

Weisskopf Will Give Two Killian Lectures in April

Two lectures designated as the James R. Killian Jr. Faculty Achievement Award Lectures will be given in April by Victor F. Weisskopf, professor of physics and Institute Professor.

Professor Weisskopf, who is the 1973-74 Killian Award Lecturer, will speak April 3 on "The Search for the Ultimate Structure of Matter."

On April 10 Professor Weisskopf will lecture on "The Frontiers and the Limits of Science." Both lectures will be at 5:15pm in Room 26-100. The April 10 lecture will be followed by a "Dutch treat" supper in the Student Center and an open discussion at 7:30pm in Student Center Room 473.

Professor Weisskopf is the second to hold the Killian Award Lectureship. Professor Nevin S. Scrimshaw, head of the Department of Nutrition and Food Science, received the award in 1972-73.

Community Fund Seeks Proposals

The MIT Community Service Fund is inviting new proposals for funding during the summer or for the 1974-75 academic year.

The CSF provides financial assistance to Institute people who participate in community projects. The CSF review panel focuses particularly on proposals in which grants for equipment, supervision, administration and service can give special leverage to the efforts of MIT volunteers. The fund also provides seed money for innovative proposals.

Proposals should be sent to the CSF in Room 10-205 by Monday, April 15. For more information, call Joseph Collins, Ext. 3-1988 or 3-5278.

MIT Grad School Courts Southern Black Colleges

By DAMON WRIGHT
Staff Writer

Representatives of some 30 black colleges and universities in the South were guests of the MIT graduate school for a one day conference last week to explore ways the Institute can attract more graduate students from southern minority schools.

The Thursday meeting was the second time representatives of the schools — all members of the so-called Thirteen College Curriculum Program (TCCP) — have met at MIT. TCCP was originally formed in 1967 by 13 schools to develop new educational programs that capitalize on the backgrounds and interests of black students. Membership has grown to 35.

The conference was opened with a morning meeting at which Chancellor Paul E. Gray gave an historical overview of efforts — beginning in 1967 — at MIT to re-



"Watergate" winner Thomas S. Birney and his marble-carrying machine.

Student Designers Wrestle With ME's 'Watergater'

There are any number of ways of playing marbles, but about 80 MIT mechanical engineering students came up with a new twist last week.

The competition was keen. Skill was involved, but luck played a role. There were cheers and groans from a roomful of spectators. There was a referee, an official timer (and a laser timing device) and a scorer.

But unlike most sporting events, and especially marbles games, this one had a serious educational purpose.

The students were from Dr. David Gordon Wilson's course in mechanical engineering synthesis

and design. And the contest was a proving grounds for one of their projects—designing and constructing a device to perform a specific task.

The task in this instance was to deliver a glass marble from an elevated starting enclosure to a high-numbered gate on a water trough (hence the name, Watergate Contest) in the shortest possible time.

The devices made by the students moved on an overhead string and had to be constructed solely of materials provided for the project.

The packages contained 27 dif-

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CSR Watchful as Mariner Nears Mercury Encounter

By DENNIS L. MEREDITH
Staff Writer

Mariner 10, the space probe which kept its scientific date with the planet Venus last February will encounter the planet Mercury this Friday, and an MIT solar wind experiment on board is expected to measure the strongest solar wind yet measured by man.

The experiment was a joint project among MIT, NASA's Goddard Space Flight Center in Greenbelt, Maryland, the California Institute of Technology's Jet Propulsion Laboratory, the Los Alamos Scientific Laboratory in New Mexico, and the University of California at Los Angeles.

MIT scientists involved in the experiment were principal investigator Herbert S. Bridge, professor of physics and associate director of MIT's Center for Space Research; and Alan J. Lazarus, senior research scientist. Dr.

George Siscoe, visiting professor of physics at MIT will assist in the analysis of the solar wind data.

Design of the instruments and integration of the portions of the package from Los Alamos and Goddard were done in the Center's Laboratory for Space Experiments under the program management of Robert Butler.

The 20-pound instrument—about the size of a shoebox—contains two detectors to measure the solar wind and its interaction with Mercury. The solar wind is composed of charged particles, and associated magnetic flux—which stream continuously from the sun.

The instrument has already distinguished itself by revealing that the planet Venus possesses a long plasma wake or tail on its anti-solar side. However, the scientists have no firm idea what to expect on the space probe's encounter with Mercury. Until now Mercury has been studied only from the earth using optical telescopes and radar measurements. Its surface, possible atmosphere and surrounding forces remain largely unknown.

Mariner 10, launched last November, is history's first dual-planet mission, and the first to use the gravitational attraction of one planet (Venus) to reach another (Mercury). The robot tourist took more than 3,500 pictures on its encounter with Venus, and is expected to return about 2000 of Mercury. The MIT scientists and their colleagues will possibly get another chance to examine Mercury, for if Mariner 10 survives its first pass by the planet, it will swing by again in about six months as it orbits the sun.

Pre-Retirement Seminars Begin

The Benefits Office has announced a new series of pre-retirement seminars to begin next week.

Discussions include topics such as Social Security, Medicare and Medex, estate planning, health, the American Association of Retired People and Institute retirement benefits. The first meeting will concern Institute retirement benefits.

The seminars will be open to all interested employees and their spouses, especially those nearing retirement.

Campus seminars will be held in Rm 39-400; the Lincoln series will take place in A-166. Seminars for faculty and staff are scheduled April 2, 9, 16, 23 and 30, 3-5 pm. Hourly, bi-weekly and exempt seminars will be April 4, 11, 18 and 25, 3-5 pm. Lincoln seminars will be held May 1, 8, 15, 22, and 29 from 9:30-11:30am.

Specific topics for each seminar will be listed in the *Institute Calendar*. Call the Benefits Office, x3-4271, for further information.



DR. CLARENCE G. WILLIAMS (second from left) special assistant to the President and Chancellor for minority affairs, checks the day's itinerary with three of some 30 guests of the MIT graduate school who recently met to discuss recruitment of minority students attending black colleges in the South for graduate programs at MIT. Shown with Dr. Williams are, left to right, Dr. Frederick S. Humphries, director of the Thirteen-College Curriculum Program and vice president of its parent organization, the Institute for Services to Education; Dr. Darlene Huddleston, of Tennessee A&T State University, Nashville, and Dr. Eunice Moore of Clark College, Atlanta, Ga.

MIT Student Math Winner

David J. Anick, a freshman from Neptune, N.J., was one of the five highest ranking scorers in the nation in the recent 34th annual William Lowell Putnam Mathematical Competition.

The competition involved 2,053 contestants from 362 institutions throughout the US and Canada and was held on Dec. 1, 1973, with contestants being tested at their own institutions.

An MIT team also received an honorable mention in the contest. Team members were Anick; Glenn A. Iba, a senior in mathematics from Hershey, Pa.; and Frank E. Morgan, a senior in mathematics from Allentown, Pa.

Individual honorable mentions went to Mark S. Fischler, a senior in physics from Brooklyn, N.Y.; Sheldon H. Katz, a freshman from Brooklyn, N.Y.; and Edward L. Wimmers, a senior in mathematics from Cincinnati, O.

(Continued on page 2)

MIT Symphony Begins Three-City Tour Tonight

By WILLIAM T. STRUBLE
Staff Writer

The MIT Symphony Orchestra is scheduled to play a concert tonight in Kleinhans Music Hall in Buffalo, N.Y.—the second in its 1974 spring tour sponsored by universities in upstate New York and Canada.

The 105-member orchestra left MIT Sunday by bus, scheduled to travel directly to Hamilton, Ontario, where conductor David Epstein had planned acoustical and dress rehearsals Monday afternoon in Hamilton Place, a new concert hall, prior to the first tour concert that evening. The Hamilton concert was under the sponsorship of McMaster University.

On Tuesday the orchestra was to travel to Buffalo and, after a tour of local sites and museums, attend a concert that evening in honor of composer Aaron Copland, who was to be present for the occasion. Tonight's concert by the MIT Symphony in Kleinhans Music Hall is under the auspices of the State University of New York at Buffalo.

Professor Epstein, who was in Buffalo late last week to prepare for the concert, was interviewed at length in a broadcast over the Buffalo station of the Public Broadcasting System and on a

program over WBFO, a campus station.

The third and final tour concert, on March 28, is by invitation of the University of Western Ontario, in London, Ont.

Marcus Thompson, violist and member of the MIT music faculty, is soloist with the orchestra on tour, as in concerts March 16 at MIT and March 19 at Wellesley—both of which drew full audiences. The program for the spring concerts consists of Bloch's *Hebraic Suite for Viola and Orchestra*, *Incidental Music for the 'Merchant of Venice'*, by John Harbison, composer and member of the MIT music faculty, and Mahler's *Symphony No. 1*.

* * *

Members of MIT's new Center for Asian Music were videotaped last Wednesday for a scheduled appearance Monday, March 25, on the Sonja Hamlin Show on WBZ-TV, Channel 4. Appearing with Professor Donald Sur, director of the Center, were visiting artists Yoo-Jin Chung and Sudesh Arora, who performed briefly on their instruments, the kayagum and the sitar.

Center Presents Kathak Dancers Concert April 1

The internationally known Kathak Dance Company of North India will give a performance at 8pm April 1 in Kresge Auditorium.

The concert will feature Birju Maharaj, considered to be the foremost contemporary Kathak dancer, in dances of the Moghul Court, stories of Krishna, and improvisational dances.

The program is the first public event sponsored by MIT's new Center for Asian Music and will be presented in conjunction with the 26th annual meeting of the Association for Asian Studies to be held April 1-3 in the Statler-Hilton Hotel, Boston. General admission tickets will be \$3. Tickets for MIT and Wellesley students will be \$2 on presentation of identification cards.

Kathak is the classical dance of North India, its name deriving from the word "kathaka," meaning storyteller. The dance form stems from the ancient Indian tradition of passing on knowledge of religious epics and mythology and the highly developed abstract movement and rhythmic aspects are accentuated by the dancers' ankle bells.

Birju Maharaj is the son and dance disciple of Acchan Maharaj, a court dancer in the state of Rampur. Birju, who is known for his virtuoso technique and elegance of interpretation, is the youngest artist to receive the Indian Akademi Award. He has danced in Europe and the Soviet Union and teaches at Bharatiya Kala Kendra, in New Delhi, of which he is a director.

A member of the company is Kumudini Lakhia, who has represented India in many dance



Dancer Birju Maharaj

troupes sent abroad by the India government. She was one of the first recipients of a governmental scholarship for advanced training and research in Kathak.

Three musicians who play the sitar (plucked lute), tabla (drum), harmonium, the naal (drum), and the sarangi (bowed lute) will accompany the dancers.

Legal Authority Will Give Compton Lecture

Jerome H. Skolnick, chairman of the Center for the Study of Law and Society at the University of California-Berkeley, will speak April 3 at MIT's Compton Lecture Program.

He will discuss "Changing Visions of Crime and Criminal Justice."

Dr. Skolnick has consulted on a variety of public agencies and commissions and has served as director of the Task Force on Violent Aspects of Protest and Confrontation of the National Commission on the Causes and Prevention of Violence. He is the author of "The Politics of Protest."

Respondents will be Dr. Richard C. Larson, associate professor in the departments of urban studies and planning and electrical engineering, and Dr. Gary T. Marx, associate professor of urban studies and planning, both of MIT.

Following Dr. Skolnick's remarks and the remarks of the respondents there will be a panel discussion and Dr. Robert M. Fogelson, associate professor of urban studies and planning at MIT, will serve as moderator.

The lecture will be held in Rm 9-150.

New Exam Procedures Announced

The Schedules Office has announced new procedures for final examinations to take effect this spring.

Each academic department will be responsible for preparation and reproduction of final examination material and for assignment of departmental graduate students as proctors.

The examiner or proctor assigned will be responsible for picking up and returning all final examination material to the department.

The Schedules Office will assign all rooms for final

examinations. Wherever practical, only one large examination per session will be assigned to Walker Memorial and duPont Gymnasium. The Schedules Office also will continue to organize and conduct conflict examinations.

The Schedules Office will maintain a central examination headquarters office in Rm 7-102 throughout the final examination period.

Questions concerning these procedures should be directed to W.E. Glynn, assistant registrar, x3-4788.

Interlochen Group To Give MIT Concert

A chamber music concert by the Gabrieli String Quartet, whose members are high school students at the Interlochen Arts Academy, Interlochen, Mich. will be given at 5pm, Thursday (April 4) in the MIT Music Library.

The quartet will perform Beethoven's Quartet in F, Opus 18, No. 1, Joaquin Turina's *La Oracion Del Torero* and Shostakovich's Quartet No. 2 in A, Opus 69. The concert, sponsored by the MIT Music Section, will be free and open to the public.

New UROP Listings

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

Attention! Last call for second term UROP proposals! We will soon freeze our assets so as to be able to plan for summer.

Summer UROP

UROP will have a summer program again this year. Eligibility will be limited to undergraduates who are continuing ongoing UROP projects. Support for research and personal expenses will be awarded according to the usual UROP proposal procedures and negotiations. Such proposals are now welcome, and should be submitted through the faculty supervisor's department UROP coordinator. Award decisions will not begin until the end of April. Summer proposals will receive priority according to the date of receipt in the UROP office and evidence of faculty enthusiasm for the proposed activity. A new option this summer includes the case where a faculty member agrees to support the full wages of

a student. By submission of a suitable proposal to UROP, overhead charges on these wages can be waived. Call the UROP office for more information on this option.

New England Energy Management Information System (Project NEEEMIS)

Interested in the energy crises? Project NEEEMIS is engaged in collecting raw data on the supply of petroleum and petroleum products in New England and the flow of these products to and from New England states. This project includes collection of data on number and size of containers of oil products, their inventories and transactions against inventories. Extensive interviews with local, state and federal officials and researching government documents and private publications are a few of the data gathering techniques that will be used. Students will also be involved in processing and analyzing data, creating computer models and forecasting economic projections. Because of the scope of the study, students interested in computers, economics, management, natural resources, and political science are welcomed. There is much flexibility and independent study in this project, so all interested students are encouraged to visit the project in Room E40-189 or call Mr. Don Garmer, Ext. 3-5945 or Ext. 3-5946.

Department of Nutrition and Food Science

Intensive studies have been done on the technologies to produce single-cell proteins and on the fermentation kinetics of

n-alkane assimilating microorganisms. These technologies are expected to supply large quantities of proteins for animal feed and possibly for human foods in the future.

In studying the initial steps of n-alkane metabolism we have chosen a yeast enzyme system. This enzyme system involves a mixed function oxidase and two dehydrogenases that convert n-alkane to n-alkanoic acid. After purifying and investigating the enzyme systems, we are planning to immobilize the system for industrial applications. We have already developed the enzyme assays using a radioactive tracer and have obtained a particulate enzyme fraction from the yeast cell. Students involved in the project would be working on further fractionation of the system including solubilization of the enzyme from microsomal membranes. Interested students please contact Dr. A.J. Sinskey, Room 56-121, Ext. 3-6721 or Dr. T. Yorifugi, Room 16-210, Ext. 3-5106.

New England Medical Center

Rheumatoid arthritis is believed a result of an antigen antibody reaction which damages the joints. Recent studies indicate that gamma globulin molecules aggregate to form macromolecules which act as an antibody and then attach antigen sites in the joint, gradually destroying them. It has been observed in adults that the common amino acid, histidine, tends to block the aggregation of the molecules and thus to prevent, to some extent, damage to the joints. For the past three years a laboratory at

Black Colleges

(Continued from page 1)

ference together with Dean Sanborn C. Brown.

Also that afternoon TCCP members met for informal discussion with graduate student members of the black student community at MIT. Dr. Williams said that the TCCP members tended to enjoy this part of the day most.

"They were very concerned about knowing the experiences of the black student at MIT," he said.

Dr. Williams coordinated the day as a continuation of his old duties as assistant dean of the graduate school. In the capacity of special assistant to the President and Chancellor he plans to maintain the contacts he has made with the minority schools and possibly broaden the basis of action with TCCP.

Dr. Cohen Heads NAS Committee

A study group headed by an MIT faculty member—Dr. Morris Cohen, Ford Professor of Materials Science and Engineering—has found that strong federal leadership is needed to establish materials policies that are in harmony with those on resources, energy and the environment.

This finding was included in *Materials and Man's Needs: Materials Science and Engineering*, a summary report issued by the National Academy of Sciences Committee on the Survey of Materials Science and Engineering (COSMAT).

The report is a comprehensive outline of materials-research activities, challenges, opportunities and recommendations for action that should help to guide materials policy.

Dr. Cohen has been chairman of COSMAT since its establishment in 1970.

NEMC has been working with 100 patients exploring whether the phenomenon of histidine amelioration of the disease also occurs in the juvenile form of rheumatoid arthritis. In conjunction with this on-going research, UROP project possibilities exist in areas of collection, analysis and correlation of blood sample information of the clinic patients. A UROP participant will have opportunities to participate in regularly scheduled meetings of the clinic physicians. Biology related laboratory experience is desirable. For further information contact the UROP office, Room 20B-141, Ext. 3-5049.

promising individuals for national and international positions in fields which involve formulation of public policy with respect to problems of modern society. Applicants must hold a degree equivalent to the first degree offered at the university level and must submit an application which should contain an outline of his proposed study. Grants will be offered for studies requiring a period of work of at least six and not more than 12 months. Deadline: May 1, 1974.

TECH TALK

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Graduate Studies

The following brief descriptions of selected graduate fellowships have been received recently by the Graduate School Office. More complete descriptions are available in the Office, Room 3-136.

Fellowship Programme of the Committee on the Challenges of Modern Society

The Fellowship Programme of the Committee on the Challenges of Modern Society is designed to stimulate serious study of public policy in relation to natural and social environment. Available to any national or permanent resident of NATO member countries, the fellowships are aimed at helping scholars increase their skills and knowledge in the field and are designed to contribute to the training of



Thirty Are Promoted to Associate Professorships

Thirty members of the MIT faculty have been promoted to the rank of associate professor, effective July 1, 1974.

The newly promoted associate professors are:

Richard C. Tremaglio of the Department of Architecture. Professor Tremaglio received the BA degree in 1964 from Brown University and the BArch in 1968 from MIT. He was appointed assistant professor in 1970 and lives in Weston.

Judith G. Wechsler of the Department of Architecture. Dr. Wechsler received the BA degree in 1962 from Brandeis University, the MA in 1967 from Columbia University and the PhD in 1972 from the University of California at Los Angeles. She joined the faculty in 1970 as assistant professor. She resides in Cambridge.

Lawrence E. Susskind of the Department of Urban Studies and Planning. Dr. Susskind, who is director of the Undergraduate Urban Studies Program, received the AB degree in 1968 from

Columbia University, the MCP in 1970 and the PhD in 1973 from MIT. He was appointed assistant professor in 1971 and resides in Brookline.

Ian D. Turner of the Department of Urban Studies and Planning. Dr. Turner was appointed assistant professor in 1972 after receiving the AB degree in 1961, the MCP in 1964 and the PhD in 1972 from Harvard University. He lives in Cambridge.

Renwick E. Curry of the Department of Aeronautics and Astronautics. A graduate of Middlebury College where he received the AB degree in 1959, Dr. Curry received the SM in 1962, the EAA in 1963 and the PhD in 1968 from MIT. He was appointed to the faculty in 1969 and resides in Hingham.

Amadeo R. Odoni of the Department of Aeronautics and Astronautics. Dr. Odoni attended MIT where he received the SB degree in 1965, the SM in 1967 and the PhD in 1969, when he was appointed to the faculty. He lives in Cambridge.

William H. Matthews of the

Department of Civil Engineering. Dr. Matthews, who is Arthur D. Little Assistant Professor of Environmental Sciences and Engineering, received the BS and MS degrees in 1963 and 1964 from Lamar State College of Technology, SM degrees in 1965 and 1970 and the PhD in 1970 at MIT. He was appointed assistant professor in 1970. He resides in Belmont.

Wayne M. Pecknold of the Department of Civil Engineering. Dr. Pecknold received the BS degree in 1963 from Michigan State University and the SM in 1965 and PhD in 1970 from MIT. He was appointed assistant professor in 1970 and lives in Winchester.

Barry A. Blesser of the Department of Electrical Engineering. Dr. Blesser was appointed assistant professor in 1969 after receiving the SB degree in 1964, the SM in 1965 and the PhD in 1969 from MIT. He lives in Raymond, N.H.

Harry S. Colburn of the Department of Electrical Engineering. Dr. Colburn received the SB degree in 1963, the SM in 1964 and the PhD in 1969 from MIT. He was appointed to the faculty in 1969 and lives in Cambridge.

Clifton G. Fonstad of the Department of Electrical Engineering. Dr. Fonstad received the BSEE in 1965 from the University of Wisconsin at Madison, the SM in 1966 and the PhD in 1970 from MIT. He joined the faculty in 1970 and resides in Cambridge.

William J. Shack of the Department of Mechanical Engineering. Dr. Shack joined the faculty in 1968 after receiving the SB degree in 1964, the SM in 1965 from MIT and the PhD in 1970 from the University of California, Berkeley. He lives in Arlington.

Philip Thullen of the Department of Mechanical Engineering. Dr. Thullen received the BS degree in 1965 from Purdue University, and the SM in 1967 and ScD in 1969 from MIT. He was appointed assistant professor in 1969 and lives in Dover.

James H. Williams, Jr. of the Department of Mechanical Engineering. Dr. Williams, who is also the Esther and Harold E. Edgerton Assistant Professor of Mechanical Engineering was appointed to the faculty in 1970. He received a mechanical designer degree in 1965 from the Newport News Shipping and Dry Dock Company, the SB in 1967 and SM in 1968 from MIT and the PhD in 1970 from Cambridge University, Eng-

land. He resides in Arlington.

H. Kent Bowen of the Department of Metallurgy and Materials Science. Dr. Bowen was appointed assistant professor in 1970 after receiving the BS degree in 1967 from the University of Utah and the ScD degree in 1970 from MIT. He lives in Watertown.

Chrysostomos Chrysostomidis of the Department of Ocean Engineering. Dr. Chrysostomidis received the BSc (Hns) degree from Kings College, England in 1965, the SM in 1967, NA in 1968 and PhD in 1970 from MIT when he was appointed to the faculty. He lives in Cambridge.

Robert F. Engle, III, of the Department of Economics. Dr. Engle was appointed assistant professor in 1969 after he received the BA degree in 1964 from Williams College and the MS in 1966 and PhD in 1969 from Cornell University. He lives in Cambridge.

Catherine V. Chvany of the Department of Foreign Literatures and Linguistics. A graduate of Radcliffe College in 1963, Dr. Chvany received the PhD in 1970 from Harvard University and was appointed assistant professor in 1971. She resides in Watertown.

Stephen Erdely of the Department of Humanities. Dr. Erdely, who joined the faculty in 1973, received the PhD degree from Case Western Reserve University in 1962. Earlier he received the Absolutorium from Franz Josef University in Hungary and the artist's diploma from the Franz Liszt National Academy. He lives in Concord.

Heather N. Lechtman of the Department of Humanities and the Department of Metallurgy and Materials Science. Professor Lechtman joined the faculty in 1971 after receiving the BA degree in 1956 from Vassar College and the MA in 1966 from New York University. She lives in Cambridge.

Barry L. Vercoe of the Department of Humanities. Dr. Vercoe received the MusB degree in 1959 and the BA in 1962 from the University of Auckland and the AMusD from the University of Michigan in 1968. Dr. Vercoe, joined the faculty in 1971 and resides in Lexington.

Joel A. Huberman of the Department of Biology. Dr. Huberman was appointed assistant professor in 1970 after receiving the BA degree in 1963 from Harvard College and the PhD in 1968 from the California Institute of Tech-

nology. He lives in Watertown.

Jonathan A. King of the Department of Biology. Dr. King received the BS degree in 1962 from Yale University and the PhD in 1967 from the California Institute of Technology. He was appointed to the faculty in 1970 and resides in Cambridge.

Charles C. Counselman of the Department of Earth and Planetary Sciences. Dr. Counselman was appointed assistant professor in 1969 after receiving the SB degree in 1964, the SM in 1965 and PhD in 1969 from MIT. He resides in Belmont.

David G. Schaeffer of the Department of Mathematics. Dr. Schaeffer joined the faculty in 1970 after receiving the BS degree in 1963 from the University of Illinois and the PhD in 1968 from MIT. He resides in Belmont.

William M. Rand of the Department of Nutrition and Food Science. Dr. Rand received the AB degree in 1959 from Indiana University, the MA in 1961 from Brandeis University and the PhD in 1969 from the University of California at Los Angeles. He came to MIT in 1969 and lives in Watertown.

E. Victor George of the Department of Physics. Dr. George joined the faculty in 1970 after receiving the BSEE degree in 1961 from the Illinois Institute of Technology and the PhD in 1969 from MIT. He resides in Lexington.

Jochen Heisenberg of the Department of Physics. Dr. Heisenberg received the diploma in physics in 1965 and the PhD in 1967 from the University of Hamburg, Germany. He was appointed assistant professor in 1970 and lives in Arlington.

Margaret L.A. MacVicar of the Department of Physics. Dr. MacVicar, who was appointed to the faculty in 1970, is also the Class of 1922 Assistant Professor and director of the Undergraduate Research Opportunities Program. She received the SB degree in 1964 and the ScD in 1967 from MIT. She resides in Somerville.

Robert J. Taylor of the Department of Physics. Dr. Taylor was appointed to the faculty in 1971 after receiving the BS degree in 1961 from San Diego State College and the MS in 1965 and PhD in 1970 from the University of California at Los Angeles. He lives in Peabody.



AUDREY BUYRN, second right, presents a \$500 scholarship check to Janet Stoltz, second left, the 1974 AMITA Scholarship award winner. Looking on are Susan Schur, president of AMITA, left, and Dr. Kenneth R. Wadleigh, MIT vice president, who spoke at the annual AMITA student dinner.

Stoltz Wins AMITA Award

Janet Stoltz, who will receive her SB in physics and electrical engineering at this year's Commencement, received the 1974 award of the Association of MIT Alumnae (AMITA) last week.

The award is presented annually to a graduating woman senior for outstanding scholarship. Presentation was made by Dean Audrey Buyrn, '58, of the MIT Laboratory for Nuclear Science, who is chairwoman of the AMITA financial aid committee.

Ms. Stoltz plans to enter graduate study leading to an MD-PhD degree in health sciences. She also has received a Danforth Fellowship for graduate study.

As an undergraduate, Ms. Stoltz has been active in Hillel and Alpha Phi Omega. She is a past tutor in freshman physics and is member of the student-faculty committee on physics education. This year she also teaches a weekly class in Judaic studies for Hillel.

THE INSTITUTE CALENDAR

March 27
through
April 7

Events of Special Interest

Changing Visions of Crime and Criminal Justice** – Jerome H. Skolnick, chairman, Center for the Study of Law and Society, University of California, Berkeley; panel discussion moderated by Robert M. Fogelson, urban studies & planning. Respondents: Gary Marx, urban studies; Richard Larson, electrical engineering, urban studies. Compton Lecture Series. Wed, Apr 3, 4pm, Rm 9-150.

The Search for the Ultimate Structure of Matter* – Victor F. Weisskopf, Institute Professor, Killian Award Lecturer. James R. Killian, Jr. Faculty Achievement Award Lectures. Wed, Apr 3, 5:15pm, Rm 26-100.

Nominations Committee – Hearings to appoint two students to new Institute Committee on Privacy and to select four students to serve on newly reconstituted MIT-Wellesley Joint Exchange Committee. Wed, Apr 3, 7:30pm, Stu Ctr Rm 400. Appointment, x3-2696.

Bake-Book Sale* – Sponsored by Technology Wives Organization. Thurs, Apr 4, 8am-sellout, Bldg 10 Lobby.

Seminars and Lectures

Wednesday, March 27

Volunteer/Career Energy: How Sparks Light Candles** – Julia Kaufman, WBZ "Call to Action," Mass Council for Public Justice; Sandra Kahn, counselor, Civic Center Clearing House, Admissions, Radcliffe College; Herta Loeser, co-director, Civic Center Clearing House, visiting scholar, Radcliffe Institute, Matrons' Seminar. 10am, Rm 10-105.

Numerical Modeling of Turbulent Buoyant Flow* – Dr. B.E. Launder, mechanical engineering, Imperial College, London. Civil Engineering, Water Resources and Hydrodynamics Seminar. 4pm, Rm 48-316.

The Future of Portuguese Africa – Douglas L. Wheeler, chairman, history, Brown University. MIT-Harvard Africa Luncheon Seminar, CIS. 12:30-2pm, Bowie seminar, rm, Harvard CIS, 6 Divinity Ave.

Island Arcs and Continental Growth – Dr. P. Jakes, Geological Institute, Czechoslovakian Academy of Science, Lunar Science Institute. Earth & Planetary Sciences Colloquium. 4pm, Rm 54-100. Tea 3:30pm, Rm 54-923.

Monday, April 1

Optimization of Flow Conditions in Electrodialysis-Type Systems – Morton S. Isaacson, G. Mechanical Engineering Doctoral Thesis Presentation. 4pm, Rm 1-146.

Earthquakes versus Nuclear Power Plants* – Robert V. Whitman, civil engineering. Nuclear Engineering, ANS Seminar. 3pm, Rm NW12-222. Refreshments.

Some Bifurcation Results – Louis N. Howard, mathematics. Applied Mathematics Colloquium. 4pm, Rm 2-338. Tea 3:30pm, Rm 2-349.

Numerical Modeling of Circulation and Dispersion in Coastal Areas – John Wang, research associate; Jerome J. Conner, civil engineering. Civil Engineering Water Resources and Hydrodynamics Seminar. 4pm, Rm 48-316. Coffee 3:45pm, Rm 48-410.

Tuesday, April 2

Failure Prediction in Theta Pinch First Wall – A. Pant, G. Nuclear Engineering Doctoral Seminar. 12n, Rm 38-166.

Preventive Dental Care in Children – Dr. Jong, Boston University School of Dentistry; Dr. Ferrara, Mass Dept of Public Health. Course 11.547 Human Life Cycle: Children & Adolescents Seminar. 1:30pm Rm 7-102.

Institute Benefits – Allan J. Urquhart, benefits officer. Pre-Retirement Seminar. 3pm, Rm 39-400. Open to faculty and staff.

Models of Transportation Behavior – Timothy Tardiff, social sciences, University of California, Irvine. Transportation Systems Division Seminar. 3pm, Rm 1-236. Refreshments.

Prior Information and Edge Detection in Pictures – Stephen D. Shapiro, Stevens Institute of Technology. Cognitive Information Processing Group Seminar. 3:30pm, Rm 36-248. Coffee 3pm.

General Circulation Model of the Stratosphere* – Dr. Derek M. Cunnold, meteorology. Meteorology Seminar. 4pm, Rm 54-100. Coffee 3:30pm, Rm 54-923.

Psychohistory and Revolution: Austro-Marxism and Otto Bauer* – Peter Loewenberg, history, UCLA. Center for International Affairs Seminar. 4pm, Rm E53-482.

Petrogenesis of Marta Basalts and Nature of the Lunar Interior – Dr. A. E. Ringwood, Research School of Earth Sciences, Australian National University. Crosby Lecture, Earth & Planetary Sciences. 4pm, Rm 16-134. Tea 3:30pm, Rm 54-923.

Implementation Issues and Modern Analysis Techniques* – Dr. Willaim Killingsworth, management consultant, Pugh Roberts Associates, Inc. Electrical Engineering Decision and Control Sciences Group Seminar. 4pm, Rm 39-500.

Transcarboxylation: Role of Biotin, Metals and Subunits in the Reaction – Dr. Harland Wood, Case Western Reserve University School of Medicine. 4:30pm, Rm 6-120. Coffee 4pm, Rm 56-520.

Wednesday, April 3

Professional Energy: How to Plug into the Outlet** – Natalie Low, psychologist; Esther Westervelt, alumni professor, director, institutional studies, Simmons College. Matrons' Seminar. 10am, Rm 10-105.

Creative Design* – David Gordon Wilson, mechanical engineering. Mechanical Engineering Undergraduate Seminar. 12:15pm, Rm 10-105.

Cumulative Probabilistic Performance Optimization for Process Control* – Paul W. Chin, Jr, G. Aero/Astro Doctoral Thesis Seminar. 1pm, Rm 33-206.

Long Time Tails in Time Correlation Functions – Sidney Yip, nuclear engineering. Nuclear Engineering Doctoral Seminar. 2pm, Rm 24-117.

Nodal Methods for Solutions of the Neutron Diffusion Equations – J. H. Mason, G. Nuclear Engineering Doctoral Seminar. 3pm, Rm NW12-222.

Innovations in Oilfield Technology – Joseph G. Debanne, ocean engineering. Ocean Engineering Invention Seminar. 3pm, Rm 3-133.

Transmission and Reception of Wide Band Acoustic Signals in the Deep Ocean* – Robert T. Porter, Woods Hole Oceanographic Institution. RLE & EE Communication Theory Seminar. 3pm, Rm 36-428.

Experiment Design for Measurement of Turbulent Properties in Rod Bundle Arrays – P. Carejilescov, G. Nuclear Engineering Doctoral Seminar. 4pm, Rm NW12-222.

The Impact of New Technology on Construction* – Harvey Steinberg, vice president, Beacon Companies. Project Management Program, Construction Management Seminar Series. 4pm, Rm 1-350.

Consumer Durables* – Robert Lund et al, CIS. Telecommunications Policy Planning and Research Seminar. 4pm, Rm 9-450.

Course 4.603 Aesthetic Perspectives in Science and Technology Seminar. Cyril Smith, Institute Professor, professor of metallurgy, history of science and technology, emeritus. 8pm, Rm 3-133.

Thursday, April 4

Education, Youth and Social Change in Contemporary India – Y. B. Damle, sociology, India. CIS Seminar. 11am, Rm E53-482.

Institute Benefits – Allan J. Urquhart, benefits officer. Pre-Retirement Seminar. 3pm, Rm 39-400. Open to employees.

Communications Activities in ESL* – J.E. Ward, electrical engineering, deputy director ESL. ESL & Decision and Control Sciences Group Seminar. 4pm, Rm 39-500.

Some Investigations of Sound Attenuation by Plants and Soil* – Donald Aylor, Connecticut Agricultural Experiment Station. Interdepartmental Acoustics Seminar. 4pm, Rm 5-134. Coffee 3:30pm, Rm 1-114.

Bi-Component Textile Fibers – Dr. James Saunders, director, nylon & polymer research, Monsanto Textile Co. Polymer Science & Engineering Seminar. 4pm, Rm 4-231. Tea 3:30pm, Rm 8-314.

Ancient Greek Ideas about Heat – Irving Kaplan, nuclear engineering. Thermodynamics Seminar. 4:10pm, Rm 3-343. Coffee 4pm.

Acculturation and Food Habits: the Case of the Afro-American* – Dr. Norge Jerome, human ecology, University of Kansas Medical Center. Nutrition and Food Science Seminar. 4:15pm, Rm 54-100. Coffee 4pm.

Friday, April 5

Rosch? Bosch? Which is it and What is it?* – M. Manning, G. Chemical Engineering Doctoral Seminar. 2pm, Rm 10-105.

Simulation and Control of a Biological System* – R. Wilcox, G. Chemical Engineering Doctoral Seminar. 3pm, Rm 10-105.

The MBTA: Problems & Prospects – Jack Doolittle, chairman of the board, MBTA. Center for Transportation Studies Luncheon Seminar. Buffet 12n, lecture 12:45pm, Stu Ctr Mezzanine Lge. Buffet \$1, lecture free.

Designing Products to be Quieter – Richard H. Lyon, mechanical engineering. Mechanical Engineering Seminar. 3pm, Rm 3-133. Coffee 4pm, Rm 1-114.

Dynamics of Liquid Rb: Neutron Scattering and Computer Molecular Dynamics Results* – J. M. Rowe, National Bureau of Standards. Materials Science Colloquium. 4pm, Rm 9-150. Refreshments 3:30pm.

Community Meetings

MIT Committee for the Right to Choose – Meeting Thurs, Mar 28, 5:15pm, Cheney Rm.

Today's Woman** – Discussion group sponsored by Technology Wives Organization. Victoria Roemele, psychiatric social worker, will discuss "Building a Supportive Network for Yourself." Thurs, Mar 28, 8pm, Stu Ctr West Lge.

Association of Student Activities** – Representatives of all student activities are invited to attend, Sun, Mar 31, 3pm, Stu Ctr West Lge. Meeting notices may be picked up at the UA office, Stu Ctr Rm 401.

Women's Forum* – Natalie Nicholson, director, MIT Libraries, will speak on general library services; several staff members will speak on NASIC program, law-related materials, and Ohio College Library Center shared catalog program in which MIT will soon participate. Mon, Apr 1, 12n, Rm 10-105

Student Committee on Educational Policy – Chairman, treasurer and secretary will be elected. Tues, Apr 2, 7:30pm, Stu Ctr Rm 473.

Grievance Committee* – Sun, Apr 7, 6pm, Stu Ctr Rm 401.

MIT Club Notes and Meetings

Bridge Club* – ACBL Duplicate Bridge. Matchpoint pairs Thurs, 7-10:30pm; non-masters (less than 20 master points) Fri, 10pm-12m; small IMP-scored team of 4 (advance registration required) Fri, 8pm & Sat, 2pm; all Stu Ctr Rm 473. Jeff, 864-5571.

Chinese Choral Society** – Sun, 3pm, Stu Ctr Rm 473.

Goju Karate Club* – Beginners join class first week of each month: Meetings Mon, Thurs, 7-9pm, 4th fl Stu Ctr. Terry or Dick, 440-9631.

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

Israeli Student Club – Meetings Wed, 8pm, Stu Ctr Mezzanine Lge.

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

MIT/DL Bridge Club** – ACBL Duplicate Bridge. Tues, 6pm, Stu Ctr Rm 473. Jeff, 864-5571.

MIT-Harvard AAU Water Polo Team* – Competition with local teams and in tournaments in NY, Virginia and Canada. If interested, attend biweekly practices, Mon & Wed, 5pm, Alumni Pool.

MIT Karate Club** – Evening classes Mon, Wed, 8-10pm, duPont Wrestling Rm. Harry Koba, x3-6232.

MIT Kung Fu Club* – Chinese boxing, northern praying mantis. Meetings Tues, Thurs, 7:30-9pm. Call, 876-5071 or 661-8765.

MIT Outing Club* – Meetings Mon, Thurs, 5-6pm, Stu Ctr Rm 461.

MIT Rocket Society – Seventh Annual Technical Model Rocketry Convention, featuring new research, rocket launch, movies, seminar. Keynote address: "The Principles of Model Rocketry," by Jay Apt, local rocketeer. Fri, Mar 29-Sun Mar 31, Stu Ctr. Info, x0744 Dorm or x8496 Dorm.

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

MIT Tiddlywinks Association* – Meetings Wed, 8-11pm, Stu Ctr Rm 491. New members always welcome.

MITV News – The student operated television news organization tapes its weekly program Thurs, 8pm, CAES B&W studio, Rm 9-355.

MIT Wheelmen* – Meetings Tues, 7:30pm, Rm 1-203.

Rugby Club** – Practice Tues, Thurs, 6pm, Rockwell Cage.

Soccer Referee Clinic for IM Soccer Officials – Anyone interested in high school officiating should also attend. Tues & Wed, Apr 2 & 3, 7:30pm, 4th fl Stu Ctr.

Strategic Games Society* – Offers opponents and discounts on merchandise to members plus gaming and periodical library. Sat, 1pm-1am, Walker Rm 318. Info, Kevin Slimak, x0389 Dorm.

Student Homophile League* – Meetings 1st & 3rd Sun of every month, 4pm, Rm 1-132; next meeting Apr 7. Info, talk, help in coming out, Hotline 494-8227.

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

Technique* – Yearbook staff meetings Sat, 11:30am till late afternoon, Stu Ctr Rm 451. New staffers & responsible critics welcome.

Unicycle Club* – Meetings Sun, 1-3pm, Stu Ctr Rm 407. Beginners welcome. We have unicycles.

Volleyball Club** – Practice, advanced level team competition. Sun, 1-4pm, duPont Gym.

White Water Club** – Pool session. Tues, Apr 2, 8-10pm, Alumni Pool.

Women's Gymnastics Club* – Mon-Fri, 5-7pm, duPont Gym, Info, Ursula, x3-5954.

Social Events

Pot Luck Coffeehouse* – Fri & Sat, 8:30pm-12m, Stu Ctr Mezzanine Lge, sponsored by Stu Ctr Committee. Live music, free coffee, cider, donuts. Come & listen. If you want to perform call Ernest Perevoski, x9610 Dorm, for audition.

Hillel Coffeehouse* – Wed, 8pm, 312 Memorial Dr, basement. Refreshments.

Movies

Colossus – The Forbin Project – LSC. Fri, Mar 29, 7:30pm, 10pm, Rm 10-250. Admission 50 cents, ID required.

Mouchette (Robert Bresson) – MIT Film Society. Fri, Mar 29, 7:30pm, 9:30pm, Rm 6-120. Admission \$1.

Marooned – LSC. Sat, Mar 30, 7:30pm, 10pm, Rm 10-250. Admission 50 cents, ID required.

Anokha Daan (Asit Sen)* – SANGAM. Indian film with subtitles. Sun, Mar 31, 3:30pm, Rm 26-100. Admission 50 cents with ID.

Vorticity – Fluid Mechanics Film. Tues, Apr 2, 4pm, Rm 33-419.

A Curing Ceremony; Magical Death; An Ixal Calendrical Divination – Humanities Films. Tues, Apr 2, 4:30pm, 7:30pm, Rm 14N-304.

Corn & the Origins of Settled Life in Mesoamerica; Archaeology in the Laboratory; The Archaeologist and How He Works – Humanities Film. Thurs, Apr 4, 4pm, 7:30pm, Rm 4-370.

Secondary Flow; An Interview with G. I. Taylor – Fluid Mechanics Film. Thurs, Apr 4, 4pm, Rm 33-419.

Thurrow Says Energy Costs Will Make All of Us Poorer

Energy costs will fall in the long run but short-term price increases will make oil companies and their stockholders richer and everybody else — especially New Englanders — poorer, according to an MIT professor.

Dr. Lester C. Thurrow, professor of economics and management, is quoted in the March/April issue of *Technology Review*, which contains the text of an energy seminar at MIT's Sloan School of Management at which Dr. Paul A. Samuelson, Institute Professor in the Department of Economics, and Dr. Paul W. MacAvoy, professor of management, also spoke.

Technology Review is MIT's national magazine.

Although price increases are undesirable they are "not an ultimate disaster," Professor Thurrow said.

"This is especially true in the US where most of the increase in prices will result in a transfer from one American (the oil consumer) to another (the oil producer), rather than to some Arab oil producer," he contended.

Professor Thurrow also rejects what he calls "a popular fear" that Middle East Sheiks "are somehow going to buy up the world by the year 2000."

The short-run increase in energy prices, Professor Thurrow said, will not change average American income but might change substantially income distribution.

"The oil companies (and their stockholders) are going to be the winners in this income-transfer process," he went on. And since New England consumes more oil than other regions "it is going to pay more and real incomes are going to fall further than in other regions."

Professor Samuelson said the consumer's price index is "going to do worse this coming year than even in 1973."

"You're a rash person, I think, if you expect the consumer's price index in the first half of 1974, and well into the summer, not to show annual rates of increase like 7 and 8 percent."

Unemployment also will increase, Professor Samuelson said, but not to the levels indicated in some predictions.

He cited a recent economic forecast developed by the Wharton School of Finance which, if correct, would mean an unemployment rate of 6 percent by the last quarter of the year.

"...I am a bit less pessimistic than the Wharton computer," Professor Samuelson said, but he added:

"So to any of you who are college juniors, and who may be entering the labor market in the fall of 1975," he told the seminar audience, "I've only Winston Churchill's message of blood, sweat and tears to give."

Professor MacAvoy, seeking to

Watergater

(Continued from page 1)

ferent items, along the lines of two large rubber bands, five large paper clips, six inches of piano wire, four tongue depressors, four feet of string, a plastic cup, ten soda straws, a pink eraser, ten pins and, of course, a glass marble.

Each contestant was given two tries, and runs were disqualified if the students took more than 45 seconds to set up their device on the apparatus used as a track (penalty points were assessed after 30 seconds).

The students tried to get their marbles from the starting gate to a high-numbered gate in the water trough in a variety of ways.

Most used some sort of pulley system. A few tried catapulting the marbles with sling-shot designs. Some sent off small marble-carrying satellite devices from the

assess how the current situation developed, said:

"In the late 1960s, as a result of Federal Power Commission controls over the field prices of natural gas produced in the United States, this country began to develop a systematic excess demand for gas..."

"The excess demand spilled over into demand for the next best fuel for heating purposes—distillate fuel oil—adding to fuel oil demands approximately a million barrels per day by the early 1970s. Thus the "energy crisis" started as a natural gas shortage spilling over into unexpected demand

main device.

Some seem to have used nearly all the materials provided, others just a few.

Actually, the simpler devices seemed to do best, or at least to hide their failures better.

Some of the more complicated marble-carrying machines—looking like Rube Goldberg contraptions—suffered spectacular disasters, either failing to leave the starting gate at all or falling apart soon after.

Some of the machines fizzled even though they had worked in practice runs.

This led Dr. Wilson to comment on the presence in the room, "in all its horror," of Murphy's law, which sets out that if something can go wrong, it will.

"This is very painful for some of the people who have worked for weeks on the devices and have seen them run perfectly in practice," he told the spectators.

growth in petroleum markets.

"A 'devil' theory would at least designate the F.P.C. as the Faust of the energy problem in the United States," Professor MacAvoy said.

Added to this were "not altogether perfect" conditions in the distillate markets, he continued.

"The development of refining capacity in the United Nations was proceeding at a very slow pace. We were adding less than 3 percent additional refining capacity each year after 1968 (rather than the 4 percent of earlier years), and we were adding less to oil reserves by new discoveries than we were taking out in production."

"Worse luck no one could have," Dr. Wilson commented occasionally, to ease the disappointment of students.

Professor Wilson also told the audience in Rm 3-270 that the task given the students had "all the components of a true design problem. They had to decide what was the best way to go with the materials they had on hand, and then to come up with an appropriate and practical design."

For most of the 3½-hour contest, Michael C. Bura of Bal Harbor, Fla., a junior in mechanical engineering held the lead with a score of 953.04—out of a possible 1140. This meant he had delivered his marble to the highest-numbered starting gate, 76, in 2.46 seconds.

His design was the simplest of all, consisting of a large paper clip, a three-inch length of piano wire, a three-inch square piece of Masonite, a 3/8th inch dowel and some thread.

But as Bura waited in the clubhouse—make that classroom—for the contest to end, a late finisher edged him out.

He was Thomas S. Birney of Elizabethtown, Pa., a sophomore in mechanical engineering, who achieved a score of 982.68 on his second run, sending the marble into Gate 76 in 2.07 seconds.

Birney's device, like Bura's, operated on the pulley principle and was relatively simple, using only some pieces of a straw, a paper clip, some cardboard tubing and Masonite board, sand as a weight and thread.

He said he spent about three hours constructing the device and 15 hours testing it. "I don't even play marbles," he added.

Future Shock; Claud; 6-5-4-3-2-1 — BEL Spring Film Series. Thurs, Apr 4, 5pm, Projection Rm off 10-400. Coffee.

Future Shock; Claud; 6-5-4-3-2-1 — BEL Spring Film Series. Fri, Apr 5, 12n, Projection Rm off 10-400. Coffee.

Radical Cinema — A Great Treasure-House; 8 or 9 in the Morning** — Science Action Coordinating Committee. Fri, Apr 5, 6:45pm, Stu Ctr Rm 407. Admission \$1.

Antonio Das Mortas — Film Society. Fri, Apr 5, 7:30pm, 9:30pm, Rm 6-120. Admission \$1.

Au Pair Girls — LSC. Fri, Apr 5, 7:30pm, 10pm, Rm 26-100. Admission 50 cents, ID required.

King Kong — Midnite Movie Series. Fri, Apr 5, 12m, Sala. MIT or Wellesley ID required. Free admission & popcorn. Bring blanket.

Midnight Cowboy — LSC. Sat, Apr 6, 7:30pm, 10pm, Rm 26-100. Admission 50 cents, ID required.

Yaar Mera* — SANGAM. Indian with English subtitles. Sun, Apr 7, 3:30pm, Rm 26-100. Admission 50 cents with ID. Indian refreshments.

Dr. Strangelove — LSC. Sun, Apr 7, 7:30pm, 9:30pm, Rm 10-250. Admission 50 cents.

Music

Gabrieli String Quartet* — Students from the Interlochen Arts Academy. Thurs, Apr 4, 5pm, Music Library. Free.

Concert* — Indian sarodist, **Ali Akbar Khan**, will give his second MIT concert Sun, Apr 7, 8pm, Kresge Auditorium. Sponsored by the Center for Asian Music. Tickets: \$3 & \$4, available at door.

Theatre

A Funny Thing Happened on the Way to the Forum* — Presented by Musical Theatre guild. Fri & Sat, Apr 5, 6, 11 & 12, 8:30pm, plus 2pm Sat matinee, Kresge Auditorium. Tickets: \$3 evening, \$2.50 Sat matinee, \$1 discount for MIT students purchasing more than 1 reserved seat.

Dance

Kathak Dance Company* — North Indian dance troupe. Mon, Apr 1, 8pm, Kresge Auditorium. Tickets: \$3, \$2 with MIT or Wellesley ID.

Folk Dance Club* — International, Sun, 7:30-11pm Sala. Balkan, Tues, 7:30-11pm, Stu Ctr Rm 491. Israeli, Thurs, 7:15-10:15pm, T Club Lge, duPont. Afternoon Dance Break, Fri, 12:30-1:30pm, Kresge Oval.

Exhibitions

Celebrations* — Photography exhibit, assembled by Minor White, at Hayden Gallery Sat, Mar 2-Sat, Mar 30. Gallery hours: Mon-Sat, 10am-4pm, closed Sun.

Photograph by Jerry Greenfield* — Black & white prints by the Boston Photographer. Thurs, Mar 7-Thurs, April 4, 12n-7pm, Creative Photography Gallery, 120 Mass Ave. Free.

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

Music Library Exhibit — Persian musical instruments.

Athletics

Saturday, March 30 — MV Sailing. Boston Dinghy Club Cup at Harvard & MIT. **Tuesday, April 2** — V Lacrosse. University of Connecticut, 4pm. **Wednesday, April 3** — W Tennis. Boston College, 3:30pm. **Friday, April 5** — V Baseball. Lowell Tech, 3pm. **Saturday, April 6** — Lt Crew. University of Massachusetts, F-10am, JV-10:15am, V-10:30am, informal. **V Tennis**. Bowdoin, 2pm. **Track**. University of New Hampshire, 12:30pm. **MV Sailing**. Owen Trophy at MIT.

Religious Services and Activities

The Chapel is open for private meditation 7am-11pm daily.

Baha'i Discussions — Informal discussion about the principles of the Baha'i Faith. Thurs, 8-10:30pm, Rm 1-136.

Campus Crusade for Christ/College Life* — Family time, singing, prayer, teaching from God's word. Fri, 7:30pm, Rm 37-252.

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

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

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

Hillel*: Services — Mon-Fri, 8am, Rm 7-102; Fri, Traditional 5:30pm, K kosher Kitchen, Non-Traditional 8:30pm, Chapel; Sat, 9am, Chapel. **Classes** — Many interesting classes offered, for full schedule call Hillel office, x3-2982. **Shabbos Meal** — enjoy a traditional Fri evening meal at K kosher Kitchen, must order by Tues each week. Info and to order, Herbie Levine, x8403 Dorm.

Islamic Society* — Juma prayers. Fri, 2:10pm, Kresge Rehearsal Rm B. Discussion on the Qur'anic Interpretations, Sat, 4pm, ISC Lge, 2nd fl Walker.

Latter Day Saints Student Association* — Discussion of beliefs. Thurs, 8am, Stu Ctr West Lge.

Protestant Worship Services* — Sun, 11am, Chapel. Sunday school and nursery at the same time in Stu Ctr Mezzanine Lge.

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

Tech Catholic Community Programs* — Wrestling with Prayer: Lenten services lead by Fr. MacNevin, with a free, simple supper; Thurs, Feb 28-Apr 11. Ecumenical Bible Study: Tues, Feb 26-Apr 30, 12n-1pm, 2nd fl seminar rm, Religious Counselors Bldg.

United Christian Fellowship* — Meet for dinner Thurs, 5pm, Walker; singing, sharing, praying meeting, 6pm, Rm 6-321.

Westgate Bible Study* — Covering the gospel of Mark. Wed, 8pm, Westgate apt 1202. Info, 494-8778.

Announcements

Maggie's Exercise Class — Spring schedule Mon-Fri: 12n-1pm (except Tues), 1-2pm, duPont Wrestling Rm; 5-6pm, duPont T-Club Lge.

Student Summer Project Workshops — Planning workshops to answer student questions and to discuss specific project ideas will be held Wed, April 3, 9am-12n; and Mon, April 8, 1-4pm; Rm 10-280.

Non-Resident Students' Association — We are an organization of non-resident and exchange students who have a house at 311 Memorial Drive. We're open all day, so drop in any time or call x9166 Dorm for info.

Kaleidoscope is Coming! — sponsored by Association of Student Activities and the Undergraduate Association. Everyone is invited to participate in Kaleidoscope, being held April 19 & 20. Info, x3-2696.

BSU Tutorial Program — Black Student Union offers a full program of assistance to minority undergraduates for second semester. Teaching assistants available Mon-Thurs, 7:30-10:30pm, Rm 4-145, 146, 148 & 149 by appointment. Info, Karen Scott, x0351 Dorm.

MIT Community Players* — Are looking for people interested in any aspect of theater. We have an ongoing program of monthly meetings, workshops, and five productions per year. Steve Ivester, 864-6000, x2839.

MIT Opera Workshop — Directed by John Cook, is recruiting for the upcoming production of "Orpheus and Euridice," and Italian opera composed by Christoph W. Gluck. The Workshop needs a large chorus, dancers, production crew, & costume designers. If interested, call John Cook, x3-6961, or leave message at x3-3210.

Graduate Student Committee on Housing & Community Affairs* — Agenda includes filling student environment committee vacancy, budget, housing orientation & survey, rate review, social & athletic events. Wed, Apr 3, 5pm, Rm 8-105.

Graduate Student Committee on Academic Projects & Policy* — Meeting on vacancies, budget authorization & policies. Wed, Apr 3, 7:30pm, Rm 8-105.

Placement Interviews

The following companies will be interviewing Mon, April 1 — Fri, April 5. Those interested may sign up in the Career Planning And Placement Office, Mon-Fri, 9am-4pm, Rm 10-140, x3-4733.

Monday, April 1 — Civil Engineering Lab/Naval Construction Battalion Center.

Tuesday, April 2 — Masonic International, Inc.

Wednesday, April 3 — Varian Associates.

Thursday, April 4 — National CSS, Inc, Stamford, Ct.

Friday, April 5 — National CSS, Inc, Norwalk, Ct.

Freshman 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 April 3 through April 14 to the Calendar Editor, Room 5-111, Ext. 3-3279, before noon Friday, March 29.

MIT Gymnasts On TV Monday

MIT will take part in another of the Channel 5 (WCVB-TV) live college sports presentations—this one Monday (April 1) from MIT's DuPont Gymnasium. Air time will be 7:30pm.

Gymnastics will be featured and athletes from MIT, Tufts, Northeastern, Brandeis and Lowell Tech will participate. Competing from MIT: Paul Eckbo, John Austin, Scott Foster and Ursula Freeman. MIT Coach Bob Lilly will do the color commentary. The MIT community is welcome to attend.

Rockart to Speak

Dr. John F. Rockart, MIT associate professor of management, is scheduled to deliver a speech this week on "Multi-media Teaching Applied to Accounting" at a University of Texas symposium devoted to newer educational technologies that can be used to enhance business teaching in universities.

Lettvin at Aspen

Jerome Y. Lettvin, professor in biology and electrical engineering, will speak at the International Design Conference in Aspen, Colo., to be held June 16-21. Conference chairman is Julian Beinart, visiting professor of architecture at MIT.

CLASSIFIED ADS

Ads are limited to one per person per issue and may not be repeated in successive issues. All ads must be accompanied by full name and Institute extension. Only Institute extensions may be listed. Members of the community who have no extensions may submit ads by coming in person to the Tech Talk office, Room 5-111, and presenting Institute identification. Ads may be telephoned to Ext. 3-3270 or mailed to room 5-105. Please submit all ads before noon, Friday, March 29.

For Sale, Etc.

Air King humidifier, 8 gal tank, few mos old, \$30 or best. x3-6742.

Refrig, exc cond, \$35 or best. Marilyn, x8-3605 Draper.

Range w/hood, 30"; 15 cu ft refrig; cprtone. Susie, x3-3727.

Hoover upright vac clnr, old but works, \$10. Kenneth, x3-4428.

AC, 660 BTU, \$50 or best. Darrol, x7037 Linc.

IBM exec typwrtr, carbon ribbon, fair cond, \$35. x3-6952.

Tech Aero 180 Membership, 1/2 price. Harvey, x8-2870 Draper.

Hammond C-3 organ w/PR-40 & Leslie 2-2-2 spkr sys, home mdl of B-3 prof, exc cond. x8-4427 Draper.

Nw plastic coated 4" mtrcycl chain, 3/8 link, master lock, best. Nancy, x8-4413 Draper.

Land, 12,000 sq ft of 100 lake shore property, island lake (9x1/2mi) Stoddard, NH. Ed, x388 Linc.

Looseleaf binders, 70, for 6x9 1/2 paper, free to MIT user or a school, 25 cents/ea to others, title & seal on stiff brn plastic may be glued over. x3-4276.

IBM elec mdl B typwrtr, reconditioned, \$160. x3-7410.

Garrard 40 trntbl w/pickering XV-15 200E crtrdg, \$22. Call, 267-4481, around 11pm.

CM (LABS) mdl 911 stereo power amp, 140-140 W RMS/ch at 8 ohms, 190-190 W RMS/ch at 4 ohms, signal/noise ration 93 DB, less 0.2% distortion, \$325. Dave, 267-8187, evgs.

Washer, Hotpoint hvy duty, 2 yrs, exc cond, \$95. x3-1445.

Glass & alum wndw, 3 1/2'x9', used for hot bed, best. x5775 Linc, lve msg.

Kneissel Red Star skis, 205 cm, \$50; Reiker bckl boots, sz 9 1/2, \$20; poles; pr 7x13 Mobil 4 ply stud snows, ww, \$20/ea. Perry Cohen, x3-4913.

Bike lock, 3/8" hrdned stl padlock w/5' chn, too heavy to carry, gd fixed location, \$10. Stu, x3-1418.

Wht fig skates, sz 10, worn 2x, exc cond. Nina, x8-3333 Draper.

Singer sew mach 457, 2 yrs old, \$100; Keystone movie cam & proj, 200 m lens on both, all auto, super 8, \$100, Dick, x5548 Linc.

Lg mpl desk, gd cond, \$25. Call, 864-1775, evgs.

KLH mdl II stereo sys, oiled wnt components, dust cvr, lk nw, barely used, 1st reas offer. x8-2577 Draper.

Tires, 3, G78-14, on whls, for '59-'68 Olds or '65-'68 Pontiac, all for \$50. Abe, x7416 Linc.

Kodak compartment file, stores 240 cardbord slides or 96 glass, b nw, \$5.50. Walter, x3-3105.

Wht K stove, 36", bottled gas, old but runs well, gd for camp, \$10 or best. x209 Linc.

Tires, 4, 6.85x15 8 ply rated ww, fit Volvo wgn, \$25/ea, \$95/4. x3-3354.

Hoover canister vac clnr, \$15; huge antique wht ceramic mortar & pestle w/pearwd handl, \$75; elec work tbl, 6x2 1/2, formica top, 4 drwr, w shlvs & elec outlets, nrly nw, \$60. Call, 489-3515, aft 6pm.

Raleigh f bike, exc cond, \$45; Coop sanded rcrd boxes, 3/\$10; sq elec fan, 2 1/2' diam, \$5. Roger, x3-6796.

Radatron auto-radar detector, \$18; Mars auto 8 trk player, \$15; York B flat trumpet, \$50. Call, x8609 Dorm.

Keystone Everflash 20, \$30 or best. Steve, x3-5620.

Motorola 23" b&w console TV, w/UHF converter, \$50. Mike, x8-3391 Draper.

US Navy officer's uniforms, tailored by Jacob Reed, sz 38L, 4 bl, 2 kakhi, 4 wht srvc dress, 2 wht full dress. Gary Dukes, x3-1670.

Stereo, Scott 299 amp, Rek-O-Kut trntbl, Sony tape deck, 2 cab spkr sys, \$225. Bob x3-3990.

Console sew mach; 2 section wrought iron couch, best. Glenn, x8-3584 Draper.

Nw pair Clark Wallabees shoes, brn leath, sz 10 1/2-11, \$28 or best Paul, x3-1637.

Roomy 2 person camping tent, best. Ron, x3-3238,

F clothes, incl coats, dresses, shirts, pants, sz 8-12. Call, 489-3257.

ADC-XLM crtrdg, 3 mos, nvr tracked above 75 grams, exc cond, \$20; Datsun 610 console armrest, nw, nvr used, \$10. Neil, 254-6669, evgs.

Pr venetian blinds, 32x60; copy Standard Math Tables, 14th ed; Calculus, by Douglas & Zelton. x3-2723.

F 10 spd Raleigh Grand Prix, maintained by owner, 21 1/2" frame, exc cond, bought 11/72, ask \$100. Julie, x3-1703.

Kobena Super 8 mm movie camera, \$50. Levy, x3-6076.

BSO tkct, Sat, Apr 4, Giuliani conducting Rossini, Vivaldi, cost \$6, \$5 or best. Larry, x3-7921, Rm 3-339, anytime.

Wht rims, 14", '69 Skylark or similar, 2 for \$6. Dick, x7611 Linc.

B nw Pentax lenses: 85 mm fl.9, \$90; 105 mm f2.8, \$90; used Pentax S1A w/f2, \$100. Kathy, x7725 Linc.

Journal of Geophysical Research: blue, '64, '66, '70, '71, comp; parts '65, '67; green, '70, '72 comp; parts '69; best, all or part. Rhett, x3-6380.

Phillips GA212 elec trntbl w/o crtrdg, 4 mos into wrnty, perf cond, \$130 firm. John, x8-2876 Draper.

Polaroid 440 camera w/flash, nvr used, \$59. x3-3933.

Radio-cassette rcrdr, Emerson port, \$35 or best. Call, 494-0485.

Dbl matt & spr, \$40; SCM super elec typwrtr, \$175; Gibson Melodymaker elec guitar w/amp, \$200; drafting

board, T-sq & instruments, \$15. Ed, x3-2270.

Sofa bed, \$95; mpl desk & chr, \$25; 4 drwr file cab, \$38; body exerciser, \$7; Thayer baby crib & matt, \$16; baby piano, \$4.50. Call, 494-8353.

Inter Continental photocopying mach, mdl Princess 11, w/paper holder. Ed, x3-5778.

Office file cab, 3 roller bearing drwrs, \$30. Bonnie, x3-5513. Tues or Thurs.

Wurlitzer organ, incl match bench, perf cond, 4 yrs, \$500. Dave, x8-1194 Draper.

V lg brn couch, v gd cond, \$40; 2 pr right angle couch w/match tbl, gold velour, v elegant, \$150; 4 dressers, \$35-\$5; '73 VW super beetle, semi-auto, 10K, some body damage, used daily. \$2,100. Call, 267-7416.

Falcon racing bike, \$200. Call, 484-7744.

'64 Philco stereo amfm, wint cab, 60" L, 4 spkrs, nw trntbl, orig \$600, \$100 firm. x8-4417 Draper.

Vehicles

'59 VW bug, beat-up body, eats oil but runs well, 130 K, \$50 w/o, \$70 w/headlites, has own name. Dave, 254-9285.

'64 MGB roadster, vinyl hrdtp, gd cond to trade for bike. Betty, x183-277 Bedford.

'65 Ply Fury III, 4 dr sed, 91 K, 14-16 mpg, gd cond, \$200. Don, x3-1694.

'67 Valiant, 74 K, gd cond except 1 serious problem, yours for 6 mos in exch for repair. x8-1325 Draper.

'67 MGB/GT, 64 K, Pirellis, Abarth, nw clutch, rebtl trans, driving lites, 22 mpg town, \$1,300. Elaine, x3-6004.

'67 VW bug, 25 mpg, exc run cond, \$600 firm. Al, 1-344-6530.

'67 VW bug, std, gd rubber, hi 60's mileage, sev dents but gd cond, must sell, \$700. Jessie, x3-3141.

'68 Olds Cutlass, ac, p st, A-1 cond, just reduced, \$850 or best, must sell. Bob, x3-2255.

'68 Ford ranch wgn, 8 pass, 6 cyl, 60 K, gd mech cond, \$500. Tom Emberley, x8-1558 Draper.

'69 Chevy Chevelle, 2 dr conv, std, sm 8 cyl, exc on mileage, amfm, \$1,250 or best. x3-4257.

'69 Ford LTD, 4 dr, bl, vinyl top, 351 eng, 45 K, sgl owner, \$1,200. Call, 489-1476.

'69 VW bug, exc cond, std, lt bl, valve & clutch job 3K ago, nw master cyl, nw tires, gd snows on rims, bike rack, repair manual, some parts, \$1,100. Jim Hannoosh, x3-5353.

'69 Karmann Ghia coupe, 25-28 mpg, semi-auto, amfm, exc cond, has to be seen, best. Joe, x8-4491 Draper.

'70 Ambassador SST, p st & br, ac, auto, vinyl rf, mech perf, \$950. Susan, x3-4606.

'70 Chevelle malibu hrdtp, 4 dr, p st, ac, gd cond, \$1,475. x3-1770.

'71 Norton Roadster 750 cc mtrcycl, \$1,600 or best. Roger, x7148 Linc.

'71 Chevy sport van G20 series, 43 K, manual, lots of glass, seats 8, ideal camping, exc cond, \$2,100. Joe, x3-5775.

Lg assortment post '65 Corvair parts, incl 2 comp transaxle assemblies; want '66 or later Corvair 4 spd trans. Call, 965-3291.

Hydro-Catalyst gas saver reduces fuel consumption by 20%, eng runs clnr & more effic, easy installation. Call for details. 494-0273.

Housing

Andover, Shawsheen Village, lg older colonial, lg LR, frml DR, pantry, eat-in-K, 3 k sz BR, garage, \$46,000. Call, 475-1221.

Arl, Mass Ave, 4 lg rms, parking 1 car, avail 6/1, \$235 incl h. Diane, x3-1648.

Camb, 2 fam hse, less mile MIT, move-in-cond, many betterments, fenced yard, gd solid loc, come look & make offer, priced to sell, less \$40,000. Call, 547-7395.

Somerville, 2 BR, nr Porter Sq, priv hse, lg porch, qt area, avail 6/1, \$180. Call, 625-7025.

Lake Winnepesaukee chalet, 3 BR, pool, beach, tennis, etc, by wk, mo, seas. x8-4415 Draper.

Animals

Smooth fox terriers, 13 wks, champ sired, lively, gd tempered, 1 f left, '75 incl 2 shots. Call, 965-1577.

Free m cat, b&w, long hair, v affect, must give away. Dean, 262-4073, aft 6pm.

V spec, beaut, affect young m cat, topaz eyes, nds gd home w/gd people, hsebrkn, found & can't keep, wl pay to have altered. x3-2940.

Wanted: gd home for 4 mos f dog. Laura, x3-1805.

Afghan hound, 2 yr old m, apricot w/blk mask, best. Debbie, x409 Linc.

Free to cntry home: lg Ger shep, all shots, nds nice place in cntry. Call, 776-4258.

Free kittens, 6 wks old. Bob, x3-7305.

Lost and Found

Lost: Handbook of Nutrition, paperback, by Steve & Gary Null, 3/18, wl finder pls call x8981 Dorm.

Lost: silver ring w/blue carved stone. Debby, x8657 Dorm.

Found: watch, duPont Gym, 3/18. Harvey, x8-2870 Draper.

Lost: silver charm bracelet, 3/17, nr Bldg 56. Judy, x8819 Dorm.

Wanted

Visiting prof '74-'75 desires yr rental, conf furn home, Lex, fam of 4 (2 teen), can start July, Aug, Sept. Norm, x113 Linc.

Used rm ac, approx 12, 500 BTU. Call, 494-8483.

Tent for VW camper. Bob, x8-1425 Draper.

Old copies of Electronics, Computer Design, Digital Design, EDN, Elec Design, or similar, x3-7082.

Dehumidifier for bsmt, gd cond. Bart, x8-4098 Draper.

Honda XL 250. Mr. Baker, x1830 Lin Ac.

Rmmate, f, Tang Hall, rm avail 3/25, \$92. Call, 494-8928.

F to trade babysitting to to sit wkends,

wknites, nr Union-Inman Sq, I have 5 yr old f. Kathy, x5870 Linc.

Rmmate, 1 or 2, lg rm in mod 2 BR Camb St, Beac Hill, 2nd BR occupied by stu interested in music, travel, avail 4/6, \$120. Call, 723-3608, evgs.

Interested people to help staff booth MIT Committee on the Right to Choose. Help keep abortion safe, legal & matter of choice! Meeting Thurs, Mar 28, 5:15pm, Cheney Rm.

Babysitter 9-5, Mon-Fri, at my home (Bkline). Dr. Varma, x3-6737.

Carpool, MIT-Medfield area, daily. Tom, x8-3987 Draper.

Miscellaneous

Competent 15 yr old wl spend sum as babysitter/mother's helper w/fam traveling abroad in exch for rm, brd, fare. Thea, 527-6521.

Nd part of full time care for pre-school child? Family Day Care Program, x3-3953.

Yng fac cpl w/cheerful infant wl give TLC to home, garden, plants, possibly chldrn while you're away this sum avail mid May-Aug, ref. x3-5265.

Typist wl type non-tech manu, dictaphone, wl edit work for foreign stu. Chuck, x3-7410.

Expert painting done cheaply. Call, 266-1958, evgs.

Successful free lance violinist & tchr, trained Manhattan Sch of Music & Columbia U, offers patient, organized instruction, all levels. x3-5899.

Able editor wl transform pseudo-Eng, garbled syntax, verbosity into lucid prose, exp w/theses, foreign stu writing problems, 75 cents/pg. Call, 547-6345, evgs.

General & tech typing. x3-1609.

Positions Available

This list includes all non-academic jobs currently available on the MIT campus. Duplicate lists are posted each Tuesday preceding Tech Talk publication date on the Women's Kiosk in Building 7, outside the Office of Minority Affairs, 4-144, and in the Personnel Office E19-239, on the day of Tech Talk publication. Personnel interviewers will refer any qualified applicants on all biweekly jobs Grades I-IV as soon as possible after their receipt in Personnel. Employees at the Institute should continue to contact their Personnel Officers to apply for positions for which they feel they qualify.

Virginia Bishop 3-1591
Mike Parr 3-4266

Philip Knight 3-4267
(secretary - Joy Dukowitz)

Sally Hansen 3-4275
Jack Newcomb 3-4269
Evelyn Perez 3-2928
(secretary - Mary Ann Foti)

Dick Higham 3-4278
Pat Williams 3-1594
Claudie Liebsny 3-1595
(secretary - Dixie Chin)

New applicants should call the Personnel Office on extension 3-4251.

Technical Assistant - Academic Staff in Nutrition and Food Science will work with radioamino assays which is measuring hormones in the blood. The job entails working with rats, rabbits and radioactive material. BS or BA degree in Biochemistry required. 74-216-A (3/13).

Technical Assistant - Academic Staff in Biology will conduct biochemical experiments on cell-free protein synthesis. Techniques used include: radioisotope counting, radioautography, gel electrophoresis, paper electrophoresis and chromatography, ultracentrifugation, column chromatography. AB, BS, or MS in Biology or Chemistry required; previous lab experience in bio-chemistry helpful. 74-249-R (3/27).

Technical Assistant - Academic Staff in Nutrition and Food Science will perform specialized and routine chemical analyses on body fluids; responsible for operation and maintenance of a mass spectrometer. A college degree with a strong background in chemistry, biology, and quantitative analysis required. Minimum three years laboratory experience; ability to work independently required. 74-259-R (3/27).

DSR Staff in the Laboratory for Nuclear Science will participate in fundamental particle research at major accelerators and in data analysis. Candidate must have a Ph.D. with a minimum of two years experience in high energy physics. Detailed knowledge of bubble chamber techniques is essential. 74-222-A (3/13); 74-223-A (3/13).

DSR Staff in the Laboratory for Nuclear Science will participate in fundamental particle research at major accelerators and in data analysis. Candidate must have Ph.D. in high energy physics or a related field with experience in scintillation counter and spark chamber techniques and familiarity with large computer data analysis. 74-220-A (3/13); 74-221-A (3/13).

DSR Staff Physicist in the National Magnet Laboratory will conduct original research in experimental solid state and low temperature physics with emphasis on the magnetic fields. Ph.D. in physics or related area and 3 years postdoctoral laboratory experience in magnetism and low temperature physics required. Familiarity with cryogenic and electronic instrumentation desired. Position available after 10/1/74. 74-130-A (2/13).

DSR Staff Junior Electronics Engineer for the National Magnet Laboratory will design, test and assemble electronic circuits for nuclear magnetic resonance spectrometer operating in the vhf region on line with PDP-11 computer. Assist in system design; maintenance of spectrometer system. BS degree in EE with experience in design development and testing of vhf low level, low noise, solid state circuitry required. Familiarity with electronic data processing procedures required. 74-129-A (2/13).

Assistant Dean of the Graduate School - Academic Staff will supervise the minority graduate student program. Will be concerned with recruitment, financial aid as well as academic and personal counseling of all minority graduate students. Work with department and administrative representatives in developing and supervising projects designed for such students. Candidate should have a background in graduate study and/or administrative experience dealing with problems of graduate education. The position also involves travel to other academic institutions for recruiting minority students and developing cooperative educational programs. 74-190-R (3/6).

Administrative Staff General Manager of the MIT Food Services will be responsible for all phases of the operations of dormitory dining rooms, cafeterias, snack bars or lounges and catering services on campus. Will reorganize the department; develop and implement operational policies and procedures; perform financial planning; oversee the administration and supervise staff. Minimum 5 years experience in the management of college or university food services; ability to relate effectively to students, faculty, staff important. A degree in the food services field is preferred. Candidate must be innovative and creative in developing new food service programs. 74-75-A (1/30).

Assistant Auditor - Administrative Staff in the Audit Division will perform EDP internal auditing, reviews of the systems development effort,

evaluate internal controls, and post-audits of computer systems. Will develop audit programs, questionnaires, write and present reports. Must have four years of working experience in EDP, a degree in Accounting, knowledge of COBOL or PL/1, and public accounting experience. 74-150-A (2/20).

Assistant Auditor - Administrative Staff will develop audit programs and questionnaires, perform audits, direct junior staff members, write and present reports. Must have experience in public accounting or internal auditing. A degree is preferred. 74-151-A (2/20).

DSR Staff in the Energy Lab will design, build, and operate a high performance combustion facility for fluid mechanics and materials research directed toward the development of electrodes for a high power energy conversion device. Will also handle the instrumentation of a shock tunnel driven MHD generator. Ph.D. and minimum 5 years experience in experiment and engineering hardware. Interest and ability in dealing with MIT, local and US research and engineering communities desired. 73-47-A (1/23).

Meteorologist - DSR Staff in Meteorology will work with a group involved in constructing a general circulation model of the stratosphere for the purpose of evaluating the effect of rocket and aircraft emissions on stratospheric ozone and dynamics. Update and construct computer codes; analyze results; responsible for the day-to-day operation of the model. MS in meteorology, BS in math and an extensive familiarity with scientific computer programming required. Job available 7/1/74. 74-236-R (3/30).

Research Engineer - DSR Staff in the Aeronautics and Astronautics Aerophysics Laboratory will assist the Project Leader and conduct research using wind tunnel magnetic balance system in study of magnus forces. Gather and interpret data from subsonic and supersonic wind tunnel programs; train and supervise graduate students and research assistants. BS or MS in Aeronautics; experience in wind tunnel magnetic balance and suspension systems or other types of balance systems, knowledge of Fortran IV and experience in IBM programming required. Available 6/1/74. 74-245-R (3/27).

DSR Staff in the Cell Culture Facility will handle all aspects of tissue culture and animal virology; grow animal cells; infect cells with viruses. BA or MS degree required; minimum of one year experience in tissue culture and animal virology highly desirable. Experience in microbiology will be considered. 74-258-A (3/27).

DSR Staff - Senior Systems Project Engineer will take chief responsibility for the proposal, design, development and limited manufacture of advanced instrumentation, mainly digital, for very-long-baseline radio interferometry experiments. Monitor costs, supervise project support personnel. BS in EE, MS preferred; 10-15 years experience in design and development of the diverse electronic instrumentation systems, experience with digital systems and all the related duties of being a project engineer required. 74-247-R (3/27).

Scientific Programmer DSR Staff - Part-time/temporary in Earth and Planetary Science will handle large amounts of data on random-access disc under FORTRAN and JCL; perform graphical output and contouring with calcomp and SC-4020 routines. Experience in working with data, scientific programming experience required. Bachelor's degree or equivalent preferred. Flexible hours until project is completed; approximately 6 months. 74-239-A (3/20).

Systems Programmer - Administrative Staff will provide technical expertise; develop and implement methods of improving computer performance. Minimum of two years S/360 or S/370 programming experience. Knowledge of teleprocessing, and COBOL or PL/1. 73-265-R (4/73).

DSR Staff Systems Programmer at Project MAC will perform system analysis and system programming on a research version of the Multics operating system. SM or EE degree required; 2-3 years programming experience in the supervision of some advanced operating system required. Ability to contribute to research and work with students important. 73-1234-R (11/14).

Systems Analyst - Administrative Staff in the Office of Administrative Information Systems will design financial and/or administrative applications to be run on a medium sized computer. Make feasibility studies, system flow charting, define test, implementation, documentation and client education. Experience in designing financial application, teleprocessing applications data base management systems and a working knowledge of ANS COBOL and/or PL/1 required. 74-196-R (3/6).

DSR Staff Member in Research Laboratory of Electronics will conduct experimental determination of sound

pressure in the fluid of the inner ear. Recent Ph.D. in EE with background in physiological experimentation and acoustics. Knowledge of the auditory system, particularly the inner ear, is required. 74-120-A (2/20).

Medical Technician - DSR Staff in the Clinical Research Center will supervise and direct the activities of the clinical laboratory; responsible for quality control, setting up new procedures, teaching new personnel, automation and instrumentation, ordering supplies and equipment. Minimum of a BS in Medical Technology, Biology, or Chemistry including hospital laboratory training and ASCP certification or eligibility for certification required. Minimum 5 years clinical laboratory experience with interest in clinical chemistry and hematology required. Supervisory experience desirable; leadership qualities important. 74-126-R (2/13).

DSR Staff - Curriculum Developer at the Artificial Intelligence Lab will develop and write new mathematical curriculum material in the Logo language for elementary school use. The job will often require working outside normal office hours. Position requires academic qualification in developmental psychology and mathematics; experience in curriculum writing for elementary school, evidenced by at least one successful publication of teaching material; experience in computer programming, and teaching it to children; experience and certification in elementary school teaching and teacher training. Position available in May 1974. 74-153-R (2/20).

Systems Analyst - Administrative Staff in the Office of Administrative Information System will develop, under direct supervision, solutions to business problems; prepare, design, and program specifications for new programs and for modifications to existing systems. Applicants should have business and administrative experience, analytical ability and familiarity with computers. 73-1315-R (12/19).

Programming Analyst for the MIT Information Processing Center must have experience and knowledge of large-scale time-sharing computer systems. PL/1 and FORTRAN language. Documentation and communication skills are necessary qualifications. The User Services Group requires an individual who understands and is responsive to the needs of the Center's users.

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

User Information - instructional documentation and conducting seminars, workshops, and short courses. 74-178 (2/27).

Computer Operator IV will operate IBM Model 135 and all peripheral equipment associated with it, including disk drives, tape units, card reader/punch, printers. Must have a good knowledge of DOS job control, multi-programming experience and be capable of understanding operating instructions. 4pm-12:30am shift. 74-191-R (3/6).

Keypunch Operator II in the Medical Department will provide support to information processing of patient contacts. One year experience of IBM 129 keypuncher and verifier preferred. Ability to work independently is important. 74-29-A (1/16).

Night Manager - Exempt will be responsible for overseeing the operation of the Wallace Observatory (Earth and Planetary Science) and assisting observers, primarily at night. Train new observers in the operation of the telescopes, the computer control system and the auxiliary instruments. Familiarity with optical observatory operations and astronomy is highly desirable; experience and facility in handling mechanical and optical instruments, some electronic experience preferred. Ability to make decisions and assume responsibilities important. 3-11pm, 5 day/week. 73-1357-A (1/16).

Engineering Assistant - Exempt Staff for the National Magnet Laboratory will arrange and perform the day-to-day experiments in medical electronics. Work with cryogenic detectors; familiarity with low-frequency electronics required. Will often work with animal and human subjects, including hospital patients. Candidate must be available for occasional night and weekend work. 74-241-A (3/20).

Student Account Representative - Exempt in the Student Accounts Office will assist students in the financial registration process and act as an intermediary between students and various Institute offices. Aid students in understanding the accounting entries applied to their accounts, prepare adjusting and correcting entries as required. Candidate must have a sincere desire to assist students, ability to communicate effectively, patience to listen to problems of others, ability to make decisions. 74-224-R (3/13).

DSR Staff in the Center for Space Research will analyze and interpret plasma data from satellite borne plasma experiments. Recent Ph.D. in

space plasma physics or related area required. Candidate should have had direct experience with the analysis and interpretation of experimental results related to the interplanetary plasma. 73-1184-A (11/14).

Senior Secretary V in the Physics Department Graduate Office will coordinate the functions of the office and handle the secretarial duties for the Graduate Committee Chairman. Ability to follow instructions and to work independently on administrative matters involving graduate students essential. Excellent shorthand, typing and organizational skills required. Ability to coordinate the work of an assisting secretary important. 74-257-R (3/27).

Secretary IV in Mechanical Engineering will handle general secretarial duties necessary for the smooth function of this office. Type technical reports, proposals, papers, class notes; answer routine correspondence; maintain files. Previous secretarial experience, excellent typing skills required; experience in technical typing, shorthand desirable; ability to establish priorities important. 74-229-R (11/14).

Secretary IV in Mechanical Engineering will handle standard secretarial duties; arrange conferences, maintain office accounts; type correspondence, reports, proposals, class notes (some technical). Will also handle some administrative tasks. Good typing (technical typing skills preferred); ability to establish priorities and to organize important. Previous office experience preferred. 74-228-R (3/13).

Secretary IV in Resource Development will handle diversified office duties; type correspondence; initiate follow-up on various projects; maintain busy schedules. Excellent typing required; organizational ability and ease in dealing with high ranking Institute and industrial officials is desirable. 37½ hour work week. 74-248-R (3/27).

Secretary IV in an Administrative Office will handle general secretarial duties; type letters and memos from hand-written material or dictaphone; process office bills and invoices; assist with registration processes. Excellent typing skills; poise and maturity needed in working with and assisting people. 74-251-R (3/27).

Secretary IV for a professor in Earth and Planetary Sciences will handle all secretarial functions; perform some administrative chores, some library research and editing. Excellent typing (some technical); shorthand preferred. Editorial and organizational skills important. 74-8-R (1/9).

Secretary III-IV in Personnel will work for the Employment Officer and two Personnel Assistants. Good typing skills needed for correspondence, memos, form letters, reports; maintain special files; assist in arranging schedules for recruiting; handle employee cases, reference, applicants for Personnel Assistants. May also help with special projects, reports and extra typing. Ability to work independently and to keep track of a variety of schedules and procedures important. Flexibility, experience, and interest in being a part of an active group is necessary. 74-246-R (3/20).

Secretary III-IV to two professors and two research associates in Ocean Engineering will type technical reports, class notes, proposals, correspondence from dictation. Monitor project accounts; organize seminar; set up appointments. Good typing and shorthand required; technical typing preferred; accounting skills and ability to organize important. 74-240-R (3/20).

Secretary III to the Director of Alumni Services will handle all general secretarial duties; type correspondence, budget reports, maintain office accounts, schedule meetings, conferences, seminars; transcribe and distribute minutes from meetings. Excellent typing and dictaphone skills required. Ability to work independently with poise and good judgment important. 74-217-A (3/13).

Secretary III to the Superintendent for Construction and Engineering (Physical Plant) will handle general inquiry telephone calls concerning construction activities; schedule meetings; and reports. Good typing and shorthand skills essential. Ability to work with individuals from outside the MIT community important. 74-20-R (1/6).

Secretary III to an Industrial Liaison Officer will assist with the Institute publication distribution, symposia and faculty travel, research of briefings. Handle all other general secretarial duties. Good shorthand (speedwriting) and typing skills necessary. 74-99-R (2/6); 74-100-R (2/6).

Secretary III in Chemical Engineering will type quizzes, reports, technical manuscripts, proposals for three associate professors. Will arrange appointments, file, act as receptionist, of the office. Dictation from tapes; technical typing experience preferred. Prompt, dependable, able to accept supervision, and follow through on details. 74-162-R (2/20).

Secretary III in the Flight Transportation Laboratory, Aeronautics and Astronautics will handle general secretarial duties for two professors. Type correspondence and reports; monitor xerox account. Ability to establish priorities important. Previous office experience and good skills required. 74-57-R (1/23).

Secretary III - Temporary in Cambridge Project will perform online typing of documentation of programs, program routines, manuals, reports, etc. from rough drafts. Will also do some transcribing. Good typing required; familiarity with online work (Multics) important. Job ends 6/30/74. 74-168-R (2/27).

Secretary III will work with a Industrial Liaison Officer in providing services to approximately 15 companies; research briefings, institute publication distribution, schedule symposia travel, handle general secretarial duties. Good typing, dictaphone, shorthand or speedwriting skills necessary. Previous experience or schooling helpful. 74-214-R (3/20).

Secretary III in the Sloan School of Management will handle all the general secretarial duties for three professors in a one-person office. Will also need some experience in technical typing for course material, reports, manuscripts. Previous office experience helpful. 74-238-R (3/20).

Accounting Assistant V - Part-time at the MIT Press will reconcile department accounts to central accounting office statements; post, balance general ledger; maintain inventory cost cards and inventory control. Research and answer letters concerning declined and refunded checks. Knowledge of accounting procedures and book-keeping experience required. 22½ hour work week. 74-250-R (3/27).

Senior Clerk III or IV in the Personnel Records Section will process personnel actions; act as liaison with employment sections; answer phone inquiries and follow-up on department problems; generate required statistics or reports. Good typing skills; ability to work with details; minimum of three years office/clerical experience required. 74-262-R (3/27).

Senior Clerk III in the Registrar's Office will process class room reservations; assist in the development of the schedules for final examinations, classes, registration. Key punch cards and maintain the master files; type letters and mailing lists, assist with special projects. Good typing required; keypunch experience or willingness to learn important. Ability to work with faculty, students and staff essential. 74-263-R (3/27).

Senior Clerk III for the Athletic Department will act as equipment room attendant and generally control admission to men's dressing room at the swimming pool, check identification, assign lockers and issue equipment. Other duties include the sale of athletic cards, guest tickets and the keeping of accurate records and files; accept telephone and over-the-counter reservations for squash courts. Candidate must be a male capable of working independent of full-time supervision following job training. Must be dependable, courteous and helpful in response to a variety of request from guests and regular patrons. 74-261-R (3/27).

Senior Clerk III in the Office of Administrative Information Systems will type data processing control documents and memorandums; maintain documentation library, including organization and maintenance of programmer reference library. Efficient, well-organized typist required; experience in a data processing environment desirable. 40 hour work week. 74-235-R (3/20).

Senior Clerk III to the Work Control Coordinator, Physical Plant will receive and dispatch service requests; assist with scheduling; monitor requisitions; perform other clerical assignments. Ability to learn details of procedures; good office skills required. 74-16 (1/16).

Accounting Clerk III will work in the Grants and Contracts Section of the Comptroller's Accounting Office; prepare various financial and fiscal reports. Recent business school coursework required; ability to communicate efficiently is important in dealing with departments regarding their monthly expenditure statements. 74-204-R (3/13).

Senior Clerk III in the Comptroller's Accounting Office will type correspondence and bills for Institute benefits; maintain data logs for the computer system. Good typing, knowledge of 10 key adding machine required. 74-215-A (3/13).

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

learn MTST and work independently required. 74-179-R (2/27).

Technical Statistical Typist III in Comptroller's Accounting Office will type a variety of Institute reports including Financial and Treasurer's reports; Professorship, NIH, and Research Grant reports, etc; as well as other reports and typing that comes in from various departments. Will operate a 24 inch typewriter, work with A.B. Dick Masters; use the adding machine. Excellent typing skills and a minimum of one year statistical typing necessary. 73-1356-R (1/9).

Microfilm Assistant II or III in the Microreproduction Laboratory will be trained in the techniques of micrographics: planetary and rotary camera filming, microfiche production-photographic enlarging, and other methods. Candidate should have an interest in technical photography, mechanical aptitude, and a willingness to learn. Some experience in microphotography desirable but not necessary. 40 hour work week. 74-264-R (3/27).

Clerk-Typist II in the Office of Lab Supplies will type purchase orders, price requisitions, process invoices, perform other office functions. Ability to operate a 32 NCR machine, adding machine or calculator experience required. 74-242-R (3/20).

2nd Class Engineer must have a Mass second class Engineer's license or higher. Individual must be willing to work on any shift. 73-182-R (11/24).

Technician B in the Environmental Medical Service will perform general radiation protection technician duties at the MIT reactor. Repair and calibrate instruments; conduct radiation surveys and sample preparation, decontamination and lab clean-up. Package radioactive waste and assist in construction of shields. Training and experience in electronics and radiation protection required. Afternoon shift. 40 hour work week. 73-1227-A (12/15).

Locksmith in Physical Plant must have five years in the trade, have knowledge of current trade practices in Builder's Hardware, lock repairing, master keying, and key changes. Must be reliable; have excellent work record. 74-159-R (2/20).

Campus Patrolwoman/Patrolman Minimum 10 years experience required in all phases of law enforcement to include knowledge of court procedures and case preparation, investigation of criminal and other complaints and reporting on same. Rotating shift/40 hour work week. 74-94-A (2/6).

Reactor Operator Trainee IV in Nuclear Engineering will serve as shift operator on the MIT Reactor after passing A.E.C. Operator's Examination. Two years of technical college education or its equivalent background will be necessary for preparing for operators licensing. Knowledge of electronic circuits would be helpful. Ability to work under pressure of emergencies important. 40 hour work week. 74-227-R (3/13).

Lab Assistant in Nutrition and Food Science will wash general and tissue culture glassware; sterilize and prepare glassware for research laboratories. High School background, experience washing scientific glassware (beakers, pipetts, etc.) in research laboratory desirable. 40 hour work week. 74-260-A (3/27).

Waitresses/Waiters - Part-time at the Faculty Club will set up silver & china on dining room tables. Take member orders, serve food and beverages. Clear, clean and reset tables. Experience helpful, but not necessary. Shifts: M-F 11:00am-3:00pm; may require weekend work. 74-210-R (3/27).

The following positions have been filled since the last issue of *Tech Talk* and are no longer available:

74-175-R	Grounds Crew
74-167-R	Waiter/Waitress
73-1014-R	Staff Nurse - Exempt
74-119-A	Sec. III - Temporary
73-1351-A	Sec. III
74-187-R	Sec. III - IV
74-1374-R	Sec. IV
74-192-R	Sr. Clerk III - IV
74-211-A	Sec. III - IV
73-875-R	Admin. Staff
74-200-R	Sr. Clerk III
74-212-A	Sec. IV - Temp.
74-172-R	Sec. IV
74-185-R	Sec. III - IV
74-226-R	Sec. III
74-22-R	Electronic Tech A
74-91-R	Computer Opert IV
74-231-R	Waiter/Waitress
74-205-R	Sr. Clerk III
74-219-A	Sec. III

The following positions are on HOLD pending final decision:

74-184-R	Sec. IV
74-218-R	Sr. Sec. V
74-189-R	Sec. IV

MIT Computer Operations Are Among Largest in Nation

By JOHN I. MATTILL

Editor, *Technology Review*

Of all American universities, none has contributed more than MIT to the development of modern computers. And none makes more intensive use of the product of this innovation.

There are at least 180 computers on the MIT campus, and to operate them all costs nearly \$9.5 million a year. That is seven percent of the Institute's general operating budget—not including Lincoln Laboratory; it is "a very large proportion," says Robert H. Scott, Director of the Institute's Information Processing Services. It means that MIT probably devotes a larger share of its annual operating budget to computers and computation than any other university in the world.

Of MIT's 180-plus computers (defined as "general-purpose programmable machines which can be made to serve many functions," a definition which rules out simple calculating machines and special-purpose devices which perform a single operation for a single experiment), 12 are operated as computer facilities serving many different users for many different problems; to these machines is devoted \$8.5 million of the annual computation bill.

Two of the 12 are large, general-purpose computers operated by the Information Processing Center to do by far the largest share of the MIT community's computation—an IBM 370/165 (some 5,500 users) and a Honeywell 6180 Multics system (perhaps 1,300 users).

Mr. Scott thinks that at least 50 percent of the professionals within the MIT community—students, faculty, and staff—are using computers at any one time, and in the course of a year perhaps two-thirds of all such workers at the Institute use computers. In addition to access through their normal classroom and research work, at least 1,000 undergraduates use machines for their own projects through the Student Information Processing Board, a student-managed clearing house with a budget of computer time for allocation to undergraduates.

Northeast's Largest

Half of the computer time used at MIT is devoted to research—by faculty, graduate and undergraduate students, and staff, administrative activities—the Office of the Comptroller, the Registrar's Office, the Alumni Records Office, and others served primarily by the Office of Administrative Information Systems—account for just over one-quarter the total computer time.

The School of Engineering uses about half of the computer time assigned to research and academic work, the School of Science 27 percent, the Sloan School of Management 10 percent, and the Schools of Architecture and Planning and of Humanities and Social Science six percent each.

But the Sloan School of Management spends a larger percentage of its total academic budget on computing than any other school, the School of Science the smallest. This is because, thinks Mr. Scott, research in the life sciences simply doesn't require as much computation as work in other fields. And large, highly specialized off-campus computer facilities—notably at the National Center for Atmospheric Research, Los Alamos National Laboratory, and the National Accelerator Laboratory (Batavia, Ill.)—are used instead of MIT facilities by many workers in meteorology, physics, and the earth and planetary sciences.

Corbato, Others Honored 'Chip Off Old CTSS Disc'

After 10 years of effort, the compatible time-shared system (CTSS) for managing a single computer in simultaneous service for many users was phased out at MIT in July, 1973. It was a major effort of Project MAC ("multiple access computer"); its direct applications have been substantial and its influence has been pervasive.

Hence a special honor on March 20 to Fernando J. Corbato, Professor of Electrical Engineering, to recognize his leadership of the CTSS work: a desk set fabricated from an element of the CTSS disc-file storage system.

Presenting the award, President Jerome B. Wiesner credited the project with "a tremendous revolution in computation" through its emphasis on "great accessibility;" Professor Corbato and his associates made "important contributions to computation and the Institute," Dr. Wiesner said.

Richard G. Mills, Vice President of the First National City Bank of New York (he was associated with computer projects at MIT from 1963 to 1970) agreed: "You've taught a whole generation of people to be demanding," he told Professor Corbato.

Responding, Professor Corbato found it all "a very sentimental affair." That there



Dr. Wiesner (left) with Dr. Corbato and desk set containing chip from original CTSS disc file.

are "alumni" of the CTSS who work in so many places throughout the US—many of them couldn't come to the ceremony—is "a very sentimental thing," he thinks; the project "led a lot of people to start thinking about what could be, and now they've

gone out to try to do it."

Other elements from the original disc file were presented as mementos to many of those present to recognize their part in the pioneering development of CTSS.

—JM

Some 15 percent of MIT's computer time is devoted to work for other institutions—chiefly Harvard, but also Tufts, Brandeis, and other New England colleges, universities, and even industrial firms; work is done for the latter only if appropriate commercial facilities are unavailable or if the work is in cooperation with computer projects at MIT. Indeed, MIT now does much of Harvard's computing under an agreement concluded between the two institutions three years ago.

All this means that MIT's Information Processing Center is the largest such organization in the Northeast. Only a few other universities—larger institutions with far more students and faculty—anywhere in the nation have more computer capacity.

Almost Everyone

What about the unit cost of computing? Lower every year than the year before, says Mr. Scott, because the technology improves and because there are more users every year to share the cost of ma-

chines that are not yet fully utilized. Both trends will continue into the foreseeable future, he thinks—and, except for inflation, so will the trend toward lower cost...at least until growing demand renders MIT's two big computers inadequate and there is need for expansion.

Software—the matter of organizing a problem so that a computer can work on it and instructing the computer about the tasks to perform and how to report its results—is the biggest challenge for

the MIT Information Processing Center, just as it is for computer service groups everywhere. Most research and academic users bringing work to the Center provide their own software, and some of it is "very sophisticated;" but some people come to computing with no experience at all, says Mr. Scott, and helping them work out programming problems is "the most important thing we do." Indeed, programming represents perhaps 25 percent of all the work of the IPC staff.

But with this kind of help available, with technological developments making computers more and more useful, and with problems growing ever more complex, Mr. Scott thinks "eventually almost everyone" at MIT will find himself using the computer. Two problems, the chief barriers to this era when every desk will have its terminal as it now has its telephone: better interface facilities, to make computers easier for the uninitiated to understand and to use; and new software packages so that programs devised for one purpose can easily be adapted for others.

New Humanities Requirement

The catalogue description of new Institute Requirement in the Humanities, Arts and Social Sciences was approved by the Faculty at its regular monthly meeting Wednesday, March 20.

Discussion at the meeting centered on a proposed amendment to the description of the revised requirement which will appear in the *General Catalogue*. Discussion on administration of the revised requirement and appointment of a committee to oversee selection of subjects for the distribution list was deferred until the April meeting.

The faculty also approved a change in faculty rules to provide a seat for the associate provost on the Committee on Educational Policy.

Discussion of a report by the Ad Hoc Committee to consider advisability of establishment of a Faculty Review Group for Research Contracts was deferred until the April meeting.

Talking Birds Studied in RLE Acoustical Research Mynahs Found Good Imitators of Human Speech Sounds

Mynahs, parrots and other talking birds have long held a fascination for man because of their ability to mimic human speech. What is remarkable about these expounding fowl, say two MIT scientists, is that their imitations are really quite excellent renditions of human speech. The researchers are Drs. Raymond A. Stefanski and Dennis H. Klatt of MIT's Research Laboratory of Electronics.

Their findings fly in the face of long-held assumptions that talking birds are intelligible only because human listeners subconsciously "fill in" the missing portions of the bird's speech.

The MIT scientists, who presented their results at a recent meeting of the Acoustical Society of America in Los Angeles, compared audio-spectrograms of a talking Indian Hill mynah bird named Ig-Wog and its teacher-owner Mrs. Evett Bower—both declaring "I'd like a grape."

"Our detailed comparison showed that the mynah can imitate the vowel and consonant sounds quite well, though there are some differences between mynah and human sounds," said Dr. Stefanski. As

might be expected, the mynah also does a good job of repeating the same phrase in precisely the same way.

"Our analysis of 'I'd like a grape' showed that the bird was more consistent than Mrs. Bower in its repeated enunciation of the phrase."

"What is most surprising," said Dr. Stefanski, "is that the mynah precisely imitates human speech with a much more primitive set of articulators and a more primitive brain than even a chimpanzee, who cannot even come close to talking."

In fact the mynah imitates speech without moving its small tongue or beak significantly, say the acousticians. Nearly all birds, including the mynah, have a special sound-producing organ called the syrinx that is not found in man. The syrinx is located at the end of the windpipe nearest the lungs.

The mynah syrinx is more complex than that found in most birds. It includes two labia (lip-like masses) similar in shape to the human vocal cords; two pairs of thin membranes that vibrate and produce

sound when air is blown across them; and five sets of muscles that control position and tension in those structures.

"We believe that one of the labia vibrates like the human vocal cords during the production of such speech sounds as vowels. The mynah imitates the changing formants of these sounds by causing the syringeal membrane to vibrate at corresponding frequencies."

What motivates the mynah to imitate humans? "Other researchers have found that the mynah does not imitate other birds or environmental sounds in the wild," said Dr. Stefanski. The young mynah most likely acquires its call repertoire from an adult model, and, thus, may perceive its human owner as being a parent mynah.

According to the MIT scientists, the mynah can provide an excellent model for detailed studies of how animals make sounds. It can also give insight into the acoustic features of speech sounds that are perceived as being the same, but are actually quite different.