

A WARM WINTER'S DAY?—Hardly a scene you'd expect to find in February—these students took advantage of the warm weather we had last week to study on the steps of Killian Court. Photo by Donna Coveney

2ND ANNUAL

Entrepreneurial Competition Returns

MIT is a breeding ground for entrepreneurship, and now there is \$10,000 in prize money to encourage it.

For anyone who hasn't seen the posters plastered throughout the campus, the second annual 10K Entrepreneurial Competition is offering \$10,000 for the best student business plan on the MIT campus. The contest is open to all MIT students.

The historical importance of both new start-ups as well as MIT's role in these ventures is clear. MIT's reputation as a prolific incubator for entrepreneurs is supported by a recent study by the Bank of Boston. The study identified 636 companies in Massachusetts alone that were started by MIT alumni. In 1988, these companies boasted combined sales of 39.7 billion dollars, and accounted for 10 billion dollars of personal income. The list of companies is virtually a who's who of the high-tech world: DEC, Raytheon, Thinking Machine, Lotus, and many more.

Classes For High Schoolers

Do you know any students in grades 7 through 12 who'd be interested in taking a course on daytime astronomy, basic sign language or practice doing science?

These and over 50 other creative academic and non-academic classes will be taught by MIT students and area professionals in the spring 1991 term of the MIT High School Studies Program (HSSP).

Classes meet for ten consecutive Saturdays from March 2 through May 11 in three class periods between 10am and 5:30pm. Students can take one, two or three classes for one \$20 registration fee.

Registration for the spring term will be Saturday, February 23, 10am-noon at the Student Center.

For more information call William Glass, director of HSSP, at x3-4882, or write to HSSP at Room W20-467.

Governor Weld recognized the importance of the entrepreneurial spirit in reviving the Massachusetts economy and made it one of the keynotes in his inaugural address. While the Massachusetts Miracle has faded, there has been no cooling off of entrepreneurial activities at MIT. In fact, student groups like the MIT Entrepreneurs Club and the Sloan New Venture Association are more active than ever. The two clubs are devoted to helping students

harness their creative and entrepreneurial energy.

The 10K Competition is a direct result of their interest in promoting start-up ventures. In the first competition last year, more than 300 entry packets were distributed, and some 60 teams entered the contest. Business plans ranged from new technology projects to not-for-profit projects.

The \$10,000 first prize was awarded (continued on page 6)

THAT'S HIS RAQUET

New Tennis Products Tested Here

By Eugene F. Mallove
News Office

A dozen tennis racquets of many shapes and sizes were strewn on the table. Dr. Rudrapatna V. Ramnath, MIT's resident world expert on tennis racquet technology, began his seminar by serving his audience a burst of tennis trivia.

Did you know, for example, that macho man Bobby Riggs has occasionally handicapped himself by playing with a dog tied to his leg? "He said it's great if the dog is housebroken," recalled Dr. Ramnath, an active player, who once did battle with Riggs on the clay court.

Dr. Ramnath, an adjunct professor of aeronautics and astronautics, and a senior lecturer in mechanical engineering, became enchanted with the science of tennis racquet dynamics about 12 years ago, along with his colleagues Professors Karl Hedrick and Bora Mikic of mechanical engineering.

Now Dr. Ramnath serves as the technical editor of World Tennis Magazine, whose bi-monthly laboratory evaluations of new tennis products may make or break them. Already they have tested more than 1,000 racquets. Their performance numbers have become "the industry standard," he says.

Dr. Ramnath traced the history of scientific tennis-racquetry to its inception with the 1880 paper on the "Irregular Flight of a Tennis Ball" by Lord

Rayleigh. The famous physicist dubbed the phenomenon of a spinning ball's curving trajectory the "Magnus effect." Dr. Ramnath noted that it wasn't until aerodynamicist Prandtl's 1903 work on the theory of object-hugging boundary layers, that science began to understand the "Pro-Magnus" and the "Anti-Magnus" effects that occur under different conditions.

It is the flexure and dynamics of racquets themselves, however, that give life to speeding balls, so Dr. Ramnath has focused much of his work on cata-

NUCLEAR ENGINEERING

Students Have Busy HS Visiting Program

By Elizabeth A. Thomson
News Office

One of Jerry Martin's favorite demonstrations when he talks to high-school students about nuclear physics involves a Geiger counter and an orange dinner plate.

"Notice how the counter ticks even if there are no radioactive materials around," the graduate student in nuclear engineering told a chemistry class of juniors at Quincy High School last week. "That's because of background radiation in the air. But there are materials in which you can find more concentrated sources of radiation."

So saying he picked up the orange plate. "Anybody have this at home?" he asked. "Fiesta-ware? I bet your grandmother had some—it was very popular back in the 1950s." Mr. Martin held the plate up to the Geiger counter and instantly the machine ticked furiously. The reason? Orange Fiesta-ware gets its distinctive color from uranium tetroxide, which is radioactive (though at levels that are not considered dangerous).

The point of the Geiger counter demonstration is to show students that radiation is all around us; that nuclei are constantly being emitted even from common household goods. And that gives them "a better intuitive understanding" of nuclear phenomena, said Tony Hechanova, a graduate student in nuclear engineering and coordinator of the High School Speakers Program through which Mr. Martin's talk was arranged.

"The high-school students we talk to probably have a better understanding of nuclear phenomena than people at MIT that are not in nuclear engineering," Mr. Hechanova said. "That's because these are not things you intuitively understand. No one does. You don't interact with nuclear phenomena on a daily basis."

Mr. Martin, Mr. Hechanova, and 14 other students in the Department of Nuclear Engineering are giving high-school classes around New England (continued on page 8)

IN BRIEF

THANKS, FOLKS

A note from Barrie Gleason, communications manager, says that members of the community responded most generously to her request for copies of the 1990-91 Student Directory.

"In fact," she said, "we received so many directories that we are now able to handle additional requests."

Faculty and staff may call the Communications Office, x3-1702 or 3-1705, to request copies. Students may stop at the Information Center, Rm 7-121, to pick one up.

CU BANQUET

The MIT Employees' Federal Credit Union will hold its Annual Dinner Dance Saturday, March 9, at the Caruso Diplomat in Saugus. Two bands will be on hand to provide ballroom, disco and rock for dancing.

Tickets, at \$13 and limited to two per member, will be on sale Friday, Feb. 22, noon-2pm in Lobby E18; 11:30am-12:30pm in Rm A220 at Lincoln, and noon-2pm in the Draper Human Resource Office.

YOU'RE INVITED

MIT Graphic Arts will hold an open house Thursday, Feb. 14, 3-6pm in its headquarters at 211 Massachusetts Ave, so that customers and would-be customers can meet the staff there and see demonstrations of state-of-the-art equipment now in use. Refreshments will be served.

LURIA DIES

A memorial service is being planned for Salvador E. Luria, the pioneering molecular biologist who shared the 1969 Nobel Prize. A date will be announced soon.

Professor Luria, who founded the MIT Center for Cancer Research, died February 6 at his home in Lexington, at the age of 78. See obituary on page 6.

BLACK HISTORY MONTH

See complete listings of activities in the Calendar on page 4.



Professor Ramnath with one of the high-tech tennis racquets he talked about at a recent IAP seminar. Photo by Donna Coveney

SCHOOL OF ENGINEERING

ME's Wormley Named New Associate Dean

Professor David N. Wormley, head of the Department of Mechanical Engineering since 1982, has been named associate dean of the School of Engineering. Professor Wormley is recognized widely for his research in control systems, transportation systems and fossil fuel energy systems.

His appointment was announced by Dean Joel Moses of the School of Engineering. Dean Moses, the Dugald Caleb Jackson Professor of Computer Science and Engineering, also announced that Professor Wormley would continue to serve as head of mechanical engineering while a search for a new department head is made.



Professor Wormley

"Dave Wormley was the overwhelming choice of the many members of the faculty and administration whom I have consulted," Dean Moses said in a letter to School of Engineering faculty. "He has been an outstanding head of the Mechanical Engineering Department for the last nine years. He is an excellent teacher and has won two Graduate Student Council Awards for Outstanding Teaching. His research interests... complement those of my own. He is widely recognized as a person with great judgment. It will be a pleasure sharing the Dean's Office with him."

Professor Wormley succeeds Professor Jack L. Kerrebrock who served as associate dean with Professor Moses' predecessor, Professor Gerald L. Wilson, from September 1985 until January 1990, when he began a sabbatical year. Professor Kerrebrock has resumed his teaching and research in the Department of Aeronautics and Astronautics.

The new associate dean of engineering received all of his degrees from MIT—the SB in 1962, the SM in 1964, and the PhD in 1967. He was appointed to the faculty in 1967 as assistant professor in the Department of Mechanical Engineering and became head of the department's Systems and Design Division in 1977.

Professor Wormley's research has focused on the dynamic analysis, optimization and design of advanced control systems, transportation systems and fossil fuel energy systems. He is director of the Association of American Railroads Affiliated Laboratory at MIT. His research has included the development of sensors and actuators for advanced control systems, control modeling and simulation techniques for fossil fuel power systems and analysis techniques and experimental evaluation methodologies for transport vehicles and guideways.

Long noted for his excellent classroom teaching, Professor Wormley twice (1975 and 1977) was the recipient of the Graduate Student Council's award for outstanding teaching in his department.

He has taught undergraduate and graduate subjects in dynamic systems, control, instrumentation and design. He is a member of the Institute Committee on Undergraduate Programs, has been co-chair of the Science-Engineering Working Group (a committee which in 1989 made recommendations concerning the science and engineering core subjects for first-year undergraduates) and currently is chairman of the Education Committee for the School of Engineering.

He serves on the Governing Board of the Leaders for Manufacturing Program and is chair of the Sea Grant Faculty Advisory Committee. He is co-principal investigator of the NSF-ECSEL university coalition effort at MIT for renewal of undergraduate engineering education. In addition to MIT, members are Howard University, which is the lead institution, City College of New York, Morgan State University, Pennsylvania State University, University of Maryland and University of Washington.

Professor Wormley is chairman of the board of the Massachusetts Technology Development Corporation, a Commonwealth of Massachusetts quasi-public venture capital organization; a member of the National Science Foundation Advisory Board to the Mechanics and Structures Division; a member of the American Society of Mechanical Engineers' Board of Research, and is past chairman of the Systems and Design Division of the American Society of Mechanical Engineers. He is vice-president elect of the Systems and Design Group of the ASME.

In addition, he is a member of ASME, Sigma Xi and Pi Tau Sigma and serves on the editorial board of the International Journal of Vehicle Mechanics and Mobility. He has been the recipient of the ASME Lewis Moody Award, and a NASA Certificate of Recognition, and is a Fellow in the American Society of Mechanical Engineers.

Security Awareness Rises

As the war in the Middle East enters its second month, Campus Police Chief Anne P. Glavin says there have been no incidents at MIT that can be linked to possible acts of political terrorism.

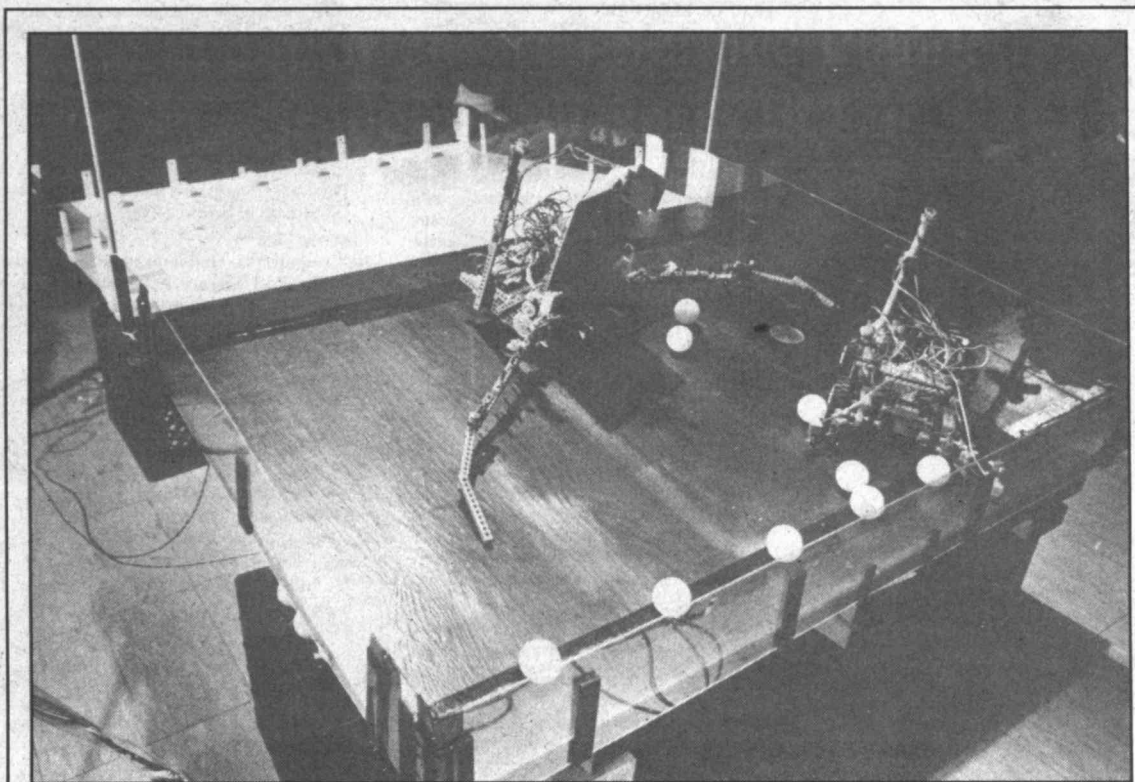
"Nevertheless, as we have from the outset, we are maintaining a heightened sense of awareness," the chief said, "and this has been reflected in our patrolling procedures."

Two recent incidents that led to evacuating some buildings were not linked to the war in the Middle East, the chief said. On January 18 an anonymous caller reported a bomb in Building 10, but said nothing else. A police sweep found nothing. A few days later Buildings 6 and 8 were evacuated when an employee reported a briefcase had

been left unattended for more than an hour at the end of the Infinite Corridor. The Cambridge bomb expert opened the case with firefighters standing by. The case, of the type carried by technicians who service copying machines or computers, was empty. Police believe it had been stolen elsewhere and emptied of tools.

Although news accounts about the likelihood of terrorist attacks have raised concerns on campus to some extent, the chief said, she has received only about a half-dozen phone calls and one letter expressing apprehension.

Chief Glavin said community members with special concerns about security could contact either her at x3-9760, or Deputy Chief James F. Mahoney Jr. at x3-9751.



ROBO-PONG--"ET," a contender in the Media Lab's Robot Design Competition, spreads its arms toward "Anthrax." ET was ultimately victorious in this particular duel, in which the robots competed to push ping-pong balls onto each other's playing surface. Students constructed the robots over IAP with a standardized kit of parts that included LEGO bricks and a microprocessor. ET was made by sophomores Wilson Chan, Michael Daniels, and Manish Tuteja, and freshman Richard Lester. Anthrax was made by sophomores Nitish Swarup and Sriyayanth Chakrapani, and freshman Rajexh Suryadevara.

Photo by Donna Coveney

PRICES SOAR

Libraries Plan Journal Cuts

The MIT Libraries seek faculty advice in identifying which subscriptions to professional and scholarly journals are most important to the community, as a major cancellation program begins because of continuing inflation in journal rates.

Anticipated price increases in 1991 range from 12 percent for domestic journals to 25 percent for foreign titles, which constitute about 42 percent of the Libraries' subscriptions, according to Carol Fleishauer, associate director for collection management and technical services. She said the differential is largely attributable to the weakness of the dollar abroad.

The Libraries have carried out sev-

eral cancellation projects over the past decade, which will make the 1991 effort the most difficult so far, Ms. Fleishauer said. Nearly all duplicate subscriptions among campus libraries have already been cancelled and in 1988—the last major cut—nearly 1,000 unique titles were dropped.

The extent of cancellations needed this year will not be known until the Libraries' FY 1992 budget is set, major publisher price projections are received and the dollar vs. foreign currency rate is known. A substantial reduction of titles is expected, however.

Library subject specialists are now reviewing price, use and citation data to arrive at a preliminary list of titles for

possible cancellation. During February and March, librarians will be contacting academic departments to get faculty input on proposed cancellations. The Faculty Committee on the Library System will review the recommendations before cancellations are implemented.

As a long-term solution, Ms. Fleishauer said, the Libraries are investigating avenues that substitute ready access for journal ownership using electronic means. But, she noted, the cancellations necessary this year are likely to have a perceptible effect on the MIT Libraries' ability to respond to the information needs of faculty and students.

MANY PRIZES

Writing Competition Opens

The Writing Prize Competition, sponsored by the Writing Program, is accepting manuscripts from undergraduate and graduate students through April 11. The 36 prizes carry cash awards and are given to students whose essays, plays, poetry, short stories and technical papers are judged to be of the highest quality by a committee of faculty and staff members.

Ilona Karmel, senior lecturer in the Writing Program and this year's competition chairman, hopes all interested students will submit their best efforts to the competition. She is also encouraging faculty members who receive outstanding undergraduate papers to urge the student writers to enter the competition.

The prizes are:

—The Ellen King Prize for Freshman Writing: for writing in all categories (fiction, short story, essay, drama). First prize, \$150; second, \$75; honorable mention, \$25.

—The Robert A. Boit Writing Prize: for undergraduates in the categories of essay, poetry and short story, with prizes in each category. First prize, \$250; second, \$150; third, \$100; honorable mention, \$50.

—The Boit Manuscript Prize: for undergraduate work in fiction, poetry, drama or essay of substantial length, completed or in progress. This prize is for longer works or collections that give evidence of publishable quality. First prize, \$300; second, \$150; honorable mention, \$75.

—The S. Klein Prize: for outstanding interpretive writing on scientific and technological subjects by undergraduate and graduate students. Entries should be

specifically intended for a nonspecialized, but educated audience. First prize, \$300; second, \$150; honorable mention, \$50.

—The Dewitt Wallace Prize for Science Writing for the Public: writing by undergraduates for lay audiences on issues and developments in science, medicine or engineering. First prize, \$300; second, \$150; honorable mention, \$75.

—The Writing Program Prize for Engineering Writing: undergraduate writing on any topic of professional interest to engineers. First prize, \$200; second, \$100; honorable mention, \$50.

For more information, visit the Writing Program office, Rm 14E-303, where applications and prize guidelines are available.

MIT/BU ROTC

Navy Plans Merger

The Navy Reserve Officer Training Corps programs at MIT and BU are slated to be combined by the Secretary of the Navy as part of a program reflecting future budget reductions, the Navy has announced. The consolidation of the two programs is to be implemented by September 30, 1992.

Capt. Robert W. Sherer, commander of the Navy ROTC unit at MIT, said classes will continue to be held here for MIT students and for NROTC students from Harvard and Tufts. (The Wellesley-NROTC program is being terminated.)

BU NROTC students will continue to have classes on that campus and so will students from Boston College and Northeastern who train with the BU group.

"We are considering coming together as a large consolidated unit for drills, alternating on the two hosts'

campuses," Capt. Sherer said. Those discussions are just beginning, he said. MIT has informed him that final arrangements will have to be acceptable to MIT. Professor Margaret L.A. Mac Vicar, dean for undergraduate education, is the MIT official with responsibility for the ROTC programs.

The MIT-BU combination would be one of eight "geographic consortia" the Navy has proposed forming. The other pairings are UCLA and USC; Northwestern and Illinois Institute of Technology; Duke, University of North Carolina and North Carolina State; Georgia Tech and Morehouse; Villanova and University of Pennsylvania; Rice and Prairie View A&M; Memphis State and University of Mississippi.

The plan also includes closing units at five other schools in fiscal year 1996.

LIVE INSTRUMENTS/INTERACTIVE COMPUTERS

Collage Performs Music from the Media Lab at Symphony Hall



Tod Machover

Photo by Donna Coveney

Some of the newest and most groundbreaking music to come out of the Media Lab is performed by Collage, conducted by David Hoose and Tod Machover, associate professor of the MIT Media Lab, above, on February 24 at Symphony Hall at 8pm.

"Collage at Symphony Hall" gives an exciting glimpse into the future of music.

Featured on this program will be music that is diverse both in its expressive content, and in its visionary use of technology. The program includes a piece for large ensemble and computer-generated tape by Associate Professor Peter Child of MIT Music and Theater Arts. Collage will also perform a piece for solo piano which is "listened to" by an intelligent computer, which in turn "improvises" its own musical response to the live pianist, composed by Media Lab PhD candidate Robert Rowe.

Also performed will be *From Silence*, a work for soprano, six instruments, and live computer interaction, commissioned in 1989 by the Media Lab from British composer Jonathan Harvey.

Closing the program will be two works by Tod Machover: *Flora*, featuring the cosmic images of Japanese computer-graphics master Yoichiro Kawaguchi; and *Towards the Center*, co-commissioned by Collage. This piece which combines the energy and exuberance of rock music with the most disciplined classicism, is scored for six instruments and two computer "hyperinstruments" developed at the Media Lab. The computers follow every nuance of live instrumental gesture, expanding the playing into a vast and intricate kaleidoscope of sound.

The Boston Phoenix wrote of the recently released recording of *Towards the Center*: "(It) starts by showing the rhythmic connection between minimalism and rock, then takes them both to some unearthly oasis neither has ever been to before... Beautiful and compelling."

Tickets are \$10, available at the Symphony Hall box office or SymphonyCharge: 266-1200

Off Campus

Stacia Conklin, senior office assistant for the Office of the Dean for Undergraduate Education will perform "A French Valentine," music by Ravel, Debussy, Chausson and Piaf, with pianist Eric Kamen at the French Library, 53 Marlborough St., Boston, Sunday, Feb. 17 at 4pm. \$6 at the door.



THE ARTS

The Arts Page is produced by the Office of the Arts in collaboration with ARTSNET--253-4003

3 NEW SHOWS

List Visual Arts Center Reopens

Three new exhibitions open with a public preview and reception, Friday, Feb. 22 from 5-7pm, at the List Visual Arts Center on the entry floor of the Wiesner Building (E15). Artist Barbara Broughel will attend.

The Sculpture of Juan Francisco Elso Padilla. The first US showing of work by a Cuban sculptor who died of leukemia in 1977 at the age of 32. Elso was a part of the Cuban Renaissance of the late 1970s. His art embodied a highly personal blend of secularism, mysticism, magic and ethics seeking to identify and embody a Latin American mythology.

Robert Arneson's Jackson Pollock Series. In 1982, Arneson began exploring the life, death, art and myth of the abstract expressionist painter Jackson Pollock. This exhibition contains works in both disarmingly small and disconcertingly large scale.



The portraits of Pollock range from facial masks to full heads to a sculpture bust atop a high pedestal, a type derived from ancient Rome but pushed here to colorful and expressive extremes. Several works document the painter's death in unsentimental reenactments of the car crash that also claimed the life of a young and reluctant passenger.

As critic Donald Kuspit has written, "Arneson's identification with Pollock recovers the sense of Pollock as victim, as disturbed, even deeply pathological—which is the only way to be 'authentic' in the modern world."

Born to Raise Hell, 1987, pictured above.



Harvest Chair, 1991

Barbara Broughel's *Storytelling Chairs*. This ensemble of eight richly doctored and decorated early American chairs by the New York-based sculptor creates an environment for reflecting on the little-appreciated extent to which colonial American culture was indebted to Indian example and precedent, and on the devious and deceitful conquest of Native-American lands by the European "settlers."

In his essay for the exhibition's accompanying catalogue, critic Edward Ball likens *Storytelling Chairs* to a "kind of remedial history." Incorporating, among other things, arrows, harvested vegetables, gunstocks, tools, Native American symbols, and embroidery, these chairs function like found artifacts, deftly inserting poignant references to the sophisticated culture of the Iroquois or Haudenosaunee people.

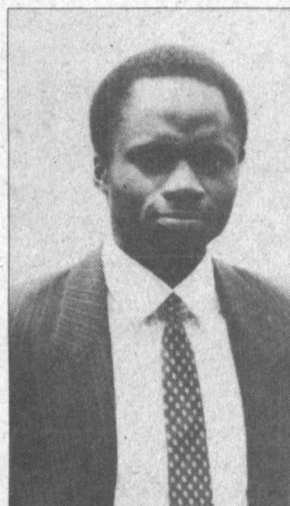
A **Gallery Talk** by Barbara Broughel occurs at 3pm, Saturday, Feb. 23.

These exhibitions will be in place until April 14, 1991. Weekdays 12-6, Weekends 1-5. 253-4680.

BLACK HISTORY MONTH OBSERVED AT MIT

A Sampling of MIT Minority Community Presentations

South African Author Speaks: Mark Mathabane lectures on "From Apartheid, South Africa, to Kaffir Boy in America, an Overview," today (February 13) at 7:30pm in Kresge Auditorium. A voluntary \$1 donation goes to the Fund for a Free South Africa.

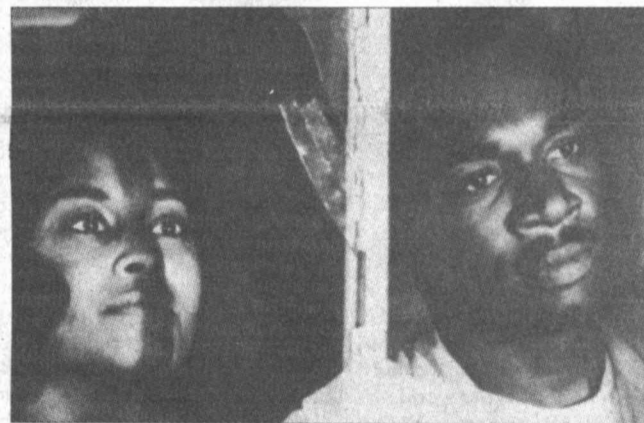


His autobiography, *Kaffir Boy: The True Story of a Black Youth's Coming of Age in Apartheid South Africa* won the Christopher Award for achieving highest honors in France, Germany, Norway, Denmark, Sweden and the Commonwealth nations.

Born of illiterate parents who could not afford to pay the rent for their shack or put food on their table, Mathabane spent his first 18 years in Alexandra, a one-square-mile ghetto outside of Johannesburg. In *Kaffir Boy*, he describes a childhood of devastating poverty, terrifying and brutal police raids, and relentless humiliation that drove him to attempt suicide at the age of ten.

His latest book, *Kaffir Boy in America* chronicles his ten-year odyssey in America and also compares the American black experience with the South African black experience.

Ivan Dixon Tribute: Actor/director Ivan Dixon is honored with showings of two of his films, February 14-15. *Nothing But a Man* (photo below) will be shown on February 14 at 7pm in the Black Student Union (BSU) Lounge (50-105). And, on February 15, Ivan Dixon makes a guest appearance at a screening of *The Spook Who Sat by the Door* at 7pm in Killian Hall (14W-111).



Abbey Lincoln and Ivan Dixon in a scene from *Nothing But a Man*

Other upcoming BSU films include *Tongues Untied*, a look at the lifestyle of black gay males and the issues they confront, shown on Friday, Feb. 22 at 7pm in the BSU Lounge. This film is co-sponsored by GAMIT (Gays at MIT), which will lead a follow-up discussion. The film series is funded by a grant from the Council for the Arts at MIT.

Theatrical Presentation: Students portray outstanding figures from African and Afro-American history as "exhibits" in *The African American Living Museum*, presented on Wednesday, Feb. 27 in the BSU Lounge.

For information contact Ayida Mthembu, 253-4861.

JAPANESE COMEDY



"To Hell with English" (above) one of four comical vignettes in *Bakayaro!* ("I'm Plenty Mad"), shows a young executive's desperation trying to master English in preparation for running his company's Chicago office. The MIT Japan Program and the Japanese Language Program film focuses on the difficulty of maintaining the traditional Japanese facade of polite impassiveness in the face of extreme provocation. Monday, Feb. 25 at 7:30pm in Rm 10-250. \$2 donation. 253-8095

Love Poems by MIT Poets for Saint Valentine's Day

Dry Winter

Gone just now, you leave behind
an irreducible space, like the rush again
of domestic air out into the cold
at the back door's opening this morning.

The air is brittle as glaze. Even inside
any surface crazes, catching the light
like the sign of some creature's passing.
I can find you when you're not here,
in the arc of the curtain as the heat comes up,
something I catch, nearly, sight of
as you say your belly catches your eye
unexpectedly as you dress.

I carry you with me almost as you do the child,
and will when it's born and growing
and moved on for good, leaving us perhaps
indifferent as primitives again
to any number greater than two.

This occupation I never intended,
this sense of you in-grown, indelible as stain,
trailing always your sum of names
like an old spirit of drought or harvest,
called a little differently
by hour or country or season:
lover, familiar, healer, passer of thresholds.

John Hildebidle

Vegetable Love

The eggplant hides shyly
its drooping purple globes,
shiny, discrete,
among the dense, stiff leaves.

The virginal tomato shocks easily,
its best started under glass.
When green and hard,
old, ornamental love-apple, it
blushes, and softens red.

The squash lies among the eggplant,
heavy and narrow-waisted,
dreaming how it sprouted
from the blossom's throat.

Showy, yellow, velvet
head dangling on its spindly stalk,
the fragile nasturtium climbs the tomatoes.
The marigold, blunt and brilliant,
traps the beetle in its orange heart,

while the small, exuberant parsley
stretches its curly fronds in all directions,
hides nothing, digs its roots in,
and like the ancient, self-sufficient fern,
prepares to winter over.

Naomi Feigelson Chase, from *Listening
for Water*, Archival Press, 1980

XVI

I love the handful of the earth you are.
Because of its meadows, vast as a planet,
I have no other star. You are my model
of the multiplying universe.

Your wide eyes are the only light I know
from extinguished constellations;
your skin throbs like the streak
of a meteor through rain.

Your hips were that much of the moon for me,
your deep mouth and its delights, that much sun;
your heart, fiery with its long red rays,

was that much ardent light, like honey in the
shade.
And so I pass across your burning form, kissing
you—compact and planetary, my dove, my globe.

Pablo Neruda, from *100 Love Sonnets*,
University of Texas Press, 1986,
translated by Stephen J. Tapscott



Students Have Busy HS Program

(continued from page 1)
that intuitive feel for nuclear science
via talks and demonstrations that start
with the structure of the atom and con-
clude with state-of-the-art applications
of nuclear phenomena.

Their vehicle is the High School
Speakers Program, organized by the
MIT student chapter of the American
Nuclear Society. The program, staffed
by volunteers, has been around for 15
years but has been especially active
over the last four. This year Mr.
Hechanova sent out speaker request
forms to 311 high schools around New
England; 24 said they'd like the MIT
students to visit their school and talk to
their students about nuclear technol-
ogy and its relevance in our world.

Actually, HSSP speakers don't just
talk to students; they give demonstra-
tions, show colored overheads, and ask
lots of questions of the class. "We try
our best not to lecture to them, but to
bring them out," Mr. Hechanova said.

Teachers interested in the program
can choose from more than a half dozen
topics on the speaker request form.
That's because "nuclear engineering is
a very, very broad field," Mr.
Hechanova said. Topics include nuclear
technology in the space program,
nuclear fusion research, energy and
environmental issues, and nuclear fis-
sion power plants.

The most popular topic, Mr.
Hechanova said, is medical applica-
tions of nuclear technology, which in-
cludes a discussion on medical imag-
ing. That technology can create 3-D
images of the living human brain and
other organs (a few curious nuclear
engineering students have used it on
their own brains).

Often HSSP speakers give several
talks a day on different topics. As Mr.
Hechanova explained: "Since two
students are available for the day, if
one teacher responds to us, we ask
'why don't you talk with the other
teachers and see if they'd like us to talk
to their classes on the same day?'" So
HSSP speakers might give a talk on
medical applications for an AP biology
class, then switch to fusion research for
a general chemistry class. "Recently
Bill Holloway [president of the MIT
student chapter of the ANS] and I gave
five talks total, and there was one stu-
dent who went to three of them," Mr.
Hechanova said.

One important goal of the program,
said Mr. Hechanova, is to educate young
people about nuclear science so they
won't grow up fearing the technology
as many adults do. "Among high-school
students there's a great openness for
understanding this technology," Mr.
Hechanova said. "For older genera-
tions, though, radiation can be some-
thing that's scary, ominous. For some

people just mentioning the word nuclear
throws them into a tizzy, and yet they
themselves are naturally radioactive."

To help prevent such fears, "one
thing we want to teach the kids is that
radiation is very well understood," Mr.
Hechanova said. "We can measure it,
and we know exactly what nuclei are
going to do."

Education is important, say Mr.
Hechanova and Mr. Martin, because
today's high-school students will have
to make tomorrow's decisions on
nuclear technology, especially as they
concern nuclear power. "These issues
are going to come back," Mr.
Hechanova said.

The program will reach about 2,500
high-school students this school year.
So far, feedback has been positive, as
the following excerpts from letters
written by students show:

"I learned a lot from the guest
speaker. A majority of the things he
talked about I didn't have a clue about.
This influenced me to go out and find
out more about nuclear reactions."

And from another: "I would like to
thank you for your presentation on
nuclear science. Even though I don't
like science, and I am not interested in
any of its fields, I really enjoyed the
presentation because it gave me more
knowledge about some advances of
technology."

QUARTERLY JOURNAL

SMR Winter Issue Is Out

The Winter 1991 issue of the Sloan
Management Review, the Sloan
School's quarterly journal, leads off
with an article by Edward Roberts,
David Sarnoff Professor of Manage-
ment of Technology.

The article, "High Stakes for High-
Tech Entrepreneurs: Understanding
Venture Capital Decision Making,"
explores how venture capitalists de-
cide what to spend their money on—
and what entrepreneurs can do about
it. Dr. Roberts has looked at the high-
tech entrepreneurial community that
has grown up around MIT from all
angles—as a researcher, an entrepre-
neur, and a venture capital decision
maker. He reports on that world in his
forthcoming book, *Entrepreneurs in
High Technology: Lessons from MIT
and Beyond* (Oxford University Press,
1991), from which this article is
adapted.

The issue also includes the article
"The Check's Not in the Mail: Strat-
egies for Electronic Integration in Tax

Return Filing," co-authored by N.
Venkatraman, Richard S. Leghorn
Career Development Associate Pro-
fessor at the Sloan School, and doc-
toral student Ajit Kambil. This year
we can file our tax returns electroni-
cally; the authors trace the fascinating
ripple effects created by this appar-
ently straightforward development.

Karen Katz, Blaire Larson, and
Richard Larson studied customer sat-
isfaction when a bank introduced
electronic newsboards and clocks that
estimated the length of the wait in
line. Their article, "Prescription for
the Waiting-in-Line Blues: Entertain,
Enlighten, and Engage," grew out of
a Sloan master's thesis Ms. Katz and
Ms. Larson wrote under the supervi-
sion of Dr. Larson, Professor of
Electrical Engineering and Computer
Science.

Readers interested in copies of
these articles, or in copies of the Re-
view, should call Alexandra Burke at
x3-7170. **Sarah Cliffe, Sloan School**

New Tennis Products Tested Here

(continued from page 1)
sion," and "nodes" of high frequency
vibration in the racquet.

A number of Dr. Ramnath's tests
are carried out with simple balancing
apparatus, or jigs that measure the de-
flection of a racquet when it is bent by
various hanging weights. He and his
colleagues learned "a lot of
counterintuitive things" about racquets,
he noted, when they used some of the
late Doc Edgerton's high-speed photo-
graphy equipment.

For example, the frame of a racquet
continues to deform after the ball loses
contact. They also found that a tennis
ball typically has about five-thousandth's
of a second "dwell time"
when it is in contact with a racquet.

The Wilson Corporation now uses
an expensive, fully automated ball-
firing testing machine, Dr. Ramnath
noted, that checks the dynamical
properties of its racquets. Wilson relies
on concepts that have been uncovered
in the MIT research.

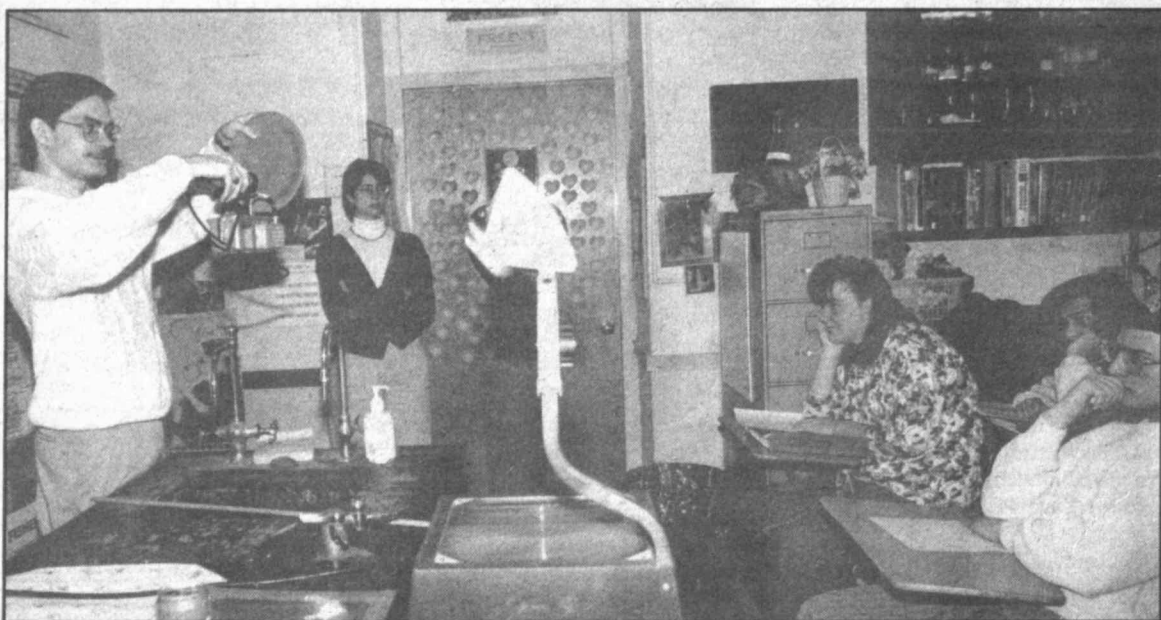
Recently, Dr. Ramnath was asked
to test a Soviet tennis racket, which is
now being produced by a former USSR
aerospace agency in an effort to re-tool
for the Western consumer market. "The

racquet is not bad," says Dr. Ramnath,
"but it has to be much better to appeal
to the sophisticated American taste."

On Dr. Ramnath's recommenda-
tion, a vintage tennis racquet with steel
strings is being donated to the MIT
Museum by Mrs. and Mr. Bissell Al-
derman (MIT '35), the daughter and
son-in-law of Karl T. Compton, MIT's
tenth president.

The shape and feel of racquets are
changing; some are beginning to re-
semble overgrown ping-pong paddles,
it would seem. In general, the string
area of racquets is climbing—from ones
with less than 90 square inches to
"super-oversize" paddles with more
than 120 square inches. More mass is
also being put into racquet rims to
boost their "moments of inertia."

The MIT work has serious impli-
cations for sports medicine. Proper
tuning of a racquet—damping certain
vibrations—might help to forestall the
painful "tennis elbow" syndrome, says
Dr. Ramnath. In general, the public's
responsiveness to his torrent of tennis
racquet numbers and technical com-
mentary pleases him. "For a scientist,
that is very gratifying." It's not just
some kind of racket.



NUCLEAR OUTREACH—Jerry Martin, a graduate student in nuclear engineering, uses a Geiger counter to show a chemistry class at Quincy High School that even common household goods—like this plate of Fiesta-ware—can be radioactive. Mr. Martin's talk was organized through the High School Speakers Program of the MIT student chapter of the American Nuclear Society. Christine Martin, another member of the HSSP, stands at center. (Jerry and Christine are married.) **Photo by Donna Coveney**