

## Orientation features housing midway, education sessions

■ By Robert J. Sales  
News Office

The "strongest class ever admitted to MIT" arrives on campus today for a revamped orientation program that includes three days devoted to academics, leadership and forging a strong sense of community.

The 602 men and 451 women who make up the class received that laudatory assessment from Dean of Admissions Marilee Jones when acceptance letters were mailed in March. The 1,050 freshmen include 41 who had perfect scores of 1,600 in the SATs (mean scores for the class were 706 verbal, 762 math), and 223 valedictorians. Forty-three percent are women and 17 percent are members of underrepresented minority groups.

Groups of freshmen will have upperclass students as orientation leaders, who also will serve as associate

advisors to freshman seminars. Many freshmen arrived early to attend the Freshman Leadership Program.

Orientation also includes the first pre-rush informational housing midway as well as several sessions, including extensive alcohol education, designed to help incoming students make prudent social decisions.

### WELCOME TO MIT

The activities got under way last night with a free showing of "Good Will Hunting." Advanced-placement exams in physics and calculus will be given from 9am-noon today, and do not conflict with other activities.

Professor Emeritus Jay Keyser and Professor Paul Lagace will host a welcome dinner at the Johnson Athletic Center from 6-8:30pm tonight, at which the incoming students will be introduced to their orientation leaders and

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Students are returning to MIT, starting with international arrivals. Helping them get acclimated is Kate Baty and the Host to International Students Program, which she directs (see story on page 6). In her office awaiting a late arrival from Tanzania are (left to right) Davis Wamola, a sophomore from Kenya; Irina Goia, a freshman from Romania; Sawaka Kawashima, a sophomore from Mexico and Japan; Ms. Baty; Phillip Asafo-Kwaako, a sophomore from Ghana; and Riyaz Bachani, a freshman from Kenya. Photo by Donna Coveney

## Hurricane study could save lives and property

To improve understanding and prediction of hurricanes such as the storm now threatening the eastern seaboard, two specially equipped NASA aircraft are collecting high-altitude information about Atlantic hurricanes and tropical storms. One of those airplane's wingpods carries MIT's contribution to the mission: a sophisticated microwave radiometer built in the Research Laboratory of Electronics.

The Convection and Moisture Experiment (CAMEX) mission is taking place in August and

September, which are prime Atlantic hurricane months. Its results may increase warning time—saving lives and property—and decrease the size of evacuation areas while giving scientists a better understanding of these dramatic weather phenomena. CAMEX will yield high-resolution information on hurricane structure, dynamics and motion.

Led by the Atmospheric Dynamics and Remote Sensing program at NASA headquarters in Washington, DC, the experiment unites eight NASA centers,

other government weather researchers and the university community.

"We only know what goes on in the bottom half of a hurricane—from sea level to 27,000 feet," said atmospheric expert Robbie Hood of the Global Hydrology and Climate Center at NASA's Marshall Space Flight Center in Huntsville, AL. "With all of the agencies and the university community working together, we now can learn about these storms from

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## Academic Council decides all freshmen to live on campus in 2001

As MIT Tech Talk was about to go to press last night, President Charles M. Vest issued this letter to the MIT community:



OFFICE OF THE PRESIDENT

August 25, 1998

To MIT Students, Faculty, and Staff:

This morning I asked for and received the unanimous endorsement of the Academic Council to house all freshman students in campus residence halls, starting in the Fall of 2001, when the new undergraduate dormitory will be ready. This decision represents a major step in our commitment to enhancing our educational community and better integrating student life and learning.

The fine report of the Task Force on Student Life and Learning provides a marvelous vision for building a learning experience grounded in a triad of education, research, and community at MIT. In my view, the publication of this report, which will be available in final form next week, makes this the appropriate moment to begin to think together about "how" rather than "whether."

This decision has been informed by nearly a year of thoughtful debate and correspondence about student housing, and by my personal review of the numerous faculty and student reports over the years that have recommended such a course.

I want to make clear my belief that fraternities, sororities, and independent living groups should and will continue to be important and valued elements of our campus life, and that MIT should assist them in managing the transition to a new system. Representatives of both FSILGs and residence halls, together with faculty, administrators, and alumni representatives, will be involved in designing our future residential system and the transition to it. This planning will be carried out in the context of the overall recommendations of the Task Force as well as the broad campus consensus that freshmen should not be housed separately and should be given a degree of personal choice within the residence hall system.

Frankly, I have had concerns about announcing this decision before the term begins, but I believe we should all enter the academic year working together to create a more integrated residential system—one that enhances the introduction of new students into the life and ethos of MIT, and that fosters a mutually supportive, academically oriented environment for all our students.

Sincerely yours,

Charles M. Vest

## Ashford urges research on chemical sensitivity

■ By Denise Brehm  
News Office

An MIT researcher who helped bring the problem of multiple chemical sensitivity (MCS) to national attention several years ago will outline his recommendations for pushing the dialogue on MCS beyond the debate over authenticity and into the realm of scientific research and social policy.

Professor Nicholas A. Ashford, who in 1991 co-authored the first definitive report on low-level chemical sensitivity—believed by many to be the basis for conditions such as Gulf War syn-

drome and sick-building syndrome—will speak at 1:15pm today at the American Chemical Society's national meeting at the Marriott Copley Hotel in Boston.

Eight years ago, Dr. Ashford and co-author Claudia Miller, MD, of the University of Texas investigated illnesses characterized by low-level sensitivity to chemicals—which they now refer to as toxicant-induced loss of tolerance (TILT) diseases. According to this theory, TILT diseases occur in two steps: an initiating exposure to a single large dose or many repeated smaller

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## Team headed by Clarke tackles Y2K problem at MIT

■ By Sarah H. Wright  
News Office

MIT has appointed Rocklyn Clarke to lead a new team charged with addressing what has become known as the "Year 2000 Problem," also known as the Y2K problem or the "millennium bug."

Mr. Clarke (SB 1980, physics) assumed his role in June. His five-person team is officially named the MIT Y2K Team.

MIT began its formal, central preparation for the year 2000 in January

1997 with the formation, by Information Systems (IS), of the Y2K Discovery Team, which was created to assess the scale of the Y2K problem here. (Many departments and offices at the Institute began their Y2K preparations well before then.) The MIT Y2K Discovery Team was led by Karen Fortoul (SB 1982), and in its final report, the team recommended the formation of the Y2K Delivery Team.

The Y2K problem began to attract anxious national and international attention when the impact of some com-

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## US News rates MIT a tie for #4

MIT is tied with Stanford University for the #4-ranked national university, according to the 12th annual US News and World Report guidebook, "America's Best Colleges."

The guidebook, which hit newsstands and bookstores on Monday, names Harvard, Princeton and Yale universities the best national universities, all tied for #1.

The rating represents a shift up in the magazine's rankings for MIT, which ranked fifth or sixth for many years and last year held the No. 6 slot.

US News determines "Best College" status by comparing data on freshmen rates of retention and graduation, faculty resources, student selectivity, student-faculty ratio, class size, percentage of freshmen in the top 10 percent of their high school class and alumni/ae giving rates.

Academic reputation, the only subjective component of the rankings, is determined by surveying presidents, provosts and

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## IN BRIEF

### JOB OFFICE MOVES

The Student Employment Office is moving from Rm 5-119 to Rm 11-120 (the Student Services Center or SSC) on Thursday and Friday, Aug. 27-28. The office will be closed for business during those two days and will reopen on August 31 in Rm 11-120. The phone number remains x3-4973. While the office is closed, materials may be left at Rm 11-120. Job listings for students are still posted in the area outside the SSC.



# Hoyt Hottel dies at 95; was expert on energy, combustion

Professor Emeritus Hoyt Clarke Hottel made fun of his tendency to procrastinate at a chemical engineering dinner in 1992 while quoting pianist/TV personality Victor Borge to show that it was not necessarily a bad trait.

"Plan to die young and keep planning," said Professor Hottel, who directed the Fuels Research Laboratory for 35 of his 76 years at MIT. "Just put off the act as long as possible."

Professor Hottel, four weeks shy of his 90th birthday when he uttered those words, died August 18 of pancreatic cancer at his home in Winchester, MA. He was 95 years old.

An only child, he was born on January 15, 1903 in Salem, IN, and grew up near St. Louis. He once recalled watching Halley's Comet from his family's backyard on April 21, 1910, the day Mark Twain died. At the time, he remembered, "I thought I would never see Halley again because it would be another 76 years." He did, of course.

Professor Hottel, who finished high school at age 15, came to MIT in 1922 after receiving the BS in chemistry from the University of Indiana. He never left. After receiving the SM in chemical engineering in 1924, he served as director of the School of Chemical Engineering Practice (now called the David H. Koch School of Chemical Engineering Practice) for a year and was an Institute Fellow in fuel and gas engineering for two years. He was named an assistant professor in 1928, associate professor in 1931 and full professor in 1941. In 1965 he was named the first Carbon P. Dubbs Professor of Chemical Engineering. He became professor emeritus in 1968.

MIT instituted the Hoyt C. Hottel Lectureship in 1985 and he delivered the inaugural lecture. The Hoyt C.

Hottel Professorship in chemical engineering, established in 1995, is held by Professor Jack B. Howard.

An expert on fuels, combustion, radiant heat transmission and industrial furnaces, Professor Hottel co-authored three books, contributed sections to 15 others and wrote more than 150 technical papers while acquiring eight patents. He was a thesis advisor to Charles Stark Draper.

## TEACHING PRINCIPLES

During that 1992 chemical engineering dinner, Professor Hottel shared with the audience a brief summary of his principles of teaching: "Beware that a student's spirit be not done to death by a formula, by teaching with answers cast in concrete. Be less concerned with technical content and timeliness—I said less concerned, not unconcerned—and less concerned with the completeness of coverage of your subject than with stretching the student's mind and stimulating him to self-teaching, hopefully continued through life."

In addition to his classroom duties, Professor Hottel was an original member and acting director of the Fuels Research Laboratory from 1929-34, when he was named director. He served in that capacity until 1968. He also chaired the MIT Research Committee on Solar Energy from 1938-64, and built three solar houses.

During World War II, he was chief of the National Defense Research Committee group that studied and developed incendiaries. He chaired the Armed Forces Special Weapons Project Panel on Thermal Radiation from 1949-56. In 1948, Professor Hottel received the Medal for Merit, a civilian award, for "exceptionally meritorious conduct in the performance of outstanding services to the United States" for his World

War II service. The British government honored him for his role in the war with the King's Medal for Service to the Cause of Freedom.

From 1956-67 he chaired the National Academy of Sciences Fire Research committee, which studied tactics to fight large fires, including forest fires and fire storms in urban areas. He was a member of the National Academy of Sciences, the National Academy of Engineering and a fellow of the American Academy of Arts and Sciences and the American Institute of Chemical Engineers.

Professor Hottel received many distinguished professional awards, including the Sir Alfred Egerton Gold Medal from the Combustion Institute (which he co-founded) and the Melchett Medal from the Institute of Fuel in Great Britain. He received the Max Jakob Award from the American Institute of Chemical Engineers and the American Society of Mechanical Engineers in 1966 and the Founders Award from the Institute of Chemical Engineers the next year. In 1975 he received the Farrington Daniels Award of the International Solar Energy Society. He was the founder and first chair of the American Flame Research Committee.

After he retired from MIT, Professor Hottel taught and lectured at many universities overseas, including the University of Newcastle in New South Wales, Australia. He served on the National Academy of Sciences advisory group on Brazil and lectured on energy-related topics in South Africa. A grandchild often accompanied the Hottels on their overseas trips.

Professor Hottel was among 55 scientists from 13 countries who volunteered to visit the Soviet Union in 1984 as "good-faith witnesses" to guarantee the return of ailing dissident Yelena Bonner if she were allowed to leave the



Professor Hoyt C. Hottel

Photo courtesy MIT Museum

country for medical treatment. Dr. Bonner and her husband, Andrei Sakharov, were banished to the city of Gorky in 1980 after criticizing Soviet intervention in Afghanistan. He never visited the Soviet Union.

## DIVERSE HOBBIES

Away from academia, Professor Hottel took great pride in his extensive vegetable and flower gardens. He was a prodigious and skilled woodworker who built two beautiful hardwood coffee tables and crafted his own Christmas decorations over the years. He also built kayaks for his daughters to paddle on Mystic Lake where they lived. One of his proudest achievements was climbing Mount Teton in Wyoming with several younger MIT colleagues when he was 50 years old.

"He was a man of so many interests," recalled his daughter, Lois H. Wood of Lebanon, NH. "Classical music certainly was at the top of his list—he enjoyed the Boston Symphony regularly with my mother, a singer, for as many years as I can remember. He had a nearly perfect ear, and could sing any song using the diatonic scale. Any song."

For fun, he wrote, photographed and edited two movies with his MIT colleagues and the MIT Drama Club, "Clementine" in 1934 and "Henry's Wooling" in 1937.

Professor Hottel was a member of Phi Beta Kappa, Sigma Xi, Tau Beta Pi and Alpha Chi Sigma honor societies and the Indiana University chapter of Phi Gamma Delta. He was an active member of the Winchester Unitarian Church.

The family summered on Sutton Island in Maine and Professor Hottel was a member of the Harbor Club in Seal Harbor for 30 years.

In addition to his daughter, Lois, Professor Hottel is survived by a son, Hoyt Jr., known as Clarke, of Mattapoisett, MA; two other daughters, Barbara H. Willis of Severna Park, MD, and Elizabeth H. Barrett of San Diego; 10 grandchildren and 18 great-grandchildren. Professor Hottel's wife of 65 years, the former Nellie L. Rich of Boston, died in 1994.

A memorial service will be held at 11am on Saturday, Sept. 12, at the Winchester Unitarian Church, Mystic Street, Winchester, MA.

Robert J. Sales

## Student Notices

\* Open to public  
\*\* Open to MIT community only

August 26-September 6

### RELIGIOUS ACTIVITIES

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

**Taize Prayers\***—Fridays, noon-12:30pm in W11, the Board Room. All invited. Sponsored by students from the Protestant Ministry at MIT, Tech Catholics and the Lutheran-Episcopal Ministry. Taize Prayers, coming from the Taize community in France, are a form of Christian meditation based on singing and silence.

**Eucharist/Holy Communion\***—Wednesdays, 5:10pm throughout the summer. W11, Main

Dining Room. Sponsored by the Lutheran-Episcopal Ministry at MIT.

**Baptist Campus Ministry\*\***—Weekly events: Sunday Nights at the RAC, 6pm, Main Dining Rm, Bldg W11. Home-cooked meal at 6pm (cost: by donation), followed by Bible Study. Tuesday Vespers, 6-6:30pm, chapel. A quiet time for reflection. More info: x3-2328.

**Baptist Student Fellowship\***—Weekly meetings on Tuesdays, include dinner followed by Bible Study. 5:30-7pm, Bldg W11, small dining room. Sponsored by Baptist Campus Ministry. More info: x3-2328.

**Campus Crusade for Christ\*\***—Weekly meeting on Wednesdays, 8pm, PDR 1 & 2, 3rd fl Student Center. Morning prayer, Tuesday and Thursday, 8:30am, Rm W11-080 (CFL). More info: x2-1781 or <bigbob@mit.edu>.

**Tech Catholic Community\*\***—Sunday Masses 9:30am, 1pm and 5pm. Weekday Masses Tuesdays and Fridays 12:05pm when classes are in session. More info: x3-2981 or <catholic@mit.edu>.

**Graduate Christian Fellowship\*\***—Weekly meetings in Student Ctr, PDR 1&2, Fridays at 5:30pm. Also weekly Bible studies and Responsible Technology discussion group. Andrew Crabtree 868-0488 or <crabtree@mit.edu>.

**Christian Science Organization\*\***—Thursdays at 7pm. Call x3-8797 or <lnorford@mit.edu> for further information.

**Communitas-Life Together\*\***—Protestant Worship Sunday at 11am. Sponsored by: American Baptist Church, United Church of Christ, United Methodist Church, Presbyterian Church (USA). Chaplain John Wuestneck, x2-1780, <chaplain@mit.edu>.

**MIT Hillel\*\***—Tuesdays: 5:30pm Beginning Hebrew Class; 6:30pm Intermediate Hebrew Class. Wednesdays: 12noon Hebrew Conversation Table in Walker Cafeteria; 7pm Haftorah Class. Thursdays: noon Taste of Torah. Fridays: 6pm Egalitarian Chavurah Services and Orthodox Minyan Services; 7pm Shabbat dinner. Saturdays: 9am Orthodox Minyan Services; 12:45pm Shabbat lunch. More info x3-2982.

**Lutheran-Episcopal Ministry at MIT\***—Regular Wednesday worship 5:10pm, followed by supper in the Bldg W11 dining room. On the second Sunday of each month, LEM assists at Common Cathedral, a gathering of homeless people on the Boston Common, at 1pm. More info: x3-0108.

**Meditation and Discourse on the Bhagavad Gita\***—With Swami Sarvagatanda, MIT Chaplain and Head, Ramakrishna Vedanta Society of Boston. Every Friday, 5:15-6:30pm, MIT Chapel. Sponsored by the MIT Vedanta Society. More info: 661-2011 or <manta@cvtel.com>.

**MIT Muslim Students Association\***—Five daily prayers, Bldg W11; also Friday congregation 1:10-1:45pm, Rm W11-110. Info: x8-9285.

**MIT Orthodox Christian Fellowship\*\***—Wednesdays at 5:30pm in Student Ctr DR 1 for dinner followed by Chapel Vespers. John Kymissis x5-7649 or Costa Sapuntzakis x5-7683.

## Other obituaries

### PAUL R. GAUDETTE

Paul R. Gaudette, 89, of North Chelmsford, a former senior clerk at Lincoln Laboratory, died on July 16. He was hired in 1965 and retired in 1974. Names of survivors were unavailable.

### MARY B. KISSANE

Services were held on July 28 for Mary B. Kissane, of Arlington, a former vegetable cook in Food Services, who died on July 24. Ms. Kissane, 81, worked at MIT from 1965 until her retirement in 1982. Survivors include four brothers: Michael of Arlington, Dan of England, and Paddy and John of Ireland; one sister, Nellie of Ireland; and a sister-in-law, Bridie of Arlington.

### FLORENCE M. OXENHAM

Florence M. Oxenham of Falmouth, ME, formerly a senior secretary in the Department of Biology, died on July 28. She retired in 1977 after working at the Institute for 10 years. Names of survivors were unavailable.

### LEA PAJEWSKI

Lea Pajewski, 87, of Wenham, a former Libraries section head, died on July 15. She retired in 1978 after 12 years at MIT. She is survived by her husband, Stephen; a daughter, Diana Lannon of Topsfield; and three grandchildren.

### JOSEPH W. SOUZA

Joseph W. Souza, 72, of Revere, formerly a senior stock clerk at Lincoln Laboratory, died on June 1. He was hired in 1950 and retired in 1994. Survivors include his wife, Marie; a son, Stephen; a daughter, Carol Souza; and two grandchildren.

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## Crimewatch

The following summary contains most of the incidents reported to Campus Police from August 6-12, 1998. It does not include medical shuttles, ambulance transfers, false alarms and general service calls.

**August 6:** Bldg. 12: 1) backpack stolen, \$60; 2) walkman stolen, \$70. Student Center: \$1,000 cash and \$800 digital camera stolen. Bldg. 3: graffiti. Bldg. 68: balance stolen, \$1,292. Assist Cambridge and State Police with a non-affiliated female who fell into the Charles River.

**August 7:** Bldg. 13: suspicious person stopped and issued a trespass warning. Bldg. E19: suspicious activity. Bldg. 2: aluminum stolen, \$300. Bldg. 7: walkman stolen, \$100. Delta Kappa Epsilon: laptop stolen, \$2,400. Outside W87: suspicious activity. Ryder Lot: Assist Cambridge Police with an individual who broke into a building. Tang: unwanted person.

**August 8:** Senior House: two rooms were entered without breaking. Suspect described by victim as white male, 25-30 years old, 5'10", heavy build, dark blond hair, birth mark on lower right side of neck. Soliciting for the AIDS walk. Zeta Psi: camera and cash stolen, \$220.

**August 10:** Student Center: 1) tools stolen, \$1,240; 2) laptop computer stolen, unknown value. Bexley: notify student to call home. Student Center: missing visitor, same located. Weight Room: wallet stolen, \$50, later returned missing cash. East Lot: student driver struck parked vehicle. Senior House: Brass Rat stolen, \$256.

**August 11:** Harvard Bridge: Assist state police, non-affiliated bicyclist struck by motor vehicle, minor injuries. Bldg. E25: answering machine stolen, \$10. Bldg. 12A: tools stolen, \$100. Alumni Pool: wallet and credit card stolen, \$75. Kresge lot: car stereo and backpack stolen, \$600. Kappa Sigma: bicycle stolen, \$400.

**August 12:** Harvard Bridge: attempted armed robbery of MIT student. Victim describes suspect as male, Hispanic looking, 20-30 years of age, slim build, mustache, brandished a knife. No clothing description was provided. Bldg. 35: overhead projector stolen, \$675. Alumni Pool: cash and gold chain stolen from a backpack, \$70. Student Center: tractor trailer pulling dumpster away from loading dock caught the corner of dumpster.



# Increase of intellectual property licensing at universities stems from changes in funding, legislation, writes TLO's Nelsen

■ By Lita Nelsen

Director, MIT Technology Licensing Office

(In tribute to the 150th anniversary of AAAS, *Science* is publishing a weekly series of personal viewpoints on the theme of science and society. Essayists include prominent scientists plus a wide range of nonscientists, including artists, politicians, religious leaders, science fiction writers and philosophers. An archive of these essays is on line at <<http://www.sciencemag.org/feature/data/150essay.shl>>. Reprinted with permission from *Science*, volume 279, number 5356 issue of 6 March 1998, pp. 1460-1461. ©1998 by The American Association for the Advancement of Science.)

Intellectual property scarcely existed in the vocabularies of US academic researchers and administrators even 15 years ago. Now it is an ever-present part of discussions on research policies and directions.

This new importance of intellectual property in academia reflects a changing view of the relationships of research universities to the surrounding society. Until recently, research at universities has been relatively isolated from demands of economic utility, and education of graduate students has emphasized a career in academic research as the final goal.

The university's contentment with this relative isolation was affected by two major events of the late 1980s and early 1990s: the fall of the Berlin wall, leading to an expected decrease in military funding of research, and the emphasis on balancing the federal budget—both producing a fear of a decline in federal funding of university research. The reaction on the part of the university has been to emphasize the benefits of taxpayer funding of research and to seek increased research support from industry. Intellectual property plays an important part in both of these efforts.

## BAYH-DOLE AMENDMENT

Economic development through exploitation of intellectual property is now widely touted as one of the major benefits of federally sponsored research. This effect was given a major boost by the passage of the Bayh-Dole Act (Public Law 96-517), implemented in 1980. The primary intent of this law was to foster the growth of technology-based small businesses by allowing them to own the patents that arose out of federally sponsored research.



Nelsen

Universities and other nonprofit recipients of federal funding were included in the definition of "small entities" benefiting from the Bayh-Dole Act, largely as an afterthought. Under the Bayh-Dole Act, the universities themselves would not develop the patented technologies, but would license the patents to industry. A provision of the law allowed the universities to retain royalties from such licensing and specified that a fraction of the royalties would be shared as personal income to the inventors. By law, the university's share of the royalties must be plowed back into its research and educational activities.

A key aspect of university licensing of their inventions under Bayh-Dole was the granting of exclusivity. How could the federal government justify allowing a single company to be given the advantage of intellectual property developed under taxpayer funding? The universities pointed out that exclusive licenses were imperative for the development of early-stage technology. The commercial licensee must devote substantial time and money to attempt to develop the technology, with no guarantee that it will be successful. Exclusive licenses are an inducement and reward for a company willing to step forward and take such a

risk—knowing that if it succeeds in the development, the exclusive license will protect it from more risk-averse competitors.

Now almost all research universities in the United States have technology licensing operations. The number of US patents granted to American universities in a year rose from about 300 in 1980 to almost 2,000 in 1995. A survey of university licensing activities documents 5,396 licenses granted by universities between 1991 and 1995.

More than 250 new companies were formed directly through university licenses in 1996—and a total of more than 1,900 companies since the inception of the Bayh-Dole Act in 1980. Hundreds of products are already on the market that were developed under licenses—ranging from new vaccines to computer security systems, electronic music chips, chemotherapeutic agents and low-pollution industrial burners.

The direct economic impact of technology licensing on the universities themselves has been relatively small (a surprise to many who believed that royalties could compensate for declining federal support of research). Although a very few, and highly visible, "blockbuster" inventions such as the Cohen-Boyer gene-splicing patent from Stanford University and the University of California, the fax patent owned by Iowa State, and the cis-platin patents of Michigan State University have made tens of millions for universities, most university licensing offices barely break even.

In contrast, the impact of university technology transfer on the local and national economies has been substantial, and leads to the conclusion that the Bayh-Dole Act is one of the most successful pieces of economic development and job-creation legislation in recent history. It has been estimated that more than 200,000 jobs have been created in the United States in product development and manufacturing of products from university licenses, with the number increasing fairly rapidly as the licenses mature.

These results of university licensing have been noted with great interest by local communities, state legislatures, the US Congress and many policy-makers abroad. Locally, some universities have noted a lessening (and even "sweetening") of the "town/gown" conflict, as cities such as Cambridge see new companies and jobs springing up out of the universities in their communities. State governments are setting aside monies specifically to fund technology transfer offices and new-company incubators in their universities. The phrase "Bayh-Dole" is heard frequently in Japan and Germany as their educational ministries seek to emulate the US university technology transfer system.

## INDUSTRIAL SUPPORT

Parallel with the development of the university infrastructure for protection and licensing of intellectual property has come an increased interest in research partnerships between industry and universities—from both partners.

Universities see industrial support as potential replacement for funds cut by the federal government. Industry has many reasons for increased interest: technology is developing too rapidly for in-house development to be sufficient; central research laboratories with cutting-edge scientists were closed down in the draconian downsizing of the late 1980s and early 1990s, and companies are

(continued on page 4)

## Erratum

An article about discounted air fares on US Airways that appeared in the August 12 issue of MIT Tech Talk failed to mention that the US Airways contract, which makes discounted fares available to all MIT business travelers, replaces an earlier MIT contract with Delta Shuttle.

## Awards & Honors

■ Professor **John W. Negele**, the W.A. Coolidge Professor of Physics and director of the Center for Theoretical Physics, has received a Humboldt Research Award for Senior US Scientists from the Alexander von Humboldt Foundation in Bonn, Germany. The award offers an extended research stay in Germany.



Negele

■ Dr. **Janice Chang**, a technical instructor in biology, has been selected as a participant in the Research Link 2000 Project, an NSF-funded project of the Council on Undergraduate Research. The program brings together biology faculty to select, develop and disseminate a group of field-tested experimental systems and instructional materials for research-based experiments in introductory biology. During the August 5-9 workshop at Carleton College, Dr. Chang and others will develop lab experiments and web site support for the project.

■ Dr. **Peter Senge**, senior lecturer at the Sloan School of Management, is the recipient of the Distinguished Contribution Award for Workplace Learning and Perfor-

mance from the American Society for Training and Development. Dr. Senge's work in organizational learning includes systems thinking, personal mastery, mental models, building shared vision and team learning. He is the author of *The Fifth Discipline: The Art of Practice of the Learning Organization* (1990) and *The Fifth Discipline Fieldbook* (1994).



Senge

■ Senior Associate Dean for Graduate Education **Isaac Colbert** has been named chair of the board of trustees at Chapel Hill-Chauncy Hall School in Waltham. Dr. Colbert has been a board member since 1991.

■ Professor Emeritus **János M. Beér** of chemical engineering is the 1998 recipient of the AIAA Energy Systems Award from the American Institute of Aeronautics and Astronautics. The award is presented for a significant contribution in the broad field of energy systems. His award cites him "for distinguished contributions as an educator, researcher and consultant in techniques, developments and applications in the field of combustion."

## On-line service provides faculty research and biographical data to MIT community

Interested in learning who at MIT is working on biomaterials or another specific area of research? Try consulting the KnowledgeBase, a searchable database produced by the MIT Office of Corporate Relations (OCR) for members of the Industrial Liaison Program. The new database is also available to members of the MIT community with an "mit.edu" e-mail address.

The KnowledgeBase includes biographical information and research interests for some 3,000 MIT faculty

and research staff. It also includes brief abstracts of current research projects as well as descriptions of MIT departments, labs and centers. It can be accessed on the web at <[http://ilp.mit.edu/ilp/members\\_only/knowledgebase/](http://ilp.mit.edu/ilp/members_only/knowledgebase/)>.

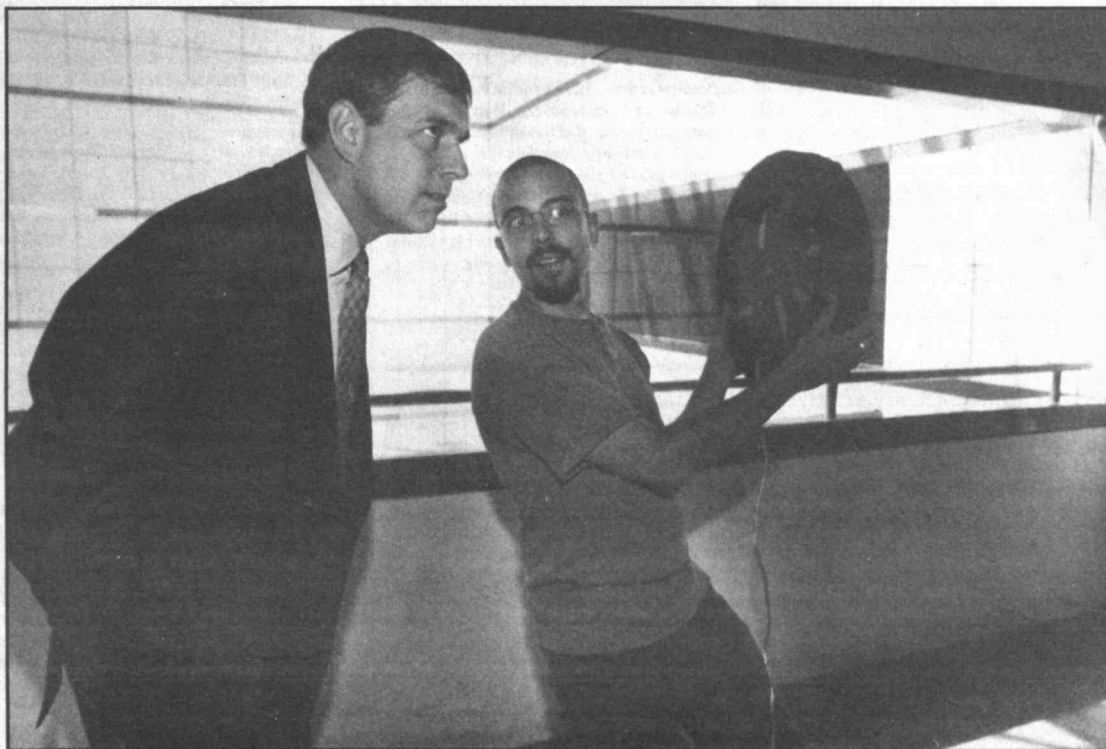
In the past, the ILP has published periodic guides to the broad spectrum of interests (MIT Expertise) and research projects (Research at MIT) underway at the Institute. The KnowledgeBase, which will be continuously updated, is the online ver-

sion of the earlier guides.

"We plan to publish both a CD-ROM and hard-copy version of the data within this academic year," said K.C. Klingensmith, editor and information coordinator for OCR and producer of the KnowledgeBase.

MIT faculty and staff can check their records and submit updates online. For instructions on updating biographical and research information, contact Ms. Klingensmith at x3-0422 or <[klingsmith@ilp.mit.edu](mailto:klingsmith@ilp.mit.edu)>.

## Celebrity spotting



Britain's Prince Andrew got a new sense of celebrity during his August 7 tour of the Media Lab, when Research Assistant F. Joseph Pompei (right), a graduate student in Media Arts and Sciences, turned his audio spotlight on the royal personage. When the audio spotlight is aimed at someone, its narrow beam of sound can be heard by its "target," but not by anyone standing close by. Photo by Donna Coveney

Do you have news or information you'd like to share with the MIT community or outside readers?

Contact the News Office at x3-2700 or send e-mail to <[newsoffice@mit.edu](mailto:newsoffice@mit.edu)>. Also see our Web page at <<http://web.mit.edu/newsoffice/www>>.



# TLO's Nelsen talks about intellectual property licensing

(continued from page 3)

reluctant to rebuild them; universities have specialized facilities and staff that cannot readily be obtained elsewhere; and companies can experiment with new technologies and approaches at universities without committing to hiring permanently the expertise that will be needed to develop these technologies.

Intellectual property terms have become vitally important. The company wants to be assured that it can use the results of the research—and that these results will not be available to their competitors. But most universities insist that dissemination of research results is key to their identity and mission and will not agree to keep the project results secret.

The key to resolving this dilemma is patents: The university will publish the results, but will first agree to file patents that will protect the company's exclusivity in the commercial marketplace.

The critical factor in making this accommodation work is an efficient,

knowledgeable technology transfer process at the university. The negotiators must be savvy about both technology and business, able to understand the industrial partner's needs and to craft reasonable intellectual property terms that meet those needs while preserving the rights, policies and freedom of action of the university. These university technology transfer professionals are part of a new and surprisingly creative profession.

## IMPACT ON STUDENTS

An unpredicted effect of the increasing interest in exploitation of university intellectual property has been that on students and the educational process. Contrary to expectations that patenting and technology transfer might somehow shut out students from full participation in the research process, the effect has instead been to motivate students and to increase their awareness of the potential com-

mercial utility of their research findings.

Many engineering, design and business development courses now include at least one session on patenting and technology transfer. Product development courses, previously unknown, are now popular in even the most science-based engineering schools. The biggest impact of university technology transfer on students comes from the success of start-up companies based on university licenses. The process tends to be very visible on campus, providing role models for many students.

At the Massachusetts Institute of Technology, for example, the annual student business plan contest elicits 75 to 100 entries, a large fraction of which are based on plans that the students fully intend to turn into businesses. Of the six semifinalists each year, more than half achieve venture capital financing, and many who do not make the semifinals nevertheless

go on to form successful companies.

Entrepreneurship courses and entrepreneurship tracks in MBA programs are now among the most popular offerings in business schools, and an increasingly large number of graduates are seeking employment in venture capital or in startup companies. A relatively new trend is that of joint programs between engineering and business schools, many of which stress moving technology "from the laboratory to the production floor."

## THE FUTURE: TRENDS AND PROBLEMS

University management of intellectual property is still young, and both policy-makers and technology transfer officers are learning by doing. Most policies have been formed ad hoc, with modifications made as problems arise. Yet the field is beginning to mature. Certain norms have arisen and some issues, such as taking of equity in startup companies as a form of royalties, were initially highly controversial, but have become accepted as experience is gained and the predicted disasters have been largely averted through thoughtful formation and enforcement of policies.

With maturity, however, are coming new problems and challenges, as there is an inherent conflict between free dissemination of knowledge (widely accepted as the university's primary mission), industry needs for confidentiality and control of intellectual property, and the university's obligation to protect and foster the development of its intellectual property in the cause of public economic development.

Although the past 10 years have shown that effective compromises can be wrought between these competing objectives, new situations show that these compromises may not be sufficient. Examples include:

- Restricted availability or delays in exchange of "research tools" (such as vectors or transgenic mice) in biological research.
- "Inappropriate" granting of exclu-

sive licenses (such as the licensing of receptor "targets" for high-throughput drug screening) where wide availability might better foster development.

- New forms of collaboration with industry that do not lend themselves to the "sponsored research" model. For example, should the university insist on owning the intellectual property when a company sponsors a design competition in an undergraduate design class for ideas to improve the company's camera? Or how should the university treat collaborative projects where the student spends half of his or her time as an intern in the company's laboratory, and half in the university lab?

- Trading-off of benefits to the university may conflict with the expectations of the researchers. A recent suit against the University of California (Singer v. The Regents of the University of California), for example, alleged that the university gave overly favorable licensing terms to a company in return for sponsored research funds, depriving the inventors of substantial potential royalties.

- Tenure evaluations. Junior faculty members worry about whether participation in technology transfer is good or bad for their tenure prospects. Some are concerned that any such activities will lead to the assumption that their academic pursuits are not primary in their minds. Others assume that licenses are critical to the tenure committee deciding that the researcher's technology is "important."

Policy fiats, changes in the law, or even attempts to categorize types of intellectual property and the "appropriate" handling of them are very likely doomed to have overly broad effects with harmful, unintended consequences. The answer at the present time seems to be to handle situations on a case-by-case basis, but under a process of continual dedication within the university to "do the right thing"—and a continuing search to discover what the "right thing" is.

## Institute Calendar

- \* Open to public
- \*\* Open to MIT community only

Tech Talk Calendar and Student Notices are on-line at <<http://web.mit.edu/newsoffice/tt/listings>>.

Next deadline for listings: Noon Friday, August 28. Covers events from Wednesday, September 2 through Sunday, September 20. Listings for the Institute Calendar and Student Notices should be submitted using the web form at <<http://web.mit.edu/newsoffice/tt/calform>>. Questions can be e-mailed to <[calendar@mit.edu](mailto:calendar@mit.edu)> or call x3-2704. Early submissions encouraged.

### August 26-September 6

#### COMMUNITY CALENDAR

**Singers Needed\***—Mondays, noon-1pm, Rm 4-148. The Meridian Singers, MIT's mixed classical and madrigal chorus, is recruiting for all parts, especially tenors and basses. No auditions required, but you must be able to carry your part in a mixed SATB chorus. The group, made up of MIT staff and students, is open to the public. It performs for the MIT community several times a year. More info: Nancy Howells, director, <[howells@mit.edu](mailto:howells@mit.edu)> or x3-1948.

**Friday Hopeful AI-Anon Meeting** now meets in Rm E25-335C, noon-1pm. All are welcome.

**MIT Job Support Group for international spouses.** Meet people in the same situation you are. We can help you find information

and prepare for your job search and interviews. More info: Jennifer at x3-1614.

**MIT Language Conversation Exchange\*\***—We find conversation partners for those interested in practicing a language with a native speaker. More info: x3-1416 or <<http://web.mit.edu/medical/wivesgroup/LCE.htm>>.

**International Dancing.** Sunday nights in the Sala, all summer. 7:30-11pm. Early teaching at 7:30pm, regular teaching at 8pm, request dancing begins at 9:15pm. More info: <[richards@theory.lcs.mit.edu](mailto:richards@theory.lcs.mit.edu)>.

#### MITAC

The MIT Activities Office (MITAC) serves the cultural and recreational needs of the MIT community (including MIT's retirement community). Two locations: (1) Walker Memorial Rm 005, 9:30am-3:30pm, Wednesday-Friday (2) Room LLA-218, x6130, Lincoln Lab, 1:15-4pm, Thursday and Friday only. More info: x3-7990 or <[julieh@mit.edu](mailto:julieh@mit.edu)>. MITAC accepts only cash or a personal check made payable to MIT. MIT IDs must be presented.

**Riverside Amusement Park (Agawam, MA)\*\***—One day park pass good any day through October. Tickets: \$16 (reg. \$24.99/height 36" and above; under 36" free).

**Six Flags Great Adventure (New Jersey only)\*\***—Early bird one-day pass into 125-acre theme park and 350-acre drive-through Safari, through October. Tickets: \$27 (reg. \$40).

**Water Country (Portsmouth, NH)\*\***—One-day park pass good any day. Tickets: \$19 (reg. \$24.95);

**King Richard's Faire (Carver, MA)\*\***—Aug. 29-Oct. 18. Tickets: \$15 adults (reg. \$18) and \$9 child (ages 5-10). Purchase by 10/9.

**Red Sox vs. Tigers (Fenway Park, Boston)\*\***—Sun., Sept. 13, 1:05pm. Bleacher ticket: \$6 (reg. \$12). On Sale 8/13.

**Trapp Family Lodge Weekend (Stowe, VT)\*\***—Sun., Nov. 8 thru Wed., Nov. 11. Tickets: \$215 pp double for two nights (Sun. and Mon. evening) and \$315 pp double for three nights (Sun., Mon., and Tues. evening).

**Big "E" (W. Springfield, MA)\*\***—Sept. 18-Oct. 4. Tickets: adult (ages 13+) \$8.50. On Sale 9/3.

**Whale Watch (Rows Wharf, Boston)\*\***—Sat., Sept. 12, 10:30am. Ticket: \$14. On Sale 9/3.

**Gross Indecency (Huntington Theatre, Boston)\*\***—Sun., Sept. 17, 2pm. Tickets: \$23.50 balc. seating (reg. \$35). On Sale 9/3.

**Museum Passes\*\***—Children's Museum, \$4 (reg. \$6-7). Museum of Science, \$4 (reg. \$7-\$9). NE Aquarium, \$5.50 (reg. \$5.50 and \$11).

**Discount Movie Tickets\*\***—Sony Theatres \$5. Showcase Cinemas \$5.50. General Cinemas: adults \$5.50, children \$3.25. Landmark Theatres \$6.50.

## Institute Arts

For more arts-related information call the 24-hour hotline at 253-ARTS or consult the World Wide Web at <<http://web.mit.edu/arts>>.

- \* Open to public
- \*\* Open to MIT community only

### August 26-September 6

#### MUSIC

**Aurelius Ensemble: Unabashed Angst\***—Aug. 27. Nina Chen (G), violin; Rachel Levinson '01, violin; Grant Ho (G), violin; Jennifer Gruzca '98, viola; Annette Klein, viola; Michael Bonner, cello; Eran Egozy, clarinet; Yukiko Ueno (G), piano; Elaine Chew (G), piano. Penderecki's Cadenza for Viola Solo; Gorecki's String Quartet No. 1 ("Already It Is Dusk"); Brahms' Piano Quartet in C minor Op. 60; Bartok's *Contrasts*. Ensemble's name honors Prof. Marcus Aurelius Thompson for his commitment to MIT's chamber music program. 8pm, Killian Hall. x3-2906.

**Live Jazz at Muddy Charles Pub\***—Wednesdays. The Pat Battstone Quartet. 8:30-10:30pm, Rm 50-110. x3-4012.

**MIT Guild of Bell Ringers\***—Change ringing on hand bells. Beginners always welcome. Will also ring for occasions. Meets Mondays, 6:30pm, 2nd floor balcony of Lobby 7. Roberta Young, x3-3573, <[rey@mit.edu](mailto:rey@mit.edu)>, or <<http://web.mit.edu/bellringers/www/>>.

#### MUSIC/DANCE

**Gamelan Galak Tika Traditional Balinese Dance and Instrument Workshops\***—Aug. 26. Finale of series of hands-on workshops to master a complete dance work accompanied by gong kebyar ensemble. 7:30-9:30pm. Endicott World Music Center (Bldg N52). Andy McGraw, 625-4816, <[andy@harmonixmusic.com](mailto:andy@harmonixmusic.com)> or Eran Egozy, 491-6144, <[eran@harmonixmusic.com](mailto:eran@harmonixmusic.com)> or <<http://web.mit.edu/galak-tika/www/>>.

#### THEATER

**Into the Woods\***—Aug. 28-30, Sept. 3-5, Sept. 10-12. Musical Theatre Guild's production of the musical by James Lapine (book) and Stephen Sondheim (music and lyrics). \$9; \$8 MIT faculty and staff, senior citizens, other students; \$6 MIT/Wellesley students; \$3 MIT freshmen. 8pm, Kresge Little Theater. x3-6294, <[mtg-tickets@mit.edu](mailto:mtg-tickets@mit.edu)> or <<http://web.mit.edu/mtg/www/>>.

#### EXHIBITS

**MIT Museum\* (N52): Ongoing Exhibits.** *Gestural Engineering: The Sculpture of Arthur Ganson*; *LightForest: The Holographic Rainforest*; *Holography: Artists and Inventors*; *MIT Hall of Hacks*; *Light Sculptures by Bill Parker*; *Math-in-3D: Geometric Sculptures by Morton C. Bradley, Jr.*; *MathSpace*. 265 Mass Ave. Tues-Fri 10-5, Weekends 12-5. x3-4444.

**Hart Nautical Gallery—Ships for Victory: American Shipbuilding's Finest Hour.** Shipbuilding production during World War II. *Ship Models: The Evolution of Ship Design*. Ongoing. Daily 9am-8pm. x3-5942.

**The Dean's Gallery—Moving Through Reality: Photocollage by Amy Ragus.** Exhibition runs through Aug 28. The Dean's Gallery, Sloan School of Management, E52-466. Weekdays 9-5pm. Info: x3-9455 or <<http://web.mit.edu/deans-gallery/www/>>.

**Wiesner Student Art Gallery—First Annual Student Art Association Summer Photography Show.** Photographers' Reception—Aug 27, 6-8pm. **Color Photos by Kevin Simmons.** Simmons graduated in 1998 with a double-major in philosophy and theater. Artist's Reception—Sept. 4, 4-6pm. Through Sept. 30. Stratton Student Center, 2nd floor. x3-7109.

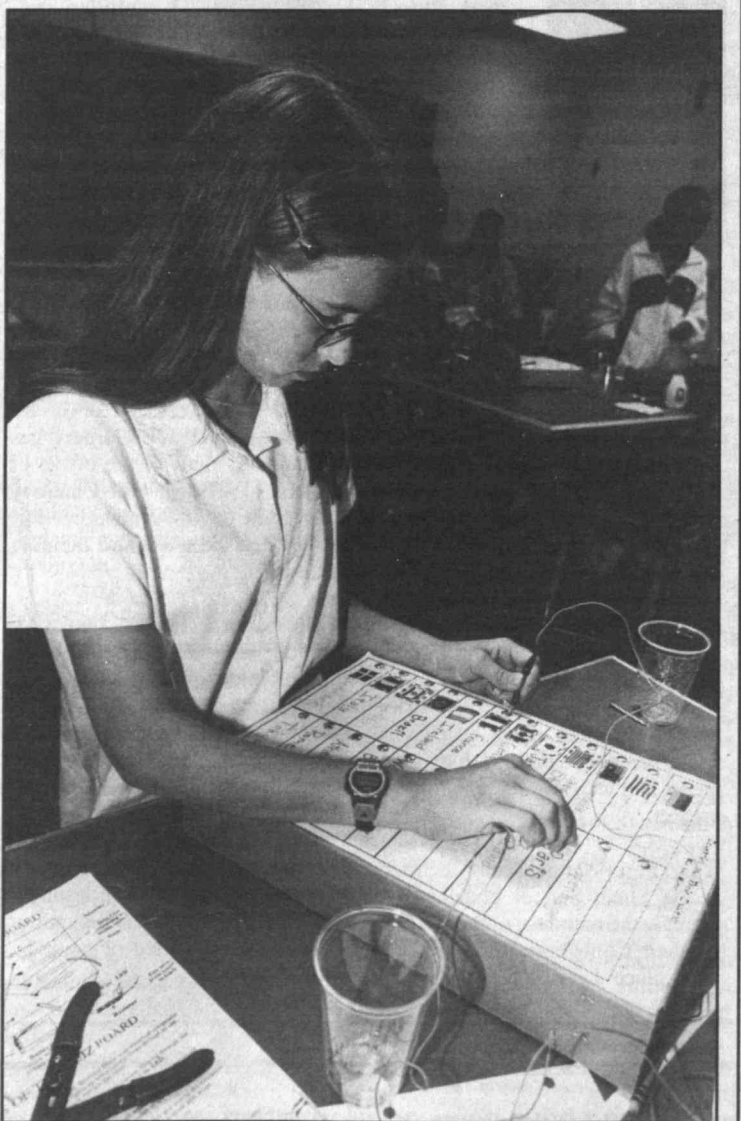
**Women's Studies.** Exhibition of archival photographs documenting the role of women at MIT over the decades. Rm 14E-316. x3-8844.

**Strobe Alley—Never Stop Learning: The Life and Legacy of Harold Edgerton.** Photographs, instruments and memorabilia documenting the life of Harold Edgerton, inventor of the strobe light. Bldg 4, 4th floor corridor. x3-4444.

#### OTHER

**Applications for Wiesner Student Art Gallery\*\*** All students welcome to apply to put up an exhibit. x3-7019.

## Plugging in to MIT



Gretchen Overholtzer, 14, of Cambridge, worked on the wiring of a board game she built during You Go, Girl! the Edgerton Center's August 17-20 workshop for Boston-area ninth-grade girls. The program provided hands-on science projects and career development activities for the participants. Photo by Donna Coveney



## Board bars alcohol for 3 years at BΘΠ

■ By Deborah Halber  
News Office

Beta Theta Pi will be alcohol-free for three years as the result of a July 17 incident in which a Boston University police officer was injured, possibly for life, when beer bottles and cans were allegedly hurled off the roof at police.

The Boston Licensing Board, in its decision last Wednesday, also said the Kenmore Square-area fraternity will not house any non-fraternity residents next summer and that representatives of the fraternity and MIT must meet with Boston University (BU) administrators and Bay State Road residents to talk about how the fraternity can be a better neighbor.

After a contentious three-hour hearing last Tuesday, in which one member of the board announced he would vote to revoke the fraternity's license, the board also specified that the fraternity close off the roof deck at 119 Bay State Road and that MIT report back in 30 days on the Institute's attempts to secure law enforcement authority in Suffolk County for MIT campus police, so that they would have jurisdiction over the 19 MIT fraternities that are located across the river in Boston.

In another development, Phi Gamma Delta, also in Boston, remains suspended. MIT informed the fraternity in July that it could not support reopening the fraternity house because MIT still does not know what occurred on the evening of Scott Krueger's death because the grand jury investigation is still not complete. Fraternity alumni decided not to apply for a license to house undergraduates and said there would not be an active Phi Gamma Delta chapter for the next school year.

Regarding Beta Theta Pi, the Boston Licensing Board, which oversees dormitory licenses in Boston, said if the fraternity wishes to house summer residents after 1999, it will have to submit a plan outlining how they will be supervised. These restrictions apply to the fraternity's building at 120 Bay State Road as well as at 119 Bay State Road, where the beer bottles were thrown. The fraternity's dorm license is subject to revocation for any further violations, said the board, which imposed the sanctions with a 2-1 vote.

At the hearing, BU police officer James Berry testified that since the incident, he has undergone surgery on a disk in his neck that he ruptured while dodging the beer bottles.

Rosalind Williams, dean of students and undergraduate education, expressed her own and MIT's outrage that

a police officer was assaulted. "To say this is serious is an understatement," she said. "I cannot overstate my anger." She emphasized that MIT is committed to doing anything in its power to identify the individuals who assaulted the police officer.

"MIT has the same expectations of law-abiding and neighborly behavior of summer residents as we do of fraternity members during the academic year," Dean Williams said. "Non-fraternity residents and fraternity members alike are informed of these expectations, and the fraternity members know they are responsible."

About the sanctions, she commented last Wednesday, "The Boston Licensing Board decision is constructive and consistent with the actions we have already taken. We have already initiated contact with Boston University officials and look forward to an ongoing and positive relationship. We want to be good neighbors and expect our students to be as well."

This summer, while only five Beta members lived at 119 Bay State Road, rooms were rented to 19 boarders. Beta members have said that they did not attend or authorize the gathering on July 17, although BU police have sought a magistrate's hearing next month to bring criminal charges of assault and battery with a dangerous weapon on a police officer and providing alcohol to underage persons against one of the fraternity members.

At the hearing, Beta members and an attorney representing the house took responsibility for failing to adequately supervise the boarders.

BU officials and police described the fraternity to the licensing board as "a constant threat to the neighborhood." A BU spokesman said he hoped that the board would "forever put an end" to what he referred to as a continual source of trouble on a block that consists primarily of buildings owned by BU and where many residents assume the building is also tied to BU.

BU police cited complaints from local residents about an overflowing dumpster and fraternity members blocking the sidewalk with ball games. "They clearly, as of this date, just don't get it," said Richard Towle, BU vice president of administrative services, about MIT.

In separate sanctions, the Interfraternity Council (IFC) banned alcohol at the house until Sept. 7, 1999, and fined the fraternity \$1,000. In addition, the IFC will require 90 percent of the members to perform 30 hours of community service, preferably in the Bay State Road area.

## Orientation to include alcohol education

(continued from page 1)

members of the faculty.

President Charles M. Vest will welcome the freshmen during the convocation program at Kresge Auditorium tomorrow from 10-11am. Professor Nancy H. Hopkins of the Department of Biology will also speak. The convocation will be followed by Contact MIT, an interactive presentation on academics conducted by Professor Kip Hodges from 11am-noon.

A discussion of "Scientific Research in the Next Millennium" is scheduled for 1-3:30pm tomorrow in Kresge. John Horgan, author of *The End of Science*, and other experts and students will debate the premise. "This is guaranteed to reinforce your decision to matriculate at MIT," notes the Hitchhiker's Guide to Orientation distributed to new students.

Tours of the athletic facilities are scheduled for 3:30-6pm tomorrow, followed by a barbecue on Kresge Oval. The evening concludes with the freshmen breaking into groups of 30 for discussions among themselves and orientation leaders that will foster diversity and a sense of community.

### EDUCATION ON ALCOHOL

The 2002/MIT folder distributed to all freshmen contains a memo regarding alcohol policy from Dean for Student Life Margaret Bates, a copy of MIT's basic alcohol policies, a statement of the goals and principles underlying that policy, and a list of sanctions for possession or providing alcohol to persons under age 21. They also will receive a wallet-sized card later in the week that outlines emergency measures and support phone numbers.

"As I'm sure you're well aware, alcohol policies and procedures have been under continuing review and discussion at MIT over the past year," Dean Bates wrote. "These discussions and related efforts will continue this fall as well."

"I want to make sure that you can participate in this important institutional dialogue and that you are also well informed about the expectations the Institute has for your behavior."

On Friday from 5-6:30pm, about 900 freshmen—including 200 to 300 women—are expected to attend the Mentors in Violence Prevention (MVP) program at Kresge.

The goal of the program is to reduce men's violence against women by educating and empowering male and female students and student leaders to provide leadership on issues that historically have been considered

"women's issues"—rape, battering and sexual harassment. By stressing the bystander approach, the program is designed to reduce the defensiveness that many men often feel when discussing these issues as well as the sense of hopelessness that some women feel.

The next day, Jim Matthews, special assistant to the vice president of Keene (NH) State University for alcohol and other drug programs, will preside over a multimedia presentation entitled "Beer, Booze and Books... A Guide to College Drinking" at 9am in Kresge. This program, sponsored by the Interfraternity Council (IFC), is mandatory for all freshmen.

Following the presentation, students will break into small groups to discuss these issues with orientation/residence leaders and an MIT professional staff member. They will also be given alcohol resource materials.

On Thursday, Sept. 3, Dr. Richard Keeling, director of health services at the University of Wisconsin and executive editor of the Journal of American College Health, will meet with housemasters, Medical Department personnel and administrators during the day. He will discuss health and student life issues with freshmen from 7-9pm.

### HOUSING AND RUSH

On Friday, female students can meet representatives from the eight sororities and other coed/female living groups on campus at the Women's Convocation in Rm 10-250 from 4-4:45pm. At the same time in Kresge, alumni/ae will discuss the residential system and the housing selection process in a program entitled "Secrets of the Sages: Looking for a Place to Call Home."

The residence midway at which new students meet with representatives from the living groups is scheduled for 7:30pm on Friday in the Johnson Athletics Center.

The Killian kickoff takes place on Saturday shortly after noon with visits to the residences allowed on Saturday afternoon, Sunday and Monday. Free rides are available for travel between residences. Students may accept bids from dormitories, fraternities, sororities and other independent living groups starting at 8am on Tuesday, Sept. 1.

Parents' orientation begins on Friday, Sept. 4. President and Mrs. Vest will welcome members of the Class of 2002 and their families from 9am-noon on Saturday, Sept. 5 at the President's House. A continental breakfast will be served at Walker Memorial.

## SAP requisition training starts soon

■ By Robert Murray  
Management Reporting Project

On Wednesday, Sept. 2, the Institute will begin a new phase of the SAP rollout focused primarily on purchasing activity. Over the next four months, users in departments, labs, centers and administrative offices will learn to do SAP requisitioning for both external and internal vendors, as well as SAPweb requisitioning using Netscape and SAP requisition approval.

Katherine Cochrane, leader of the Management Reporting Project, is pleased that the end of this phase of the rollout is finally in sight. "Our team has worked really hard to get ready for the beginning of training," she said. "Between SAP, SAPweb, the VIP card and ECAT, there are a great selection of purchasing options for the community. Any of these four are faster and easier than paper, and they provide some significant improvements over the legacy EREQ system."

SAPweb, a Web-based tool developed at MIT that offers a simpler interface to SAP, now allows authorized users to create, change and display requisitions. "We expect that most requisitioners will choose to use SAPweb because of its ease of use and reduced training hours," said Ms. Cochrane. "It's especially geared to the needs of graduate students and occasional requisitioners."

SAPweb screens were specifically designed for MIT. On-line help is available for all entry fields. When the requisition is complete, it's transferred to SAP electronically and sent through the standard requisition approval procedures that the department has set up for all SAP requisitions.

Users who use SAP to look at accounting statements, create journal vouchers, or approve requisitions may prefer to create their requisitions directly in SAP.

Available with both SAPweb and the SAP software is the ability to create a requisition for many of MIT's internal providers such as Catering and the

Copy Technology Centers. Requisitioners will follow exactly the same procedure for creating an internal-provider requisition as they do when creating an external requisition. The most significant advantage of this new system is that once saved, the internal-provider requisition creates a recorded commitment to purchase goods or services that appears on accounting statements.

"This will be a great improvement for departments that buy from providers like MIT Catering," said Mark Damian, leader of the Management Reporting Buy-Pay team. "The process is very simple for both the requisitioner and the provider. In addition, staff who monitor accounts will be able to see all the internal requisitions each time they look at their statements." Thirteen providers have been set up initially to accept SAP requisitions.

### TRAINING FORMATS

SAP Training Manager Linda Lancaster wanted to tailor requisitioning training to respond to comments received from the community over the last year.

"People told us that they really liked the tutorial format we used for journal voucher training, and they prefer to work at their own pace with an instructor available to answer questions," she said. "They also wanted classes to be as short as possible—all-day sessions are just too long—and to be taught on the main campus whenever possible. Our training program for this fall is designed to respond to these comments."

"We plan to offer SAPweb training classes in lecture halls on the main campus once a week, in a one-hour lecture/demo format," Ms. Lancaster added. "Attendees do not need to pre-register for the SAPweb classes, but I would urge them to attend a SAPweb class when their department starts using SAP for requisitioning." The class schedule is available from the school and area coordinators.

Training for SAP requisitioning (2 1/2-3 hours) and requisition approval

(2-2 1/2 hours) will be held at the MIT Learning Center in Building W89. The format will be a brief lecture, followed by self-paced lab exercises with an instructor present. Attendees can leave when they complete the exercises. The school and area coordinators are working with each department to schedule the requisition training.

Major enhancements to the procurement process provide other attractive purchasing options. The MIT VIP card (a Visa card for purchases under \$2,500) simplifies the "buy-pay" process, speeding up payment to vendors and reducing processing costs to the Institute. It should eliminate the need for many purchase orders, blanket orders, DAPOs (department-awarded purchase orders), request for payment reimbursements and petty cash transactions.

The electronic catalog (ECAT) continues to provide a Web-based purchasing option that allows users to select items (with MIT-negotiated pricing) from on-line catalogs and place orders electronically with the vendor. An upgraded ECAT system, known as ECAT2, will be available later this fall—first for NECX (the MIT partner for computers and computer-related supplies) and eventually for other MIT vendor partners. ECAT2 allows for greater flexibility in account assignments and automatically creates a commitment in SAP when the order is placed.

The Institute will provide support to SAP users in a number of ways. Extensive on-line documentation can be found on the SAP@MIT web site at <<http://web.mit.edu/sapweb/>>. The Business Liaison Team can answer questions about using SAP or SAPweb by e-mail to <[business-help@mit.edu](mailto:business-help@mit.edu)> or phone (x2-1177).

The school and area coordinators are the primary liaison between the Management Reporting Project and MIT staff. They will be available to answer questions about training and the setup of SAP for requisitioning. Shortly after each area completes its

(continued on page 6)

## Orientation's lighter side

In addition to the serious business of advanced-placement tests, advisors and housing selection, orientation includes an introduction to the finer aspects of life in Boston and Cambridge.

There will be visits to cultural centers and historical sites, among them the Museum of Fine Arts, the Museum of Science, Fenway Park, the Freedom Trail, Boston Common and the Public Garden.

If the free barbecues, ice cream and chocolate on campus do not sate

freshmen's hunger pangs, trips to the North End, Chinatown and the Hard Rock Cafe are planned. They can also tour social landmarks including Harvard Square, Newbury Street, Jillian's and Quincy Market.

Orientation also will include an introduction to hacks, free massages and the annual egg-dropping contest from the roof of the Green Building, where students try to devise ways of protecting raw eggs from the impact.

### Do you have news or information you'd like to share?

The MIT News Office staff can work with you to produce Tech Talk stories and press releases on such things as:

- Research advances
- New programs
- Noteworthy events or milestones

Contact the News Office, x3-2700, <[newsoffice@mit.edu](mailto:newsoffice@mit.edu)>. Also see our web page with links to our various publications at <<http://web.mit.edu/newsoffice/www/>>.



# Ashford urges more research on chemical-sensitivity ills

(continued from page 1) doses of a chemical, followed by increased sensitivity to very small amounts of many different chemicals encountered in daily life.

"The initiating event or series of events in TILT primes the body to be exquisitely sensitive to a large number of particular chemicals," said Dr. Ashford, who is professor of technology and policy in MIT's Center for Technology, Policy and Industrial Development, as well as an adjunct faculty member at both the Harvard and Boston University Schools of Public Health. "Once primed, the body responds at levels much lower than normal to very common chemicals, like diesel exhaust or common organic solvents."

Afflicted people are often unable to work or live normally as they become debilitated by symptoms of rhinitis, asthma, nausea, muscle aches, cardiac problems and even cognitive difficulties. Many see more than a dozen physicians in seeking a diagnosis and treatment for their difficulties.

Professor Ashford believes that as

many as 15-20 percent of people living in urban areas could be significantly affected by TILT, and that attention deficit hyperactivity disorder in children may very well be a TILT disease stemming from pesticide application in schools. "But we don't know this," he added. "It's a theory."

## RESEARCH NEEDED

In order to sift out answers from the theories, Professor Ashford recommends that research programs be undertaken in special contaminant-free, environmental medical units and that double-blind, placebo-controlled tests be used to determine if some people really do respond to unusually low levels of common chemicals or "if this a figment of their imagination," he said. Other research is needed to determine the origin of any increased sensitivity.

Additionally, he recommends that questions of social policy, such as the issue of special accommodations for patients by employers and landlords, be addressed at the national level so that a consistent policy based on scientific research may be developed.

For instance, the Social Security Administration recognizes Gulf War syndrome as a disability. But the Department of Defense has not yet accepted that events in the Gulf War initiated the disease. This sort of confu-

sion about diagnosis and cause make it impossible for most people to receive adequate treatment.

## TREATMENT OFTEN DENIED

When MCS problems first came to light, such as in groups of people exposed to chemicals in airtight buildings, they were often labeled as mass psychogenic illness and dismissed. But thanks in part to *Chemical Exposures: Low Levels and High Stakes* (John Wiley and Sons, 1991 and 1998), by Drs. Ashford and Miller, the strong possibility of a physical basis for the troubling array of symptoms is now widely recognized.

"Even if we don't know the exact origin or combination of physical and psychological basis of this class of diseases, if there are a lot of people affected, shouldn't we find a way of helping them?" said Professor Ashford, who holds a PhD in chemistry as well as a law degree.

Instead, physicians often prescribe psychiatric care for people with TILT diseases rather than search for an underlying organic disorder.

People with TILT diseases present "every symptom in the book," said Professor Ashford, and because they are sensitive to everyday chemicals at levels that may be one thousand times lower than levels that appear to affect most people, it "violates the tenets of

traditional toxicology. Moreover, the time lag between the first and subsequent stages of disease can obscure the connection between exposures and ultimate disease.

"It just doesn't follow the usual medical model. You learn in medical school that the more symptoms people present, the more you should look for a psychogenic origin. But if the brain has been damaged by the initiating chemical exposure—as some people believe—then people will behave in strange ways. Their neurological, endocrinological and immunological systems may have been severely impaired."

The most important recent research on the condition has focused on people in three groups: those exposed to organophosphate pesticides, those exposed to remodeling, and Gulf War veterans who returned ill. According to Professor Ashford, a fourth possible study group could be women who have had silicone breast implants.

While the reported symptoms of all these people are numerous, the similarities among members within groups are striking. For instance, people who share an exposure to organophosphate pesticides as their initiating event provide the same ranking of the severity of their most common symptoms. And they tend to rank all symptoms more severely than do people in the group whose initiating event was exposure to chemicals during remodeling. Gulf War syndrome symptoms tend to fall between the other two groups in terms of severity.

"These findings are what one would expect in diseases with an organic basis. If this were a head problem, the

rankings would be more equal among the three groups," said Professor Ashford.

He first began studying the problem of increased chemical sensitivity at the request of the New Jersey state government in 1988, which allocated a two-weeks' consulting budget for a study that in the end took him and a co-author (Dr. Miller) two years to complete.

"We just had no idea initially how complex and widespread these diseases were," said Professor Ashford. That report was published as the first edition of *Chemical Exposures* and won the World Health Organization's Macedo Award.

The authors prepared the second edition, which was published in February, without funding. It includes about 200 new pages, leaving the material from the first edition virtually untouched. Professor Ashford considers this fact—that developments since 1991 did not require changes to the original theory—to be a testimonial to the first edition's accuracy.

"We were right on the money the first time. The earlier material didn't need to be corrected, so we simply added a considerable amount of updated material," said Professor Ashford, whose first book, *Crisis in the Workplace: Occupational Disease and Injury* (MIT Press, 1976) is still in print more than 20 years after its publication.

"Of all the things I've worked on, this was the most difficult," he said. "It's controversial, so you can't overstate the evidence. But you can't ignore it either. You've got to toe a line which is unbelievably difficult."



Ashford

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### FOR SALE

Baby Grand Piano, \$2,500. Samick, Imperial German Scale. Rich sound, exc cond. Bench included. Contact Ken or Suze, 617 277-3414.

W's 6-sp bike, Trek, 2 yrs. old, exc cond, \$175. Jean 781-259-0032 eves, 781-981-2781 days, or <jking@ll.mit.edu>.

Moving sale: GE dorm-size fridge (3'x1'x1') used <4 mos, \$125; 13" Apple color monitor, exc cond, \$85; 20-pc dinnerware used 5 mos, \$8. Call x5-8114.

Piano, Gulbransen cherry spinet with bench, gd cond, nds tuning, \$800 or bst offer hauls it away. Karen x3-3478 or <kkluxton@mit.edu>.

Q-sz bed, bought new 8 mos ago, \$200. Contact Yun <yulong@mit.edu>, x3-6188, 617-666-2890.

Moving? Moving boxes and packing paper available free. Contact <bussard@wi.mit.edu>.

Four natural white tab-top curtains w/black rods & hold-backs, from Ikea, never used, \$140 for all or bst. Contact: <rbeck@mit.edu>.

Curly birch (antique) dresser, 22"d x 34"h x 46"w w/mounted beveled mirror 38"w x 35"h, \$250. Call Linc x2854 or 781-646-8886.

17' Michicraft aluminum canoe, good for families, stable, \$200. RJ Samuels, x3-2449 or <samuels@mit.edu>.

2-pedestal wooden desk, \$150; two child sized swivel chairs, \$25 ea; Imagewriter (nds print head), \$50. Mike x3-5824.

Sofa, 81" pin-stripe blue/ecru w/2 matching pillows, \$200; 2 solid wood country chairs w/cushions, \$20/ea; 1 office (desk) chair, \$20. Call 617-924-8316.

Power PC 8500, 604e, 1 gig hard drive, 4X CD-ROM, 128 MB memory, 180 MHz (CPU only) + Apple ext kybd, mouse, 28.8 modem, software, lots of fonts, \$1,850 or bst. Contact Suzan, x3-9634, <schin@mit.edu>.

Lincoln Fiberglass canoe, 16', wood seats & braces, built-in flotation, paddles, \$350. Contact 508-358-4064, <jnn@mit.edu>

Maple syrup for sale, place your order now. 978-681-1812.

2 A/C, new cond, \$150 & \$175; M's 10 speed bike, \$45; Lawnmower, Yd Man 5.5, used 5 times, \$100; chairs, \$35-\$55; Vari Kennel for Lg dogs, never used, \$65; tiltboard, \$25. Call 332-8251.

Executive Desk, mahog fin, 5 draw w/locking draw, 60 x 30, \$250, exc cond. masmith@plant.mit.edu or 617-389-8174.

### VEHICLES

1975 Classic Volvo, 164E, Not running, \$300 or best offer. Contact <mross@mit.edu> or 8-7851. Call before 8/29/98 or after 9/8/98.

1979 MGB, first ownr, 86,000 mi, vry gd cond, \$5,800. Claude <wind.mit.edu>, x3-2284.

1984 Honda CRX fun-to-drive 2-seater, 75K, 1 owner, fair cond but needs carburetor work, \$950. Franco x3-8131 or <ncw@rl.mit.edu>.

1991 Ford Taurus GL wagon, 3rd seat, a/c, roof-rack, loaded, alarmed, brown w/red int, well-maint, hwy miles, priced for quick sale, \$3200. Monica <monicab@mit.edu>, x8-6023.

1991 Honda CRXSI, AM FM cass, A/C, moon roof, manual transmiss, 95k mi, \$3200. Bob Cronin, Draper x8-2357.

1992 Nissan Stanza XE, 110K, pw, pl, alarm, a/c, cassette, loaded, exc cond, \$4800 or bst. Call 781-279-8534 or <ayyu@med.mit.edu>.

1993 Mazda Protege, auto, 4-dr sedan, LX w/sunroof, pw, a/c, AM/FM/cass, new tires, orig ownr, 37K, \$5,000. Call 617-527-5312.

1997 Cobra convertible, 5K miles, white w/tan top & leather, a/c, power everything, CD, much more, \$26,500. Dave <dbk@ll.mit.edu>, Linc x5629, or 603-465-2857.

### HOUSING

Bethel, Maine: Summer vacation on a lakefront condo: swim, boat, fish, luxury, 2BR, mod ktchn, cable, canoe, dock, sunsets, sleeps 4-5, rent \$500/wk. Cheryl 252-1111 or 978-664-3646.

Cambridge: 2 BR, kit, liv, 1st fl, near MBTA @ MIT (10 min), \$700 no util. Tony, Martins 666-8770.

Cambridge: Kendall Sq area, furn rms for rent in single home, convenient to MIT, subway, restaurants, \$250/wk; \$800/mo, \$65/night + utils. J. Blair, Draper x8-2843 or 617-576-5125.

Florida: Disney Area, 3 BR, 2 bth condo, htd pool, slps 8, 10 min to Disney, \$495 per wk. Gary x3-6177 or 617-666-5805, <dekow@pfc.mit.edu>, <users.aol.com/mcdeeke>.

Lg furn rm for rent, \$575/m incl util and free use of washer and dryer, international scholar welcome, 25 min by MBTA to MIT. 617-489-0460.

Office to share in private building w/part-time MIT staff person, 2 min walk to MIT, 12'x26', river vw, garden & patio, security 24 hrs, \$990/mo, no lease. Call 617-864-5555.

Palo Alto, CA: Trade Brookline or Camb house for my 3000+s.f. hse, 1 acre, vw, 5BR, pool, 2 mi from Stanford, for 98-99 yr, 1nd housing for me, my wife, 2 small children. Ted 650-856-3506.

Room and board for 20 hrs/wk care for partially invalid MIT composer; in Cambridge, on 72 bus line. Call x3-1385.

Rm for rent in lg private home, fully furn, own tv and refrig, kitchen privldgs, washer/dryer, off str & garage prkg, nr bus to red ln, routes 2, 3, 93, 128 & Mass Ave. Hansi Durlach, 781-648-7425.

Somerville: lrg 3BR, Som-Camb line, nr Harvard Sq, hwdw flrs, porch, w/d, avail Sept 1, \$1500/mo. Call 623-1377, <ahmed@ll.mit.edu>.

### WANTED

2 professional W (1 works at MIT) sk to rent a house within 15-mi radius of Camb as of Jan/Feb 99, exc refs (incl MIT professor in whose house we are currently living). Call 617-489-2028.

If you have a used refrigerator that is working well that you either need to get rid of or are selling, please call Rachel at x3-0494 or <rbatista@mit.edu>.

### CHILDCARE

Babysitter needed for 2 boys (ages 3 & 5), must have own transportation to Belmont, 1 afternoon, possibly 2, experience required. Call 617-489-2993.

### MISCELLANEOUS

Madel, a 10-yr-old Dachshund, is looking for people to donate to her "Mutts 'n fluff 'n stuff Walk" (MSPCA Walk for the Animals) on Sept 13. Contact Terri, x3-1875 or <priest@mit.edu>.

## Program seeks friends for foreign students

The MIT Hosts to International Students Program (HISP) welcomes faculty and staff members from campus as well as Lincoln and Draper Laboratories to be a friend and mentor to an incoming international graduate or undergraduate student who is new to the United States and MIT.

HISP, established in 1961, helps new internationals make the transition to MIT and greater Boston and provides ongoing friendship throughout the student's stay at MIT.

HISP matches these students with American "hosts" who stay in touch with the student by phone or in person, perhaps offering a home-cooked meal or an off-campus outing. This volunteer program is purely social; the International Students Office and other support services handle problems relating

to visas, academics and other issues.

All foreign students accepted at MIT are invited to participate in the program, and up to 150 apply for a host each year. Thus, HISP constantly needs additional volunteers, said coordinator Kate Baty, who added that some requests go unfulfilled because of the shortage of hosts.

Some hosts are former Peace Corps volunteers who want to maintain connections to the countries in which they worked. It's also a good way for recent retirees to keep up their links to the Institute, Ms. Baty noted.

HISP will hold a pair of two-hour evening orientation sessions for prospective hosts today at 5:30pm or Thursday, September 3 at 6pm in Rm 5-106. Additional times can be scheduled. Contact Ms. Baty at x3-4862 or <baty@mit.edu> for more information.

## Open house scheduled for international arrivals

The annual International Open House and "Evening with MIT Faculty" will be held Wednesday, Sept. 2 in the Bush Room (10-105) to welcome international newcomers to the Institute.

The Open House, sponsored by the International Students Office and the International Scholars Office, is an informal gathering designed to help international students, research scholars, faculty and their families get settled here. Members of the MIT community are invited to stop in from 10am-4pm and answer questions. Representatives from various campus organizations and services will also be on hand. A special play area will be set aside for children. Volunteers are also needed.

The "Evening with the MIT Faculty" will take place from 7:30-9pm. The panel, chaired by Professor Emeritus Samuel J. Keyser, will include five other MIT professors.

For more information or to volun-

teer, call the International Students Office at x3-3795 or the International Scholars Office at x3-2851.

## SAP requisition training to start

(continued from page 5) training, one or more of the six coordinators will also visit the area at a prearranged time to assist in the creation and approval of real requisitions.

Finally, the Procurement Office at x3-7241 (renamed from Purchasing) and Accounts Payable (x3-0965) can answer questions about the information displayed in SAP or SAPweb.

Portions of this article were taken from a letter that is being sent by Katherine Cochran to department heads, lab and center directors, and administrative officers.



# Putting roots down: scientists examine how plants do it

■ By Seema Kumar  
News Office

The next time you pick up a bag of weed killer, think about this: a chemical company probably spent years testing and millions of dollars developing an herbicide that is harmful to weeds but safe for people and pets. Now a new study of root growth in a tiny weed called *Arabidopsis thaliana* suggests that genetics could help scientists save

valuable time and money in developing better herbicides for the future.

Scientists at the Whitehead Institute for Biomedical Research report that they have cloned and characterized a plant gene called EIR1 (Ethylene Insensitive Root 1) that plays a critical role in the ability of roots to grow toward the earth in response to gravity. The roots of mutant weeds lacking EIR1 lose their ability to respond to gravity and are unable to grow

downward into the soil.

The findings are reported in the July 15 issue of *Genes and Development* by first author Dr. Christian Luschnig and his colleagues Paula Grisafi, Dr. Roberto Gaxiola and Dr. Gerald R. Fink, director of the Whitehead Institute.

"These findings provide important new insights into age-old mysteries about root growth, and they also may have tremendous implications for the agricultural and pharmaceutical industries," said Dr. Fink.

"Currently, most herbicides are developed by trial and error. Compounds first are tested for their ability to kill weeds, and then later tested—often for years—to ensure their safety in animals. Often the most effective ones turn out, in hindsight, to be the compounds that act against genes present only in plants but not in animals. Our findings suggest that one can design new classes of compounds targeted at plant-specific genes like EIR1 such that they would automatically be harmful to plants but safe for humans."

The Fink lab findings have additional implications for the agricultural industry. The genetic makeup of *Arabidopsis* is similar to that of food crops like rice and corn, so understanding genetic pathways that regulate the growth of this weed will lead to new approaches for the genetic improve-

ment of agriculturally important crops. For example, since root development is one important way plants obtain nutrients, understanding the genetics of root growth could lead to new strategies for enhancing food production, particularly in arid climates. (Scientists use *Arabidopsis* as a model to study plant genetics because of its small size, short generation time and abundant seed production.)

## PLANT GROWTH AND TROPISM

In addition to the implications for the agricultural industry, the Fink lab's findings provide important information about plant physiology, and in particular about a phenomenon called tropism—the growth response by plants to external stimuli, such as light, temperature, water and gravity.

Since Darwinian times, scientists have tried to get a handle on how plants are able to direct roots always to grow downward in search of the earth, and shoots to grow upward in search of the sun. So great is the plant's directive that if a root is reoriented to lie horizontal to the surface of the earth, or in other words, turned 90 degrees with respect to gravity, it responds by altering its direction of growth, curving downward again until it finds its way into the earth.

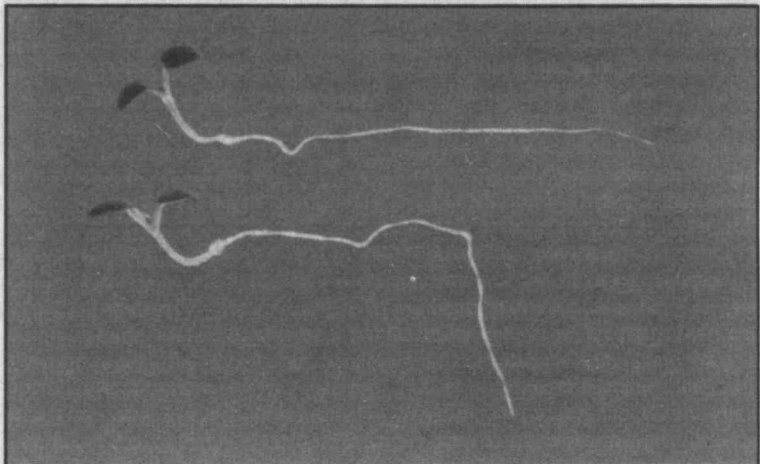
Scientists have known that during root growth, the redistribution of a plant hormone called indole acetic acid (IAA)

to the root tip is responsible for gravitropism. When the root tip is cut off, the plant no longer is able to grow downward. When roots are oriented horizontally, IAA accumulates along the lower side of the elongating zone. Cells on the top part of the root elongate, causing the downward curving of the root.

Researchers have speculated that the transport of IAA is facilitated by a gene that acts as a pump to redistribute the hormone up and down root cells as needed. The EIR1 gene isolated by the Fink lab may represent this pump. The case for EIR1 seems strong.

"When we studied the EIR1 gene, we found that it was very similar to bacterial genes that pump out toxins from bacterial cells," says Dr. Luschnig. And, when the scientists inserted the EIR1 gene into yeast cells, the yeast cells became resistant to fluorinated indolic compounds, suggesting that the EIR1 gene was helping yeast cells pump out the toxins. This suggests that EIR1 functions as an efflux pump in roots, and because EIR1 is expressed only in the roots and not other parts of the plant, it suggests that the gene is responsible for the root's response to gravity.

The study was supported in part by a Schrodinger Fellowship from the FWF, Austria, and by the PEW Latin American Program, the European Community, and by a grant from the National Science Foundation.



Whitehead scientists have cloned a plant gene called EIR1 that plays a critical role in the ability of roots to grow toward the earth's center in response to gravity. The roots of mutant weeds lacking EIR1 (top seedling) lose their ability to respond to gravity and are unable to grow downward into the soil.  
Photo by Christian Luschnig

# Corrosion fighter works to thwart oxidation at every turn

■ By Steve Nadis  
MIT Sea Grant

(This article originally appeared in the spring 1998 issue of *Two if by Sea*, a joint newsletter of the MIT and WHOI Sea Grant programs.)

It is often said that appearances are deceiving—to understand the true essence of things, we must look not at the surface, but inside. Professor Paul Laibinis's work shows that from a chemistry standpoint, this view is not entirely correct. The behavior of a material depends on its surface properties, as well as its bulk properties. These surface characteristics, moreover, are largely dictated by their molecular-scale structure.

Professor Laibinis, of the Department of Chemical Engineering, has been interested in discerning the true nature of materials since he was young, asking such questions as: What are things made of? How do you change their properties by changing their composition? And how do you relate chemical structure to the things you see on a macroscopic scale?

His specialty has been surface chemistry or "molecular engineering," as he puts it. "In contrast to many chemical engineers, my work does not involve big industrial plants or refineries. Instead, I try to manipulate surfaces on the molecular level to get the physical properties I want."

In June, Professor Laibinis completed a two-year Doherty Professorship in Ocean Utilization sponsored by the MIT Sea Grant College Program. The work he did, in conjunction with G. Kane Jennings, a graduate student in chemical engineering, focused on a problem endemic to the ocean engineering world—the corrosion of metals in aqueous and saline environments.

"We live in an oxidizing environment," said Professor Laibinis. "Any metal that is exposed to water, particularly salt water, will disintegrate with time. We need to minimize that corrosion to keep the properties of the metal intact and extend the lifetime of ships and other structures."

The economic impact of corrosion in the United States, according to one estimate, amounts to \$300 billion per year. About 25 percent of the annual steel output in this country is used to replace corroded structures. Corrosion not only damages materials; it also threatens the environment through the distribution of leached metals into our waterways.

"When a metal is eaten away by corrosion, it has to go somewhere," Professor Laibinis said. "It ends up in rivers, lakes and oceans. The accumulation of metals can be significant in protected bodies of water like Boston Harbor and San Francisco Bay."

The answer to many of these problems, according to Professor Laibinis, may lie in thin coatings known as self-assembled monolayers. The basic idea is to design molecules that adhere strongly to a surface, creating a "barrier film" that protects the surface from corrosive agents such as oxygen, water, and halides (salts).

In particular, he is experimenting with a representative metal—copper—and a class of organic compounds called alkanethiols, which consist of a carbon chain (alkane) attached to a sulfur-based chemical group (thiol). Alkanethiols spontaneously react with the surface of copper to form a coating that is roughly one ten-millionth of an inch thick. This happens because sulfur bonds strongly to the copper surface, leaving the attached carbon chain on the outside as a shield. It's a "self-assembling" system, said Professor Laibinis, because "you just put the [alkanethiol] solution in contact with the metal and the molecules figure out where to go."

The protection provided by this system is superior to that of more conventional polymer films 1,000 times thicker, he said. That's because the alkanethiol is a highly ordered, crystalline material that is less permeable to corrosive agents than a disordered polymer. Whereas the organic films can uniformly coat an object of any size or shape, polymer films often don't work well with irregularly-shaped objects.

The new system is not perfect, he admits; "the films we have don't survive forever," he said. One way to enhance longevity is to generate thicker layers that retain the crystalline structure of the alkanethiols. In this way, Professor Laibinis, Mr. Jennings and two MIT undergraduates—Jeffrey Munro, a senior in chemical engineering, and Tseh-Hwan Wong (SB '98)—have doubled the thickness of the films, thereby boosting their corrosion resistance by a factor of 20 or more.

The research team also intends to experiment with metals other than copper, such as steel, titanium and aluminum. "Copper has been a good material for us to work with because it's a single element and therefore a well-defined system," said Professor Laibinis. "Our assumption has been that we can apply the principles we learned here to different metals."

One drawback of organic coatings is that they won't work for high-temperature applications. While that will rule out some industrial uses, the barrier films may be employed in a variety of ocean engineering situations where high temperature exposure is not a concern. The coatings developed by the Laibinis team may eventually be applied to the exterior of ships, docks and other oceanic platforms, as well as to metal sensors that are extremely vulnerable to corrosion. The material can also be applied to already-assembled pipes as a way to reduce water pollution through inadvertent leaching.

Professor Laibinis is grateful for the Doherty Professorship, which gave him the chance to look at the problem in a different light. "This work has encouraged me to consider a range of new applications," he said. "Perhaps

more importantly, I've come to see that common solutions may be found to corrosion problems that extend into many different areas and environ-

ments."

Mr. Nadis, a Cambridge-based writer, was a 1997-98 Knight Science Journalism Fellow.

# Support-staff group honors members, accomplishments

The MIT Working Group on Support Staff Issues held a special meeting on June 10 to honor several of its members, including the outgoing senior co-convener, Edward A. Jacobson, and to celebrate the group's accomplishments over the past year.

Mr. Jacobson, office administrator for MIT's Consortium on Financing Higher Education, received a Distinguished Service award for his two-year tenure as co-convener, and the incoming senior co-convener, Kate Schenck, administrative secretary in the President's Office, announced the appointment of Heather Mitchell, a senior secretary in the Energy Lab, to the junior co-convener position.

Three other members of the group received special acknowledgment: Margaret Ann Gray of Personnel, and Ronnie Beth Rump of the Human Resources reengineering team, for managing and facilitating the recent reorganization process, and Joan Farrell of Personnel for administrative support of the Working Group.

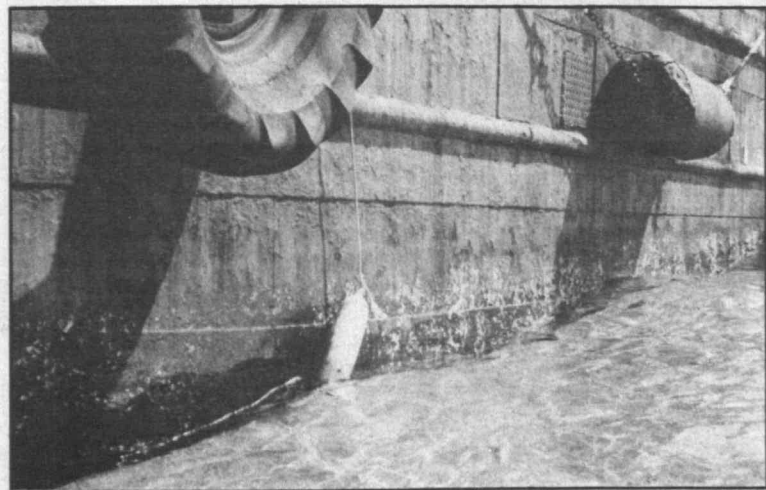
The meeting also included an interactive workshop on "Negotiating Job Flexibility," led by Kathy Simons of the Family Resource Center and Sharon Bridburg of the Office of the Dean of

Students and Undergraduate Education.

During the past year, the Working Group developed a new mission statement to guide its efforts, and refined guidelines for membership and task groups to improve the identification and implementation of support staff programs. Membership in the group is open to MIT support and administrative staff members who wish to address issues of concern to the MIT community.

Some of the past recommendations of the Working Group that have been acted on by the MIT administration are revisions and improvements to the Retirement Plan; the creation of a "Tell Someone" brochure, a resource guide for identifying harassment and other problems; the Artists Behind the Desk series; and major input on the Spousal Equivalent Benefits for MIT employees. News about ongoing work can be found on the Working Group's web site at <http://web.mit.edu/committees/wgssi/>.

The next meeting of the Working Group on Support Staff Issues will be held on Wednesday, Sept. 9 from noon-1:30pm in the Bush Room. Please contact Heather Mitchell at x3-9474 or [mheather@mit.edu](mailto:mheather@mit.edu) for additional information.



A fishing vessel in Provincetown Harbor displays saltwater rust damage.  
Photo by Francesca Bewer

# US News: MIT tied for #4

(continued from page 1)  
deans of admission about their opinions of their rival schools.

"While I am pleased that MIT is considered one of the most outstanding US universities, I believe that these rankings only take into account a small fraction of what makes each university a unique institution," said President Charles M. Vest. "MIT will continue to strive to excel in education and research with an innovative edge without regard to ratings such as these."

Other factors in the US News survey were alumni/ae giving (MIT came in eighth at 44 percent, similar to Harvard's 46 percent, higher than most

in the top 25 but well below Princeton's 66 percent) and acceptance rate (25 percent for MIT).

Following MIT and Stanford are Cornell, Duke and the University of Pennsylvania at #6. Of the 162 national liberal arts colleges that US News ranks, Amherst topped the list, followed by Swarthmore, Williams and Wellesley.

Other New England universities ranked by US News include Brown and Dartmouth, tied for #10 with Columbia University; Tufts at #25; Brandeis at #31; and Boston College, tied with four others for #36. More information is available on line at <http://www.usnews.com>.



# Clarke heads team tackling Y2K problem

(continued from page 1)

puters' mistaking two-digit shorthand for 21st-century dates such as "01" for 20th-century dates registered. Thus, they read 01" as "1901 instead of "2001," instantly losing, for example, a hundred years of financial or other history.

To help people understand both the nature of the Y2K problem and the essence of his team's approach to solving it, Mr. Clarke offered the following exercise.

"Very simply, every time you write or type a date, make sure you use the four-digit year. After you do that for a while, two-digit years will begin to stand out when you see them. You'll have a better feel for how widespread the use of two-digit years is in general, and you'll gain some sense of how widespread their use is in software.

"Designing any computer program which deals with dates involves explicit decisions about how to interpret two-digit years. You can treat them as '19xx', '20xx', or a combination of both (e.g., '50-99' becomes '1950-1999' and '00-49' becomes '2000-2049'.

"You have to choose the way you want the program to behave, and then explicitly write the program to follow your choice," he said.

"You know how you work really hard on something and find a place where you can take a shortcut, so you do that with a promise, 'I'll get back to it'? When faced with a looming deadline, programmers are no different from anyone else in this regard: they hurry. Also, back in the sixties, memory was very expensive. Everyone knew it was 19-whatever, so it made sense to write 50 for 1950, 60 for 1960 and so on. Like most people do, they figured they'd get back to fix it, or that the program would no longer be in use by 1999," he said.

## SOURCE OF TROUBLE

The Y2K problem began as a kind of solution back in the dawn of software programming, said Mr. Clarke.

"The solution to use shorthand became a problem in itself as well as a challenge to managers once the costs of fixing two-digit dates became clear, Mr. Clarke explained.

"When it came to scheduling work to make software Y2K-compliant, managers faced an unpleasant prospect: investing their programmers' time in making fixes which don't add any features to the basic product. Most managers would prefer allocating resources to something that will yield a payoff of new functions and features, leading, hopefully, to more market share," he said.

If unaddressed, the global impact of the Y2K problem could be dire, as media all over the world have speculated. At MIT, the Y2K problem could potentially affect critical health and safety-related systems such as emergency lighting, fire alarms and environmental alarms, Mr. Clarke said. The next tier of affected systems includes telephones, the cogeneration plant and electrical services.

Additional systems that are vulnerable to the Y2K problem include payroll, pensions, financial aid, registration and the Controller's Accounting Office. Lab equipment may also be affected.

"Some of these systems will work fine after 1999 with few or no fixes. Many others, such as Payroll, are already in the process of being made Year 2000 compliant. Everything has to be checked, however," Mr. Clarke said. "We're seeking out anything that uses microprocessors. I want MIT to get through this well."

His view of MIT's Y2K problem and his initial approach to solving it are, well, very MIT: simplicity equals effectiveness. His physics background

notwithstanding, he considers the Y2K problem to be "an inventorying and identification problem," he said.

"It's not a fascinating technical problem. There are operating systems and application programs which contain software which are over 20 years old. The original authors of the sections are no longer available to help interpret their work to the programmers who have inherited them," Mr. Clarke said.

"In addition, there are lots of different types of programs, and not all of them are tied together. That's why it's an inventory problem and an identification problem: our job is, literally, to lead and/or assist MIT departments, labs and centers in completing an inventory of all their software and other IT assets, and in identifying which ones use two-digit years.

"Once these have been identified, we want to provide them with any information they may need to fix the problem," he said.

As leader of the Y2K Delivery Team, Mr. Clarke's job is "to make the team work," he said. The leadership role is a "comparatively new experience" for him. He has led the SAPweb project team from its inception through the present, but this latest challenge combines technological expertise, knowledge of the culture and history of programming, knowledge of MIT's decentralized ways and knowledge of human nature.

"Thankfully, God has blessed me with good people skills," Mr. Clarke said, by way of explaining his confidence and enthusiasm for a task many would find impossibly complex.

Mr. Clarke will be using those people skills—his bass-deep voice and his ready smile exude warmth—with his team and throughout MIT. The Y2K Delivery Team's other responsibilities are to assist people with systems testing, to update members of the MIT community about new resources relating to Y2K issues in their own departments, and to provide representative cases of problem-solving.

Within MIT, the Y2K Delivery Team is also responsible for being a repository of reliable information for people on the Y2K situation here. Mr. Clarke himself also serves as a spokesman to media outside of MIT on steps the Institute is taking.

"People do look to MIT for information on this type of problem, and we're preparing to deal with a lot of media inquiries," Mr. Clarke said. He has already been interviewed by a South Dakota radio station and has received a call from CBS's "60 Minutes."

"Basically, they all want to know the same things: 'Why did it happen? What can we do? And what is MIT doing?' he said. "Everyone knows MIT has a leadership role in something like this. I'm not a Y2K expert, so I don't have all of the answers. We have an excellent Y2K team, however, so when people ask what MIT is doing, I can describe our efforts with confidence."

Mr. Clarke came to MIT in 1976 as a graduate of the Bronx High School of Science in New York, his choice of college inspired by his father's example—he was an electrical engineer—and his uncle's encouragement. Though officially a member of the Class of 1980, "I actually graduated in 1983: I took time off to get married, start a family and understand my undergraduate thesis topic," he said.

He is a member of the VM Systems Services Team, which is part of the Information Technology Service Process within Information Systems. His current responsibilities include maintaining various software products on the I/S IBM mainframes including the customer usage accounting system and the web servers. Since September 1996, he has also served as the team leader for the SAP R/3 Web Interface Development and Implementation Team.

Updates on Y2K issues at MIT are available on the web at <<http://mitvma.mit.edu/mity2k/>>.

## Picnic pals



Enjoying the Quarter Century Club's annual summer picnic on August 18 in the Johnson Athletics Center are Michael Egrous, the retired "Charlie the Tech Tailor" (center), his wife Irene (left), and Norma Loomis, a former health insurance officer in the Medical Department. Photo by Donna Coveney

# Hurricane study could save lives

(continued from page 1)

top to bottom—and hopefully improve hurricane prediction."

When a hurricane or tropical storm forms in the Atlantic, a NASA Dryden Flight Research Center DC-8—equipped with instruments to measure the storm's structure, environment and changes in intensity and tracking—will fly into the storm at 35,000-40,000 feet.

At the same time, a specially equipped Dryden ER-2—a high-altitude research plane—will soar above the storm at 65,000 feet. The modified U-2 will measure the storm's structure and the surrounding atmosphere that steers the storm's movement.

On the ground, the storm research team will launch weather balloons and monitor land-based sensors to validate the high-altitude measurements taken by instruments aboard the planes.

Ms. Hood and her team plan to fly the NASA planes in conjunction with scheduled storm flights of the National Oceanic and Atmospheric Administration (NOAA) that will take off from MacDill Air Force Base in Tampa, FL, and the "Hurricane Hunters"—the Air Force's 53rd Weather Reconnaissance Squadron from Keesler Air Force Base in Mississippi.

The Hurricane Hunters and NOAA routinely fly into tropical storms and hurricanes to determine their location, motion, strength and size. Information gathered by the two organizations is used to predict the potential strength and size of the storms as well as landfall.

In addition to providing Doppler radars on each research plane, NASA for the first time will bring state-of-the-art airborne instruments to measure moisture and wind fields around the hurricanes under observation.

## A BETTER RADIOMETER

The Microwave Temperature Sounder (MTS) component of the Aircraft Sounder Testbed (NAST) is the latest and most capable in a series of microwave radiometers built in MIT's Research Laboratory of Electronics (RLE).

This device will allow scientists to observe more closely the internal structure of intense storms such as hurricanes, to measure the microwave-transmission characteristics of the Earth's atmosphere with unprecedented accuracy, and to develop new methods of gathering and interpreting future data.

About the size of a foot locker, the MTS is mounted in one of the aircraft wingpods with the NAST-I imaging infrared spectrometer. MTS measures the heat in the Earth's atmosphere radiated by electromagnetic waves with radio frequencies near 54 and 118 gi-

gahertz and wavelengths near 5mm and 2.5mm, respectively.

MTS covers 16 microwave frequencies by scanning from side to side beneath the aircraft to a distance of approximately 40km. The resulting images are approximately 80km wide at the surface, running along the full trajectory of the aircraft flight path.

These images represent the thermal radiation emitted by the environment at microwave frequencies; this radiation is the microwave equivalent of the heat one feels in front of a fire.

Each microwave frequency responds differently to temperatures at different altitudes, as well as to different constituents such as water vapor

and roughened ocean surface. Finally, the water vapor distribution horizontally and vertically can be determined by combining this information with observations at other microwave frequencies, revealing where hurricanes and other intense storms might draw additional energy as the storm migrates and evolves.

● **Development and validation of new methods for interpreting data.** By comparing observations in two microwave bands that respond the same to temperature profiles except when clouds are present, scientists can detect and characterize cloud water and ice distribution by altitude. Similar comparisons with data from the NAST-1 infrared spectrometer can characterize clouds that impact infrared and visible sensors.

Through CAMEX-3, researchers can learn a great deal about how to combine these new unprecedented images of microwave and infrared data. Most important will be new methods to detect and correct the effects of clouds on both microwave and infrared data, and similarly to compensate for the effects of surface variations.

The NAST-MTS also views space directly above the aircraft every few seconds as the aircraft ascends and descends, permitting the microwave transmission characteristics of the atmosphere to be measured with unprecedented accuracy. These results also will be used to improve the interpretation of future satellite data.

● **Improved future systems.** Future microwave satellites for meteorological purposes are now being designed. The results of CAMEX-3 will be critical in refining and validating the design and performance expectations for these systems. Of greatest interest is the choice of microwave frequencies to be used and their required accuracies.

The NAST-MTS investigator team for CAMEX-3 comprises principal investigator Dr. Philip W. Rosenkranz, principal research scientist in RLE's Remote Sensing and Estimation group; co-principal investigator David H. Staelin, professor of electrical engineering and computer science (EECS) and assistant director of Lincoln Laboratory; and co-investigators Dr. Michael J. Schwartz, research scientist; John W. Barrett, sponsored research technical staff; and EECS graduate students William J. Blackwell, Carlos Cabrera Mercador and Fred W. Chen.

The overall NAST development effort was led by Lincoln Laboratory. The hurricane study is part of NASA's Earth Science enterprise to better understand the total Earth system and the effects of natural and human-induced changes on the global environment.

*"We now can learn about these storms from top to bottom—and hopefully improve hurricane prediction."*

—Robbie Hood, NASA

and precipitation or ice. By combining this information with observations made at infrared and visible wavelengths, much can be learned about the structure of weather systems and the surface.

The data are digitized and recorded by an on-board computer, which is also capable of transmitting these data in real time to experimenters on the ground who can be in radio contact with the pilots.

Three important scientific results are sought from the CAMEX-3 observations with NAST-MTS:

● **Observations of the internal structure of intense storms.** Microwave frequencies penetrate clouds much more readily than infrared or visible sensors, thus revealing much structure that is otherwise unseen. Most useful is the ability of NAST-MTS to detect hail and other ice thrust aloft in intense convective systems, and to measure more precisely their location, altitude and intensity. Precipitation beneath clouds can also often be observed.

The temperature structure can be particularly revealing in hurricanes, where the eye can be perhaps 10°C warmer than the surrounding air. This warming is directly related to the wind speed in the hurricane. Hurricane winds can also be sensed from microwave images as they respond to the wind-