer. In comparison, in the 1972 survey of all undergraduates, 87 percent of the respondents said the Exchange should continue, while 3 percent said it should not.

One of the original expectations of the Exchange was that it could serve to support and strengthen the experience of the women students at the Institute, who still find themselves in a minority position. It appears that the Exchange has not been successful in this respect, and indeed, has intensified or highlighted some of the problems

experienced by these women in a predominantly male environment. We do not believe, however, that the Exchange should be seen as the cause of these problems.

The Committee must deal with the presently existing ratios between men and women at MIT and acknowledge the persuasive effect of a women's college on the participation by MIT men in the Exchange. As mentioned earlier in this section, since most Wellesley participation on campus is transient, the Exchange does not significantly increase the association of MIT men with women as professional and academic colleagues. The Exchange, therefore, should not be seen as the primary means for increasing the number of women at MIT, and we urge that more women students be actively recruited to the Institute.

One very positive aspect of the Exchange for its participants was the residence exchange. It accomplished all the stated and unstated goals of the Exchange with a minimum of mechanical problems. Most MIT students participating in the residence exchange found it difficult to find two complete terms of courses at Wellesley to complement their MIT programs, but the majority seemed to prefer a full year of residence exchange to a single term arrangement. There were difficulties in dormitory space which will again appear if the program is reinstated, but it is hoped that these problems can be surmounted.

In conclusion, we must again say that the MIT student support of the Exchange is strongly favorable and that the amount of student participation certainly justifies the continuation of the Exchange beyond the experimental five-year stage. We make the following recommendations for the general improvement of the Exchange.

1. Each school set up a student advisory staff composed of students from every department to help students of the other school take full advantage of the academic offerings. This would substitute for the "student underground" which students have used in the past to discover worthwhile courses at the exchange school.
2. An explicit set of rules should be drawn up to deal with problems that may arise as a result of the differences between the academic policies and procedures of the two schools.
3. A special effort should be made to improve communication between women students at Wellesley and MIT. The programs, activities, and counselling services for women which exist on each campus should be available to the women from both schools. It is hoped that this would encourage the participation of more MIT women in the Exchange and would increase the participation of Wellesley students in the engineering and science departments of MIT.
4. At both MIT and Wellesley, faculty of limited enrollment classes should consider Exchange students with the same priority as students from their own school, neither reserving space for them, nor giving them lower priority than their own students of equal qualifications.

## D. Impact Of The Exchange As Seen By Faculty At MIT

During 1971 the Wellesley-MIT Joint Committee requested comments and evaluation of the Exchange by two MIT faculty groups: faculty having Wellesley students in their classes, and faculty designated as departmental exchange coordinators. These two groups provide two slightly different vantage points, and also represent the faculty most directly affected by the Exchange.

A systematic request for comments from the first group, the faculty having Wellesley students in their classes, produced 46 personal letters. These letters contained a remarkable consensus favoring the Exchange. Although many expressed minor concerns about mechanical problems (such as differences in calendars or troubles with library reserve practices) every letter expressing a discernible overall opinion expressed a favorable one.

Many faculty backed up their favorable conclusions with specifics. Some of these specific comments follow:

"The continuous presence of a wide range of students...has contributed greatly to an atmosphere of reality and spontaneity in which open, meaningful personal interactions are possible...Besides exchanging students the program has provided...the opportunity of changing (the) teaching environment. On several occasions we have met on the Wellesley campus and taken advantage of its less urban atmosphere."

"...the two or three Wellesley people I see in my classes each semester seem again and again to be the very making of the experience for the class at large...students so well prepared and motivated as those who have joined us from Wellesley provide a model and offer an intensity of involvement, which lifts the group in mood and aspiration to a heartening level...the program...is having effects of a broadening and enriching sort even without the consideration of a multiplication of subject choices...the great usefulness of the exchange rests in stimulation gained by a mixture of types of student; the Wellesley students I've taught have offered a quasi-professional capability in areas where most MIT students are often (brilliantly) unprepared...no sadder blow...could be struck than by a lessening of the present involvement with Wellesley."

"...Wellesley students added to the academic experience in this class...by outstanding examples of what

articulate and well-planned student statements could be."

"The (Wellesley) students have each enriched the class proceedings...the cross-reference between the two institutions enlightens class discussion...The Wellesley students are methodical...and (they) raise questions which might otherwise slide by. The MIT students are fearlessly questioned by the Wellesley students about their generalizations. The atmosphere generated by these exchanges is good."

As might be expected, most of the comments relating to the diversity of experience and background came from instructors in less technical subjects. Replies from instructors of more technical subjects tended to emphasize a perceived equivalence in ability between MIT and Wellesley students. Probably the most surprising result of the survey was the complete absence of negative appraisals.\*

In summary, it is clear that the segment of the faculty most affected by the Exchange is enthusiastic about its effects and in favor of its extension.

The second faculty group, the departmental coordinators, submitted letters of reply in December of 1971 and January of 1972. What follows is a summary of these responses.

Faculty coordinators usually confined their comments to experience within their own departments and subjects, and rarely interpreted the larger effects of the Wellesley presence on the MIT campus beyond the classroom. Replies by MIT departments may be classified in the following way:\*\*

1. Extensive Wellesley participation, with positive impact on MIT classrooms:
 

Architecture	Political Science
Economics	Mathematics
Management	Humanities
2. Moderate Wellesley participation, but no particular impact on MIT classrooms:
 

Electrical Engineering	Urban Studies
Biology	Philosophy
Physics	
3. Wellesley participation too limited to enable significant generalization:
 

Civil Engineering	Aeronautics
Metallurgy	Meteorology
Psychology	Nutrition and Food Science
Earth and Planetary Sciences	Foreign Literatures and Linguistics

The first kind of response is probably the most appropriate for elaboration. The observation made most frequently by endorers of the Exchange turned out to be essentially an argument for co-education itself. Several members of the faculty admitted that they were never really sure until grades were due, which women were from MIT and which from Wellesley, but went on to argue that the quality of discussion in many courses improves when the genders are mixed. In cases where Wellesley students were identified, they were appreciated for the contribution of perspectives (in the Social Sciences, Humanities, Architecture, for example) from the culture of the liberal arts which are noticeably different from those of engineering or science. The presence of students with a non-technical or non-scientific viewpoint, together with attitudes and values derived from the environment of a liberal arts campus, was said to have a steadily constructive effect.

Other faculty coordinators expressed a viewpoint that departments most significantly involved in the Exchange are often (though not always) those with a counterpart on the other campus, and that considerable advantage has developed from complementary curricula which provides choices which would not otherwise be available. Such is clearly the case, for example, in Psychology and to some extent in History and English. On the other hand, there are fields of study at Wellesley—such as Religion and Sociology—which are not available at MIT and Wellesley students in turn have shown a strong interest in such fields as Computer Programming and Computer Science which are particularly strong at MIT. Differences of departmental emphasis and orientation have created a reciprocal flow of undergraduates who seek on the other campus what they are not able to find on their own.

It is significant that no explicitly unfavorable or hostile comments were received from any departmental coordinator at MIT. The invitation for evaluative comment was open-ended. The yield from it would appear to reflect spontaneous impressions, the effect of which in the first

\*It should be noted that the faculty survey was completed before the publication of the Ad Hoc Report on the Role of Women at MIT, which contained some specific concerns about the interactions between the Exchange and the MIT women students. It is possible that this report has resulted in increased faculty sensitivity to this aspect of the Exchange, and some negative comments might be received in a survey taken today.

\*\*No replies were received from the following departments: Chemistry, Mechanical Engineering, Chemical Engineering, Nuclear Engineering, and Ocean Engineering. At the time of the survey, no Wellesley students were registered in the latter three departments, and only three students each in Chemistry and Mechanical Engineering.

category is to lend positive and convinced support for the program as it has evolved to date.

In no case did faculty coordinators comment on the impact of the Exchange on the informal culture of the Institute. For example, only one respondent expressed awareness of the kind of criticism of the Exchange which has been expressed by some of the women students at MIT. The faculty itself has very little way to know about the impact of the Exchange outside the classroom.

Certain specific recommendations were made by faculty coordinators at MIT. One was the suggestion that a few subjects be jointly sponsored by a pair of faculty members, one from each campus. A second was a proposal for a faculty exchange, in which a Wellesley instructor from a given department would teach a course on this campus for a semester while a counterpart from MIT taught a course at Wellesley during the same term. Criticism lies in the observation that there is still too little general contact between departmental coordinators at the Institute with their opposite numbers at Wellesley, and particularly too little direct knowledge of Wellesley itself on the part of most faculty members at MIT who have responsibility for processing applications.

Otherwise, however, there seems to be a clear consensus among those faculty most directly involved that the Exchange has fulfilled its stated purposes and that it should be continued.

## V. Administration Of The Exchange

### A. Coordination Of The Exchange Program

The operational responsibilities for the Exchange have been borne by Jane Sauer at MIT and by Diane Flasar and more recently by Helen Falkson at Wellesley. At MIT, the Exchange Office has been in the Office of the Dean for Student Affairs, and at Wellesley, in the Office of the Dean of the College. In 1971, following the recommendation of a commission studying the future of Wellesley College, the Dean of the College, then Phyllis Fleming, established a new office whose primary responsibility would be the administration of exchange programs.

Because of the differences in the administrative organizations at the two institutions, the two Exchange Coordinators found it difficult to set up parallel operations. At Wellesley, coordination for the Exchange was set up in a central office with responsibilities to help Wellesley students directly as well as to handle questions and requests between MIT students and the relevant Wellesley offices and services. At MIT, the operational responsibility was placed in the office of the Dean of Science who is co-chairman of the Joint Committee. Jane Sauer, the Exchange Coordinator at MIT, has provided extensive advice and information to MIT and Wellesley students and conducted valuable surveys of attitudes and enrollment data on the Exchange. Her functions, however, were not as clearly delineated as those of the Wellesley College Exchange Coordinator. As it worked out, her office was not at the center of all Exchange transactions (as was the case at Wellesley) nor was she included in all of the discussions and decisions regarding some operational aspects of the Exchange as well as future plans for the program. As a result, the administration of the program has been much more diffuse at MIT than at Wellesley.

While the Joint Committee has had responsibility for overseeing the experiment, formulating policy, and fostering cooperative efforts, it has not had the direct administrative responsibility for the program. Therefore, while the Committee could recommend certain actions or activities, it was not in a position to implement them.

Several alternatives have been suggested for the future administration of the Exchange, such as establishing a more operational type of joint sub-committee made up of corresponding personnel at each institution to help with the day-to-day operation of the program, leaving the Joint Committee to larger cooperative concerns. Another suggestion has been that one coordinator be placed in charge of operations at both institutions.

At both schools, faculty coordinators were appointed in each department to advise students about the suitability of subjects to their courses of study. The main function of the coordinators has been the semi-annual review of applications for courses within their departments. A great deal of academic advising as to choice of courses is done by advisers at the home institution, by the Exchange Offices, and by student word-of-mouth. Students at MIT are now completing "Course Information Sheets" describing the Wellesley subjects they have taken. The comments on those sheets have been thoughtful and give a prospective Exchange student course information not available in catalogue descriptions. The interdepartmental relationships we had hoped to encourage have not yet materialized, but in several instances we have seen that faculty interest in setting up communication channels still exists in areas such as computer science, urban studies, education, art, architecture, and political science.

### B. Academic Calendars

Two very different academic year calendars and weekly schedules had to be adjusted to facilitate the cross-

registration. At the outset, the spring vacations were adjusted to coincide. Wellesley's present schedule of class meetings (Tuesday—Thursday, Wednesday—Friday) represents an attempt to make it somewhat easier for students to fit in a course or two at the other institution.

The only serious calendar conflict that remains is the January Independent Activities Period at MIT. Since Wellesley's first semester runs through the second week in January, some MIT students have been reluctant to enroll in fall-term Wellesley courses that might restrict their activities during IAP. As a result, enrollment figures generally show a lower enrollment by MIT students in Wellesley courses for first semester than second. IAP will be a definite consideration in any future Wellesley calendar revisions, but it should not be expected that synchronization of the academic calendars would, by itself, resolve all of the logistical problems. With 70-minute class periods at Wellesley and 50-minute classes at MIT, and with MIT generally scheduling many more class periods and laboratories per week for its students, students wishing to cross-register still will need to plan their courses and sections very carefully.

In addition to academic calendar incompatibilities, the difference in operating schedules in the office of the Wellesley Recorder and the MIT Registrar creates one specific difficulty. MIT's revised curriculum and schedule for the coming year are not available until the beginning of August, and many recitation sections and a number of classes are not scheduled until registration day. Thus, Wellesley students, who must plan their academic program for the next year in April of the preceding year, choose MIT subjects without knowing when they will be scheduled, while MIT students apply for fall-term Wellesley subjects during the preceding spring without knowing if these subjects will fit into their MIT schedule.

### C. Expenditures

The Luce Foundation grant of \$175,000 to Wellesley and MIT jointly has been used entirely for the operation of buses hourly between the campuses. Administrative and transportation costs exceeding this amount have come from general funds at both colleges.

In the last three years, the total cost of the bus operation has been \$43,753, \$42,753, and \$45,000. This cost has been shared equally by the two schools. With approximately 1,000 students per year taking courses at the other institution, the bus costs are \$40 per participant. When seats on the buses are not filled by cross-registrants, other members of the community (students, faculty, and staff) are admitted. If we spread the cost over the entire student community having the use of the bus, the cost is \$5 per MIT student per year, and \$11 for every Wellesley student. There have been several suggestions made by students that would help make the bus self-supporting by selling tickets to the community at large, or would place the burden of cost on the cross-registrants. The Superintendent of Buildings and Grounds at MIT, Laurence Pickard, deserves special thanks for his handling of the bus contracts, and this summer he has promised to explore some of the alternatives to the present transportation system.

In addition to the primary costs of the bus, and salaries for Exchange staff, a considerable cost was assumed by Wellesley and MIT for meals eaten by Wellesley students in MIT facilities. The two schools had set up a courtesy meal exchange for cross-registrants who were enrolled in commons plans in their own school. Any difference, resulting from imbalance in the number of meals eaten at either school, would be reimbursed. In 1971-72 the charge to Wellesley for food cost alone was \$12,450, representing 5,271 meals. This charge to Wellesley was the result of the fact that while all Wellesley students are on a commons plan and can pay for meals at MIT with commons vouchers, only 10 percent of the MIT Exchange students have reciprocal privileges (i.e. are on MIT commons). Most MIT students therefore pay directly for any meals eaten at Wellesley. Hence the imbalance. A drastic limitation of the policy of granting meal privileges and a lengthening of dining hours at Wellesley commons has lowered the projected charge to Wellesley for 1972-73 to about \$2,800.

### D. Summary Of Problems In The Administration Of The Exchange

The following items (some mentioned earlier in this report) are listed as administrative problems which tend to inhibit fuller utilization of the Exchange program by students at both Wellesley and MIT. Some of the incompatibilities may not be possible to resolve, but we believe that many of these problems can and should be resolved if the program is to meet its promise.

1. The academic calendars are different. For example, the MIT Independent Activities Period coincides with Wellesley final exams. Also, semesters begin and end at different times.
2. The MIT Registrar receives Wellesley grades too late for MIT grade review meetings, even in semesters when Wellesley finishes before MIT.
3. The Wellesley grading system has a finer resolution than that at MIT, admitting letter grades with a plus or minus attached. Thus, an arbitrary translation of grades is required.
4. The MIT credit system has finer resolution than Wellesley's. MIT gives credits in hours, with 9-12 hours being a "full" course, Wellesley gives credits only in

units of "full" courses. Thus a Wellesley student wishing to take a 6-hour MIT subject cannot transfer credit until she takes a second 6-hour MIT subject, after which both will be added to her transcript as one Wellesley unit.

5. Wellesley requires registration decisions to be made far in advance of registration day, while MIT does not. As a result, Wellesley students must sometimes choose their schedules before the MIT list of offerings is even available, while MIT students often do not know until registration day exactly what their MIT schedule will be, making it very difficult to apply for or choose subjects ahead of time.
6. Wellesley grades average in the B- to C+ area. MIT grades average in the A- to B+ area. This difference deters MIT students from taking Wellesley subjects, while encouraging Wellesley students to take MIT subjects.
7. Books placed on reserve at MIT apparently cannot be (or are not) placed on reserve in the Wellesley library. Some students have found it necessary to spend more time than anticipated in the other institution's library.
8. The deadline dates for dropping subjects, and the customs surrounding drops are different. MIT generally permits drops late into the semester, and with minimal explanation; Wellesley makes dropping a subject a major issue. As a result, Wellesley instructors are unprepared for repeated absences of MIT students without explanation.
9. Wellesley students are late in receiving MIT roll cards, so their course registration is frequently delayed.
10. Class periods at MIT and at Wellesley are of different lengths (50 minutes at MIT, 70 minutes at Wellesley). MIT also schedules its students for more class hours per week than Wellesley (18-21 hours/week at MIT, 10-12 hours/week at Wellesley). Both of these factors make commuting to the other campus for a course very time consuming and sometimes impossible for people who would otherwise cross-register.
11. Instructors and students are not routinely briefed on the mechanical problems described here, and often must re-discover them for themselves.

## VI. Possible Future Directions

The Exchange program was established to expand the formal and informal educational opportunities for students at both institutions, by taking advantage of the complementarities of the two schools. The Exchange to date has explored and built on some of these complementarities—largely through opportunities for cross-registration in subjects, but also through interaction at the social and cultural level which takes advantage of the unique environments of MIT and Wellesley. There has been some cooperation between faculty at the two schools, but this has been rather limited and solely on the initiative of the individuals involved. Most of the increased contact between people at MIT and Wellesley has been among the students.

While cross-registration in subjects does expand curricular options, it should be noted that freedom of choice and broader access to the range of resources at each institution cannot be fully accomplished simply by increasing the number of subjects available to the students. With the expansion and diversification of curricular options, there is an attendant need for more effective information and guidance for the students, as well as for organizing the institutions' intellectual resources in ways that make them more accessible to the students. It is not enough simply to open both schools' catalogues to the students. It may not be enough, either, to assume that the advantages of the Exchange will accrue to faculty members without providing both information and support for cooperative efforts between the two schools. There is a need not only for more information and guidance about educational and cultural opportunities, but for the development of programs and/or activities that would make the special resources and complementarities of the two schools more clearly accessible to their faculties and students.

The Joint Committee has discussed possibilities for further cooperation between Wellesley and MIT and examples of some of these activities have been referred to in this report. However, a fuller exploration of these possibilities will require more than the Joint Committee. We want to encourage more contact between Wellesley and MIT faculty members and more contact between faculty committees and departments. The Joint Committee sees the following opportunities for increased cooperation and recommends that they be explored:

1. Exchanges of faculty for a term or a course. There have already been faculty exchanges, but there would appear to be many other opportunities. For example, when temporary replacements for faculty on sabbatical leave are sought, corresponding departments at the other institution could be consulted for possible candidates.
2. Courses taught jointly by Wellesley and MIT faculty. With complementary strengths in the two faculties, it should be possible to move ahead faster together in some areas than separately.
3. Identification and description of possible academic programs which draw on the special strengths of both institutions.
4. Cooperation in educational research and development. Both institutions have growing interests in edu-

cational research and experimentation. There are opportunities for jointly working on undergraduate curricular opportunities and carrying out research on education more generally. The establishment of the Education Division at MIT provides a base for the development of important new activities in these areas at the Institute. We recommend direct and continuing collaboration between the Education Division and the Education Research Center at MIT and the newly formed Committee on Education Research and Development at Wellesley College.

5. Cooperation in the arts would benefit both Wellesley and MIT through cooperative sponsorship of exhibits, dramatic performances, concerts, lectures, chamber music groups, dance workshops, etc.
6. Joint faculty/student research efforts. At MIT, the Undergraduate Research Opportunities Program is one of the most popular and unique features of undergraduate education. Currently, Wellesley students are able to participate in UROP on an ad hoc basis. It would be useful to explore whether and how such participation can be regularized, and also how such opportunities at Wellesley might become more accessible to MIT students.
7. Joint field work or clinical experience. As students become more interested in connecting their education with experiences outside the university, educational institutions are exploring ways of connecting such activities with the academic program. It would be useful to explore the possibilities for further joint cooperation in activities such as Upward Bound, Urban Legal Studies, off-campus UROP, tutoring programs and teaching in the local schools.
8. Expanded library cooperation. Each school has some outstanding specialized library collections; we should be able to build on these complementarities. We encourage more direct consultation between librarians at the two institutions in order to avoid duplication of acquisitions of high cost and limited use (certain journals, collections, serials, and facsimiles). We also encourage collaboration between Reserve Room Librarians in advance of each semester to arrange for reciprocal placement of books on reserve for courses from opposite campuses.
9. Development of women's programs—as an area of study and as a counseling resource. Such programs could be developed both independently by each school and collaboratively, and made available to women students at both schools.
10. Discussion between MIT and Wellesley of further cooperation in the area of career counseling and placement for students and alumni.

## VII. Conclusions And Recommendations

The basic purpose of the Exchange, as set forth in 1967, was to extend the diversity of educational experiences available to students in the curricula and environments of both institutions. This was to be done, initially, through the provision of cross-registration privileges for undergraduates at both Wellesley College and MIT. It was a proposal by which students from each campus would be able to enroll, without extra tuition, in courses at the other. It was seen as a pragmatic plan without any larger implications about merger.

In the judgment of the Joint Committee on the Exchange, and in the opinion of a sizable majority of the students at each institution, the Exchange has worked well—not always as predicted or expected, but it has worked. Courses of study, programs and extracurricular activities have become available on either side of the twice-crossed Charles that were not available before. From the evidence given in this and other reports by students and faculty, we have learned that there is a complementarity of environment, tradition and intellectual climate which enriches the lives of the students on both sides of the transaction. We believe it would be very difficult—and perhaps counterproductive—to attempt to separate the academic from the non-curricular benefits and values of the Exchange experience. The living-learning experience must be treated as an entity that is educational and that affects the entire student's personal growth. Social interchange must be interpreted broadly to include all of the ordinary interpersonal relationships that must develop between men, between women, and between men and women in order to facilitate the functioning of inquisitive, educated persons in our society.

It is true that the program has produced an uneven distribution of elections between the Schools and departments at MIT, concentrated far more heavily in Humanities and Social Sciences and in Architecture than in Engineering, Science or Management. Given the fact of a liberal arts tradition at Wellesley, however, this development is not surprising. Greater concern has been expressed over an imbalance of enrollment at MIT by Wellesley students. With a total enrollment in the College equal to half the number of MIT undergraduates, Wellesley student participation has been greater than that of MIT during each of the nine semesters but one. Although we are not altogether sure why the proportional number of enrollments has led to such an imbalance, it is also a fact that the four-course plan and class schedules at Wellesley leave the majority of Wellesley students with fewer class hours

per week and therefore a more flexible schedule for fitting in MIT classes and for commuting. It should be remembered that most Wellesley students are able to take MIT subjects in their major area of study (approximately half of them do), while the great majority of MIT students are not able to do so: subjects in engineering are not offered at Wellesley and MIT science majors have sequences of subjects to follow. Two other factors appear to affect the size of MIT enrollment at Wellesley. One is the Independent Activities Period in January, which conflicts with final examinations at Wellesley, and the other is cross-registration at Harvard, which annually involves 80-100 MIT undergraduates there. Given the size of the Institute, the number of subjects in its curriculum, and the dispersion of Wellesley students through MIT subjects, the issue of the numbers alone has not been a matter of major concern to the Joint Committee thus far.

The Committee has felt greater concern about the lack of more extensive interaction between the two faculties, and about the lack of awareness that each faculty seems to have of the other school's curriculum and of the Exchange. One result of this condition is, or may be, ineffective counseling; course selection is apparently based more often on catalogue-reading and on subjective impression than on the advice of the faculty members, although students do in many cases consult with the instructors of courses they are interested in taking. Prior to registration each term, direct contact between faculty coordinators representing respective departments would seem to be an obvious corrective step toward more effective counseling. And for students and faculty alike, we recommend that at the beginning of each term there be an open house on each campus for orientation and opportunities to discuss Exchange activities.

While a sizable number of students from both campuses has found the Exchange experience valuable enough to participate, there have been some objections to the program. Most of these objections relate to certain aspects of the program as it affects people not directly participating in the Exchange. We believe that channels of communication should be maintained within the Joint Committee to represent these interests.

For members of the Joint Committee on the MIT side, it is clear that the most troubling response to the program is the serious opposition—even hostility—which has been expressed by a significant number of women students at MIT. While faculty and administrative members of the Joint Committee have frequently disagreed with certain of their arguments against the Exchange, we cannot dismiss or disregard the intensity of feeling which informs this dissent. Moreover, MIT members of the Committee take the side of the critics in deploring the patronizing attitudes toward women students which are reported from members of the faculty and male students alike. Committee members also agree that the Exchange has in some ways dramatized a series of unsolved problems in the experience of women at the Institute which clearly require close attention.

Administrative aspects of the Exchange have been discussed in Section V, which indicates that the major operational problems with the Exchange seem to be related to the differing academic calendars, class schedules, and registration procedures; limited enrollment classes; the role of the Exchange coordinators; and the time required for commuting between the two campuses.

We have mentioned areas where revisions and clarifications are needed if the program is to continue satisfactorily. There is one additional area that needs attention—the tendency of all of us to stereotype students and institutions into broad categories. The Exchange experience has shown us the difficulties created by lack of communication and lack of familiarity with different people, different interests, and different objectives. Perhaps the greatest non-curricular bonus that can be encouraged by the existence of the Exchange is the habit of trying to communicate.

In sum, the following points emerge as conclusions of our review of the program:

1. A significant number of students at both Wellesley and MIT have taken advantage of the opportunity to take courses at the other institution in spite of the time required for transportation. The number of courses taken at MIT each term by Wellesley students has averaged 335, and the number of courses taken at Wellesley each term has averaged 300 for the five years of the Exchange.
2. The students' choices of subjects at the other institution have indicated ways in which the educational programs at Wellesley and MIT are complementary. The MIT subjects taken most frequently by Wellesley students in 1971-72 were Introduction to Psychology and Brain Science, Organ and System Physiology, General Biochemistry, Physiological Psychology, Photography, and Politics and Television. The Wellesley subjects taken most frequently by MIT students in 1971-72 were Philosophy of Education, Social Psychology, Personality, Ideas in the Novel, and Introduction to Anthropology. However, students have not yet taken full advantage of the complementary strengths of the two institutions; and we should attempt to find ways in which students at each school may explore more fully the resources of the other.
3. The residence exchange in 1971-72 for about 25 students from each institution was found to be a rewarding change in environment for the participants and there

have been many requests since then to reinstate the residence exchange. There were problems with the residence exchange that need to be studied so that they can be avoided as much as possible in the future.

4. A number of undergraduate women at MIT have felt that the Exchange has intensified their feeling that the MIT community does not take them sufficiently seriously as capable persons with strong career motivations. The Joint Committee is sympathetic with the problems of MIT undergraduate women, and the MIT members of the Committee urge a program of active recruitment of women students at all levels.
5. Although the Joint Committee has not been directly involved with extracurricular activities, this has been an important part of the Exchange for students, including many students who have not participated in the course exchange.
6. Wellesley and MIT are quite different institutions and it is perhaps for this reason that new educational activities involving faculty cooperation in planning and presentation have been slow to develop. During this experimental five-year period there has been little contact between the faculties at the points where change was taking place most rapidly in curricular innovation and experimental educational programs. There have been several instances of faculty cooperation arising in connection with the Exchange, but more contact between the faculties, and more effort and time for development will be required to determine the extent to which this will be possible.
7. The differences between the institutions with respect to rules, customs, grading scales, academic calendars, etc., have caused problems but these have not been insurmountable. We are confident that further progress can be made in dealing with these problems as we gain more experience with the operation of the Exchange.

On balance, the full Committee, representing both institutions, and responding to the strong indications of support on each campus, concludes that the Wellesley-MIT Exchange is clearly fulfilling its stated purposes. We believe that each campus has acquired enlarged intellectual resources through this cooperation. At a time of fiscal pressure, students have access to instruction and richer cultural experiences on both campuses—benefits which could not be available to either school without increased expenditures and additional faculty appointments. We believe that the life of classrooms and seminars involved in the Exchange has acquired a widening of perspective, viewpoint and intellectual experience which leads inevitably toward richer circumstances for learning. The Joint Committee concludes that the experimental period has yielded significant advantages to both institutions, and makes the following recommendations to the Academic Council at Wellesley College and to the Committee on Educational Policy at MIT:

The Joint Committee recommends continuation of the cross-registration program between the two institutions. The Committee feels that the experimental five-year period has increased the diversity of educational experiences and environments available to students at both institutions and should no longer be considered an experiment, but a regular part of the programs of both institutions. Faculty members and students should be involved in formulating policy for the Exchange, evaluating its usefulness, and in making regular reports to the faculties of Wellesley and MIT. The Committee also recommends that the residence exchange be reinstated on a necessarily limited basis. We feel that the residence exchange is a valuable part of the program, and recognize that some difficulties in implementation indicate the need for careful planning and for consultation with those students most directly affected by such a program. Finally, the Joint Committee recommends the development of new joint activities between Wellesley College and MIT in the future.

## VIII. Reports Available On Request

There is a great deal of information in past studies and commentary on the Exchange which illuminates in greater detail the nature of the Exchange activities, enrollment patterns, faculty and student attitudes toward the Exchange, its advantages and difficulties. These reports are available upon request from the Exchange Offices at each school.

1. Report on Questionnaire to MIT Students in Spring 1972, by Jane Sauer.
2. Report on Questionnaire to Wellesley Students in Fall 1972, by Helen Falkson.
3. Report on the Exchange at the End of Four Years, by the Joint Committee.
4. Report of the Ad Hoc Committee on the Role of Women at MIT, Spring 1972.
5. Transcript of Discussion of the Exchange by Wellesley Students, February 1973.
6. An Analysis of the MIT-Wellesley Cross-Registration Program, by Students in Managerial Psychology (15.06), January 1969.
7. Wellesley-MIT Exchange: A Profile of the MIT Class of 1972, by Jane Sauer, February 1973.

# MIT Club Notes and Meetings

## Auto Club

Ralph Meany, Porsche racer, will be guest speaker. Bob Perron will have slides on the Daytona 24-Hour Race. Wed, Mar 21, 8:30pm, Lobdell, Student Center.

## Bridge Club\*

ACBL Duplicate Bridge. Thurs, 7pm, Student Rm 473. Admission: MIT Community, 50 cents; others, 75 cents.

## Ergo

Staff meeting. Sun, 7pm, Student Center Rm 443.

## Judo Club\*\*

H. Yanagi, 5th degree black belt, chief instructor. Mon, Wed, Fri, 5-6:30pm; Sat, 1-3pm; duPont Exercise Rm. M. Portnoff, X3-5954.

## Hobby Shop\*\*

Mon-Fri, 10am-6pm, Rm W31-031. Fees: \$6/term for students; \$10/term for community. Call X3-4343.

## Karate Club\*\*

Beginner and intermediate classes in Goju style. Mon and Wed, 7:30pm, duPont T-Club Lounge. For info, call X3-2018.

## Kung Fu Club\*\*

Northern Praying Mantis. Tues, Thurs, 7-9pm, duPont Athletic Center. For info, H.C. Wong, 876-5071.

## MIT/DL Duplicate Bridge Club\*\*

Tues, 6pm, Student Center Rm 473.

## MIT Wheelmen\*\*

All aspects of bicycles and bicycling discussed, events planned, advice and help given. Thurs, 7:30pm, Rm 1-246. Call Harry, X2384 Dorm.

## Rugby Club\*\*

Practice sessions; Tues, Thurs, 8pm; Sat, 1pm; meet in duPont Gym.

## Soaring Association\*\*

General meeting. Tues, Mar 20, 7:30pm, Student Center Rm 407.

## Student Homophile League\*

Meeting and coffee hour. Sun, 4-6pm, Rm 14E-307. All men and women welcome. For gay help (anonymous) at MIT, call student gay tutor, 492-7871, anytime.

## Science Fiction Society\*

Fri, 5pm, Rm 1-236.

## Scuba Club\*\*\*

Dry session, Wed, Mar 17, 8pm, Rm 20E-017. Compressor hours, Mon-Fri, 4-6pm, Alumni Pool.

## Strategic Games Society

Sat, 1pm, Walker Rm 318. Club offers opponents and discounts on merchandise to members plus gaming periodicals library. Kevin Slimak, X0389 Dorm.

## Student Information Processing Board Meeting\*

Mon, 7:30pm, Rm 39-200.

## Tae Kwon Do Club

Tues, Thurs, 5-7pm; Sat, 11am-1pm. DuPont T-Club Lounge. Call Jae Kim, X9212 Dorm.

## Tech Engineering News\*\*

General staff meeting. Sun, 5pm, Rm W20-453.

## Technique

Staff meetings. Sat, 11am, Student Center Rm 451.

## Tech Squares\*

Western style square dancing. Tues, 8-11pm, Sala de Puerto Rico. \$1. First time free.

## Tiddlywinks Association\*

Wed, 8pm, Student Center Rm 491.

## Unicycle Club\*

Activities and beginners' session. Sun, 1pm, in front of Student Center.

## Social Events

### Friday Afternoon Club\*\*

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

### Muddy Charles Pub\*\*

Join your friends for music, beer, wine, snacks, conversation at the Muddy Charles Pub, 110 Walker. New hours: Mon-Fri, 11:30am-2pm and 4-7:30pm; Sat, 7-12pm. Starting January 1, nightly specials will include: Mon, all wines 25 cents; Tues through Thurs, free pretzels and chips. Call GSC, X3-2195.

### SCC Pot Luck Coffeehouse\*

Live entertainment every Fri and Sat, 8:30pm to 12m. Student Center Mezzanine Lounge. Free coffee, cider, doughnuts. Sponsored by Student Center Committee. Volunteers to perform or otherwise help out, call Paul Mailman, X9626 Dorm, or Doug Fried, X8767 Dorm.

## Movies

### Present Tense (Cole)

Humanities 21.276 movie. Tues, Mar 13, 7pm, Rm 10-250.

### Film and Lecture Series\*

Architecture 4.097. Midge MacKenzie lecture on "Sex Roles in Films." Wed, Mar 14, 2pm, Rm E21-010 followed by a Feminist film, title to be announced. 7pm. Free.

### Death in Venice (Visconti)

Humanities 21.276. Thurs, Mar 15, 7pm, Rm 10-250.

### A Man For All Seasons

LSC. Fri, Mar 16, 7pm, 9:30pm, Rm 26-100. Tickets 50 cents, MIT or Wellesley ID.

### SCC: Fail Safe

Student Center Committee Midnight Movie Series. Fri, Mar 16, 12m, Sala de Puerto Rico, MIT or Wellesley ID.

### The Seven Minutes

LSC. Sat, Mar 17, 7pm & 9:30pm, Rm 26-100. Tickets 50 cents. MIT or Wellesley ID.

### Animal Farm

LSC. Sun, Mar 18, 7pm, Rm 10-250. Tickets 50 cents. No IDs.

### Blue Angel (Sternberg)

Humanities 21.299 movie. Mon, Mar 19, 7pm, Rm 10-250. Free.

### The Frozen Revolution (Mexico)

Humanities 21.492 movie. Tues, Mar 20, 7pm, Rm 10-250. Free.

### Film and Lecture Series\*

Architecture 4.097. Feminist film (title to be announced) related to Midge MacKenzie lectures on "Sex Roles in Films." Tues, Mar 20, 7pm, Rm E21-010.

### Feminist Film

Humanities film. Joyce at 34 by Joyce Chopra. Tues, Mar 20, 7:30pm, Rm 14N-0615. Discussion with Ms Chopra after screening.

### Film and Lecture Series

Architecture 4.097. Midge MacKenzie lecture on "Sex Roles in Films," Part II. Wed, Mar 21, 2pm, Rm E-21-010. Followed by a Feminist film, title to be announced. 7pm. Free.

### Great Catherine

LSC. Fri, Mar 23, 7pm & 9:30pm, Rm 10-250. Tickets 50 cents. MIT or Wellesley ID.

### SCC: "I Know Who You Are, and I Saw What You Did!"

Student Center Committee Midnight Movie Series. Fri, Mar 23, 12m, Sala de Puerto Rico, MIT or Wellesley ID. Free.

### Dance Free Films\*

Movies (16mm), dancing, multimedia happening, audience participation. Architecture student project. Every Thurs, Fri, Sat, 7-12pm, Odd Fellows Hall, 536 Mass Ave, Cambridge. Tickets: \$1 or 75 cents w/costume. Fruit and cider.

## Music

### Noonhour Concert

April Showers, flute and John Cook, harpsichord. Thurs, Mar 15, 12n, Chapel. Free.

### MIT Symphony Orchestra

Works by Debussy, Mozart, Vercoe and Brahms. Conducted by David Epstein, piano soloists John Buttrick and Robert Freeman. Sat, Mar 17, 8:30pm, Kresge. Tickets: free to MIT community, Lobby Bldg 10 or \$1 at the door.

### Songs of Exile-Songs of Zion\*

Shulamith, folksinger, and Dr. David Neiman, narrator. Songs in Hebrew, Arabic, Ladino and Yiddish depicting Jewish history. Sun, Mar 18, 2pm, Kresge Little Theatre. Free.

### Max Reger Centennial Concert

John Buttrick, pianist and Eric Rosenblith, violinist performing the works of Reger and J.S. Bach. Mon, Mar 19, 8pm, Kresge. Free.

### Noonhour Concert\*

Betsy McCory, harp. Thurs, Mar 22, 12n, Chapel. Free.

### Glee Club

Rehearsals. Works by Stravinsky, Brahms, Mozart, Schubert. Tues, Wed, Thurs, 5pm, Kresge.

## Theater and Shows

### The MIT Dramashop Presents an Evening of One-Act Plays

"The Cat and the Moon" by W. B. Yates and "Motel" from "America, Hurrah" by Jean-Claude van Itallie. Critique and coffee hour following the presentation. Fri, Mar 16, and Sat, Mar 17, 8:30pm, Kresge Little Theatre. Free.

### Community Players

Auditions for Brecht's "Good Woman of Setzuan," Tues, Wed, Thurs, Mar 20, 21, 22, 7:30-11pm, Rm 5-218.

## Dance

### Folk Dance Club\*

International, Sun, 7:30-11pm, Sala. Balkan, Tues, 7:30-11pm, Student Center Rm 491. Israeli, Thurs, 7:15-10:15pm, duPont T-Club Lounge. Afternoon dance break, Fri, 12:30-1:30pm, Bldg 7 Lobby.

## Exhibitions

### Photographs of Gregory Smith\*

Hayden Corridor Gallery, through March 15.

### Sculptures by Harold Paris-Souls and Indian Miniatures from the Collection of John Kenneth Galbraith

Hayden Corridor Gallery. Mar 16-Apr 7. Open 10am-4pm, Mon-Sat.

### Lobby 7 Phot Exhibits

Ron MacNeil-Photographics. Lower Level. Mechanical Engineering and IAP Committee Joint Photo Contest Entries, Second Level. "The Architecture of Bernard Maybeck," Third Balcony. Mar 5-16.

### Botanical Illustrations from the Massachusetts Horticultural Society and the Arnold Arboretum

Hayden Corridor Gallery, Mar 16-Apr 11. Corridor Gallery is always open.

### Photo Exhibit-Transformations

The results of an IAP workshop at the Creative Photography Lab by instructors John Weiss and Bob Tycast. Mar 19-Apr 6, Lobby 7, Second Level.

### Photographs by George Thomas

Creative Photography Gallery (120 Mass Ave). Mar 19-Apr 10. Open daily 10am-6pm. Free.

### Music Library Exhibit

Photographs of early instruments up to 1600. Daily, Rm 14E-109.

### Hart Nautical Museum\*

Exhibits include "Ocean Engineering Summer Laboratory Projects 1971 and 1972," and "Tugs and Towing." Bldg 5, first floor.

## Religious Services and Activities

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

### Campus Crusade for Christ/College Life\*

Family time, fellowship and teachings from God's Word. Fri, 7-9:30pm, Rm 1-132.

### Christian Bible Discussion Group\*

Thurs, 1pm, Rm 20B-031. Call Prof. Schimmel, X3-6739, or Ralph Burgess, X3-2415.

### Christian Study Group

Meeting to study God's Word and the lives of Christian men. Sun, 9:30am, McCormick Green Rm. For info, 494-8778.

### Christian Science Organization\*

Thurs, 7:15pm, Rm 8-314. Meetings include testimonies of healing.

### Divine Light\*

Discourses on the knowledge of Shri Guru Maharaj Ji. Mon, Wed, Fri, 7:30pm, Rm 4-159.

### Hillel Services\*

Mon-Fri, 8am, Rm 7-108; Fri, Mar 16, Reform Sabbath Service, 8:15pm, followed by an Oneg Shabbat of Israeli folk dancing and singing, Chapel; Sat, Mar 17, Purim Services and Megillah Reading, 8pm, followed by a Purim Party, Talbot Lounge East Campus.

Yiddish classes, Thurs, 7-9pm, Rm 1-242; Hebrew classes, Wed: beg 6-7pm, intermed 5-6pm, Rm 1-203. For adv classes, X3-2982. Mekhila classes, Fri, 11:45am, Hillel Office, 312 Memorial Drive.

### Islamic Society\*

Prayers, Fri, 12:15pm, Kresge Rehearsal Rm B. Discussions on the Qur'anic interpretations of various aspects of life, Sat, 4pm, ISC Lounge, Walker 2nd floor, coffee served.

### Protestant Worship Service\*

Sun, 11am, Chapel.

### Roman Catholic Masses

Weekly masses in the Chapel: Sun, 9:15am, 12:15pm, 5:15pm; Tues, 5:05pm; Wed, 4:30pm; Fri, 12:05pm.

### Vedanta Society\*

Services, Fri, 5:15pm, Chapel. Followed by discussion hour, 6pm, Lobdell Dining Rm.

### Westgate I & II Bible Study

Wed, 8pm, Westgate I, apt 1202. For info, 494-8405 or 494-8778.

### United Christian Fellowship\*

Christians for dinner, food, fellowship. Wed, 5pm, Walker (at sign of the fish). Followed by singing, praying, sharing meeting, 6pm, Rm 14E-303.

### Zen Society\*

Meditation meetings. Mon through Fri, 8-9am, Chapel. Call 492-4945.

## Announcements

### Foreign Students Meeting

Discussion of "Foreign Students Returning Home." Thurs, Mar 15, 4pm, Walker Memorial, International Students Lounge Rm 50-210.

### Student Center Committee

The possibility of purchasing new furniture for the SC lobby areas and function rooms is being discussed. If you have any interest or ideas concerning the new decor, please call and leave your name, X3-7974 or X3-3913.

### Summer Jobs

Students, both graduate and undergraduate, interested in summer jobs are reminded to review the books of "leads" on display in the Student Financial Aid Office, Rm 5-119.

### Rental Typewriters

Now available at Student Center Library. MIT ID required.

### R/O Week

Work has started on organizing R/O Week for next year. If you have any modifications, new ideas or are interested in helping out, leave name at FAC Office, Rm 7-103.

Fiji Island Party. Sat, May 5. Make your plans now.

## Dining Service Specials

### 20 Chimneys

Open at 11:45am for lunch service, for 2 week experiment. Regular menu.

### Wednesday, March 14

Lunch: Beef chop suey over toasted noodles  
Dinner: Chicken breast Maryland style

### Thursday, March 15

Lunch: Frank-a-roni  
Dinner: Roast sirloin of beef au jus

### Friday, March 16

Lunch: Baked macaroni and cheese  
Dinner: French fried haddock w/tartar sauce

### Monday, March 19

Lunch: Spaghetti with meat sauce and garlic bread  
Dinner: Roast fresh ham w/applesauce

### Tuesday, March 20

Lunch: Cottage chicken  
Dinner: Chopped sirloin steak w/mushroom gravy

### Wednesday, March 21

Lunch: Gaucho pot pie  
Dinner: Southern fried chicken

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 March 21 through March 30 to the Calendar Editor, Room 5-111, Ext. 3-3279, by noon Friday, March 16.

## Kurtich to Present Multi-Media Shows



A simultaneous seven-image projection system and quadraphonic sound installation will be used by cinematographer-architect John Kurtich for multimedia presentations March 20-22 in the Building 7 Lobby.

Kurtich, who is also an urban designer, is a faculty member of the School of the Art Institute of Chicago, Department of Environmental Design.

The presentations, entitled "Archaeology" and "Athens," are sponsored by the MIT Lobby 7

Committee and will be given at noon, 1pm and 5pm Tuesday through Thursday, March 20-22. An additional performance will be given at 7pm on Wednesday, March 21.

"Athens" is a media portrait of the city of Athens, exploring the modern and ancient faces of the city through art and architecture. "Archaeology" presents a media portrait of Samothrace, the Greek island in the Aegean Sea, and contrasts ancient temples with architecture in Chicago.

## Alumnae Plan Centennial

(Continued from page 1)

who received a degree in chemistry in 1873 and went on to teach chemistry at the Institute and founded the field of home economics. (A plaque of Mrs. Richards hangs in the lobby of Building 4.)

The convocation will present a broad range of panel discussions, workshops and speeches on matters affecting the professional and personal lives of women and men. Registration for the convocation is open to the public.

Adm. Zumwalt will discuss "Global Perspectives for the Coming Decade" at the opening panel at 9am, Saturday, June 2, in Kresge Auditorium. Other topics in the panel include "Economic Patterns and Prospects for Men and Women and Work" by Dr. Mary Potter Rowe, special assistant to the President and Chancellor; "Sociological Trends," and "The Impact of Art on Technology and of Technology on Art." Speakers for the last two are yet to be announced.

Saturday afternoon will be given over to workshops in four fields: professional development, paths for career advancement, new directions in education, and personal development.

Mrs. Graham will speak at the convocation banquet, Saturday evening in duPont Gymnasium.

A second panel, entitled "A

## Women's Forum

Recent changes affecting women at MIT will be discussed at the Women's Forum Monday, March 19, at noon in the Bush Room (10-105). Speakers include Chris Randall on athletics, Susan Stevick on the libraries, Audrey Buyrn on the centennial celebration. Other topics include graduate assistance and a possible spring workshop.

Century of Women Students at MIT: Continuity and Change," is scheduled for 9:30am Sunday, June 3. Speakers will include Dr. James R. Killian, Jr., '26, Honorary Chairman of the MIT Corporation; Florence Luscomb, '09, an architect and feminist; Dr. Julius A. Stratton, President Emeritus of MIT; and Dr. Emily L. Wick, professor and former associate dean for student affairs. The moderator will be Dr. Dorothy Weeks, '23, consultant to Harvard University.

The concluding speaker, at 11:15am June 3, will be Helvi Sipila, assistant secretary-general for social and humanitarian matters of the United Nations, whose topic will be "Status of Women Professionals: An International Overview."

The convocation will close with a private showing of an exhibition depicting the history and contributions of MIT women.

# Statement Re-emphasizes Safety Guidelines for Labs

(The following statement has been issued to department heads and laboratory directors by Philip A. Stoddard, vice president for operations, as a reminder for MIT people working under potentially hazardous conditions around the Institute.)

The recent unfortunate accident involving a student in a chemistry laboratory emphasizes again the importance and the necessity for strict adherence to good safety practice and Institute policy regarding working alone. In its simplest terms as quoted from the MIT Accident Prevention Guide, 'Never work alone if the work involves operations or experiments which may be hazardous. Make sure someone is in visible or audible range to help you if something goes wrong.'

Students, staff and employees often find that it is necessary to conduct experiments or perform other work tasks during off-hours and weekends. Working alone at those times, or even in secluded rooms during normal working hours where hazards to life safety may be encountered, is contrary to established safe practices and Institute policy. There are several instances that can be recalled where the presence of a second individual has saved someone from serious injury by his action, especially in summoning Campus Patrol, medical assistance, the Fire Department, and Physical Plant personnel.

Types of operations considered in this category are work with high energy materials; highly reactive chemicals; flammable liquids;

toxic gases, liquids or solids; high pressure equipment; electrical systems; towers and cold rooms.

Each department and laboratory is responsible for establishing procedures with regard to potentially hazardous work by individuals in accordance with the guidelines set forth in the MIT Accident Prevention Guide. When doubt exists as to whether or not it is permissible to work alone on a particular operation or job func-

tion, the supervisor and safety personnel should determine jointly the extent of the activity and the safety limits involved.

In the final analysis, it is the responsibility of the immediate supervisor, and most particularly the person involved, to abide by established safety procedures in such instances and to assure positive arrangements with at least one other person for help in an emergency.

## Clerical Skills Classes Training Section Starts

The Training Section of the Office of Personnel Development has announced that registration for several clerical skills development classes and English Conversation classes will begin Wednesday, March 14.

The number of courses offered by the Training Section has been expanded by one and now includes beginning Gregg shorthand. For this initial, 13-week, pilot program, eight applicants will be selected. They will meet for instruction on Tuesdays and Fridays from 11:00am to 12:30pm. Some of the objectives of this course will be to provide MIT employees with the means to acquire a solid foundation in the fundamental theory of Gregg shorthand and to develop speed commensurate with the time and effort expended.

Registration for the following classes is now being held: Typing I (beginning typing), Technical Typing, Typing II (continuous),

Technical Typing Introduction (short course, two lectures), Dictaphone Transcription, Shorthand and English Conversation (beginning, intermediate and advanced.).

General Office Practice is also open for registration at this time. It is, however, somewhat restructured and will be presented as a seminar course. Employees will have the opportunity to take part in discussions concerning office practice and procedures which relate to specific jobs and to share their knowledge and experiences with other office employees. It is hoped that the registrants for this course will come from a diverse cross-section of office clerical employees.

To register for any of the above classes, call or visit the Training Section, Room E19-734, Ext. 3-1912 or 1913. Classes will begin on Monday, March 26.

## Fencers Win New England Title But Fall in Eastern Competition



MIT's New England Championship fencing team poses with their trophy. Left to right, they are: Maestro Silvio Vitale, Mark Sausville, Dong Park,

Mike Wong, Kevin Hunter, Mark Hickman, Chris Eckel and Coach Eric Sollee. --Photo by Margo Foote

MIT's New England Championship varsity fencing team fell in competition at the 76th Intercollegiate Fencers Association Tournament held in New York March 9-10.

Going against 12 tough Eastern schools like Yale, New York University and University of Pennsylvania, the MIT fencers failed to qualify for final rounds in all three weapons—foil, epee and sabre.

Losing the Eastern meets was a disappointment for the fencers

who had just won their seventh New England Championship on March 3. Top winners in the New England meet were: Mike Wong, a senior in electrical engineering from Overland Park, Kansas, first in sabre; Dong Park, a sophomore in biology from Demarest, N.J., third in sabre; team captain Chris Eckel, a junior in biology from Cleveland Heights, Ohio, second in epee; and Mark Sausville, a junior in humanities and engineering from Glen Rock, N.J., third in foil.

Under the coaching of Maestro Silvio Vitale and Eric Sollee, the varsity fencing team finished the 1973 season with a strong 10-4 record.

Despite a successful season, the team is looking for new members. Undergraduates interested in fencing are encouraged to try out for the team. Practice is held daily from 5 to 6pm in the duPont Fencing Room throughout the year. In addition, the Fencers Club meets every Wednesday at 7pm.



# Engineer Shortage Forecast for Nation

Contrary to public opinion, a serious shortage of engineers is developing in the US according to Fred M. Hechinger, education writer for the *New York Times*. In an article in last Sunday's *Times*, Hechinger said enrollments at engineering schools have been declining over the past few years, and "educators and manpower experts are now warning that key industries—and the economy as a whole—will be hit within two years by a crisis."

The enrollment decline has been caused, Hechinger said, by the belief that unemployed engineers are a glut on the market—a notion attributable to cutbacks in defense

## New Advisory Group Named

A new Advisory Committee on Minority Graduate Student Affairs has been announced by Dr. Clarence G. Williams, assistant dean of the Graduate School.

The committee, Dean Williams said, will advise him on policies, procedures and programs to expand educational, residential and extracurricular opportunities for minorities at MIT.

The initial thrust will be aimed at recruitment, counseling and financial aid for graduate black Americans, Mexican Americans, Puerto Ricans and American Indians, Dean Williams said. An essential function, he said, will be to gather data on minority graduate education at MIT and nationwide.

Committee members are: Dr. Sanborn C. Brown, associate dean of the Graduate School; Professors William A. Davis, Jr., of urban studies and planning, David J. Epstein of humanities, Wesley L. Harris, Sr., of aeronautics and astronautics, and James E. Young of physics; graduate students Paulette Coleman, Corpus Christi, Tex. (urban studies and planning), James R. Ellis, Jr., of Tulsa, Okla. (electrical engineering), Martin L. Jankowski of Bay City, Mich. (political science), Nilda Martinez of New York City (chemistry), Ronald E. McNair, of Lake City, S.C. (physics), Georgia A. Persons of Seale, Ala. (political science), and Simon R. Wiltz, of Dorchester (architecture).

and space work. However Hechinger said, despite these curtailments, the overall demand for engineers is still strong and growing.

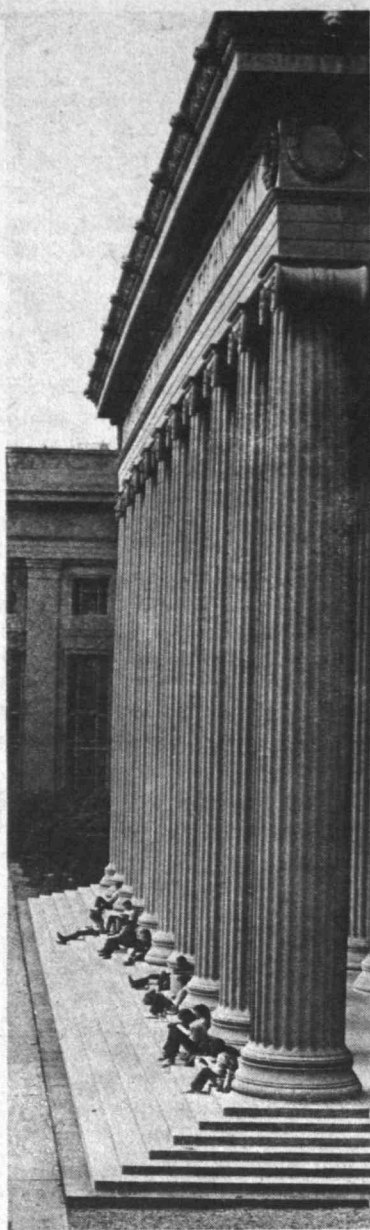
Hechinger said the Engineers' Joint Council, in figures just released, shed light on what engineering educators call a developing crisis:

The current college freshman class of 52,100 engineers represent an 11 percent drop below the class that entered in 1971 and the 1971 freshman class was 18 percent below the 1970 total. Conservative forecasters are predicting an average annual shortage of 10,000 engineers for the remainder of the decade.

"The future supply indicated by the enrollment figures would seem alarmingly inadequate even if compared only with President Nixon's latest manpower forecasts of an annual need for 48,000 new engineering graduates during the remainder of the decade," Hechinger said.

"Given the normal attrition, plus the constant flow of engineering graduates into nonengineering fields, such as management and sales, a freshman class of about 52,000 will not produce anywhere near the president's estimated minimum needs."

Hechinger cited EJC figures showing that last year's graduates from engineering programs did not find a general shortage of jobs, even with the slowdown in hiring that resulted from the economic recession of 1970-71.



Un-Marchlike weather draws sun worshippers to the Building 10 steps.

—Photo by Margo Foote

## Nominations Sought For Goodwin Medal

Nominations of candidates for the 1973-74 Goodwin Medal are now being accepted by the Graduate School.

The Goodwin Medal, established in memory of Harry Manley Goodwin, the first dean of the Graduate School, is presented annually to a graduate student who has demonstrated excellence in teaching. The Goodwin Medalist is a young man or woman who has established a place of distinction in the opinion of his or her colleagues, students and professors.

Nominations can be made by any member of the faculty or by

an organized student group through one of its officers. Written nominations should include the nominee's curriculum vitae, the department in which he holds academic appointment and his specific teaching responsibilities. Letters from students, colleagues and faculty must be submitted to provide evidence of outstanding competence in teaching.

Nominations should be sent to Irwin W. Sizer, dean of the Graduate School, Room 3-134, through the head of the nominee's department. Deadline for submitting nominations is Monday, April 2.

# Expanding Protons Theory Confirmed

(Continued from page 1)  
material reality—have led physicists in recent years to "smash" atoms with increasingly energetic beams as a way of studying the interactions and kinds of particles that emerge from the nuclear collisions. When a beam of energetic protons, for example, is directed against a target, usually a bubble chamber, that contains protons, the proton-proton collisions produce an array of scattered particles. The scattering cross-section, as it is called, provides clues to the size of the particles involved and to the probabilities of their interaction.

Prior to the work of Professors Cheng and Wu, there were two main views of the laws governing proton-proton interactions. One, called the Regge-pole theory, predicted that at very high energies the proton would become larger, flatter and increasingly more transparent to bombarding particles. Its total cross-section—and consequently, the probability of all interactions—would tend to a constant or diminishing value.

The other theory, called the optical model, predicted that the particle would be invariant in size—in the same way a box, for example, is not changed by the energy of light falling on and rebounding from its surface—and thus the total cross-section would remain constant at high energies.

In their paper three years ago, Professors Cheng and Wu wrote that, according to their new theory, their own predictions marked "a drastic departure from current concepts of high-energy scattering."

"After more than a year of deliberation," they wrote then, "we now realize that the above predictions constitute the only answer supported by all theoretical evidence from field theory."

Specifically, the two collaborators predicted that the total cross-section of the proton—and of all other particles, known as hadrons, that interact through the nuclear or so-called "strong" force—would gradually increase as the energy of the interaction rose. Instead of becoming transparent to colliding particles it would become increasingly absorptive, or black.

Professors Cheng and Wu's new model also led them to predict an

increase in the total elastic cross-section, in which the particles recoil from each other.

Both these predictions have now been confirmed by the recent experiments at CERN, while several other predictions still await experimental confirmation.

The experiments were conducted by two large international groups of experimental physicists with CERN's new Intersecting Storage Rings, in which beams of particles traveling at high energies in opposite directions are allowed to collide. Because of relativistic effects, two beams of approximately 30 billion electron volts apiece can produce energies of about 2,000 billion electron volts when they collide. At these enormous energies, previously unattainable even in the largest accelerators, the experiments showed an increase of about 10 percent in the proton's total cross-section, thus confirming the Cheng-Wu predictions.

Dr. Victor F. Weisskopf, professor of physics at MIT, said the results of the new experiments were "most exciting," and noted that the observations tend to support the suspicion, raised in recent years, that the proton itself is formed of smaller constituents. Professor Weisskopf was director of CERN when the Intersecting Storage Rings were being constructed.

In their 1970 paper, anticipating the current series of experiments on the new facilities then being built, Professors Cheng and Wu wrote:

"In conclusion, we emphasize the uniqueness of the present physical picture from our knowledge of high-energy behavior in field theory. Confrontation with the experimental data in the next few years will be most exciting."

## Chomsky Speaks

Dr. Noam A. Chomsky, Ferrari P. Ward Professor of Modern Languages and Linguistics, will present the third Technology and Culture Seminar "Images of Man" lecture today, March 14, at 5:30pm in Room 9-150.

Professor Chomsky's topic will be "Science and Mystery in the Study of Human Language."

## New UROP Listings

**ATTENTION UNDERGRADUATES: April 2 is the deadline for all Spring UROP requests for wages. No proposals for Spring term wages will be accepted after this date.**

### Summer Urop

UROP is offering a summer program this year. Participation will be limited to undergraduates who are continuing ongoing UROP projects. Support for research and personal expenses will be awarded on a matching basis through the usual UROP proposal procedures. Funding decisions will commence April 9th with proposals received on a first come/first serve basis.

### Arthur D. Little, Inc.

The NIH now funds a research program at ADL's Acorn Park facility to develop blood compatible polymeric materials with high permeability to gases for use in artificial lungs and blood oxygenators. A particular sub-project centers on the gas permeability properties of modified polyalkylsulfone membranes, and correlating their permeabilities with chemical structure and with methods of manufacture. The project would be primarily laboratory work, but the student should have an interest in learning about the underlying mathematics and physical principles of the process. Credit preferred for second term. If the project continues into summer, pay is a possibility. Schedule, 15-20 hours a week by arrangement.

## Student Employment

**On Campus:** Captain and employees needed for new bicycle compound; Students needed for Lobdell and Twenty Chimneys; Launch driver needed by Coach Holland.

**Off Campus:** 3 students needed as inspector's helpers at Lincoln Lab; Programmer for Bio-dynamics in Cambridge.

**Summer:** See Summer Job Books located in 5-119.

For details on these and other available jobs and how to apply, come in and see Kathi Mahoney, Student Employment Office, 5-119.

## Other Opportunities

### Summer Grants For Student Projects In Community Affairs

**Attention:** Undergraduates and graduate students who wish to implement community service and fieldwork projects this summer.

Application guidelines will be available beginning this Friday for student-initiated projects in areas of health care, ecology, transportation, education, economic development, housing, communications, etc. Projects are to be developed jointly with off-campus organizations—work with community groups, government agencies, hospitals and other service programs in the Greater Boston area.

Assistance in planning projects will be provided by Timothy Bird, coordinator, in a series of workshops. Pick up guidelines from the Information Center (7-111), Urban Action Office (W20-437), Timothy Bird (9-416) or Dr. Louis Menand (3-234). The Summer Community Affairs Program is sponsored by UROP, the MIT Community Service Fund, and the President's Fund for Community Affairs.

For information call Ext. 3-4822.

**Deadline for Proposal Applications: April 13, Bldg. 9-416**

### Summer in Peru

Proyecto Amistad is a summer volunteer project in Peru for students, professionals and others who wish to learn about a new culture and who have varied interests and talents. In previous summers volunteers have worked in teaching, teacher education, medicine, community development and recreation. Other types of jobs are possible.

Requirements: (1) A genuine desire to live with a Peruvian family. (2) A knowledge of Spanish. A one-semester intensive course is probably the minimum. (3) A commitment to stay in Arequipa for at least seven weeks. (4) An interest in some particular work area. Cost: Around \$500. This includes charter flight from Miami to Lima, stay in Lima, bus ticket to Arequipa, open flight from Lima to Miami. Dates: Approximately June 25 to August 20.

For further details see Professor Locke or Paula Kelly, Room 10-303, Ext. 3-5243.