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Wednesday – March 7, 2007

TechTalk

SERVING THE MIT COMMUNITY

PHOTO / **CHRISTOPHER CLEAVER**

Environmental studies

A program to teach environmental studies at the Hindu Girls School in Mauritius was one of many international projects supported by MIT Public Service Center expedition grants. Story, page 5.

MacVicar Day celebrates variety among learning strategies

Deborah Halber
News Office Correspondent

Some people learn better when they are being graded; some do worse. Some like to go over classroom material by saying it out loud to themselves; some like to teach it to others. Some said they learn best when they look, some when they listen and some when they draw pictures.

If there's one thing clear from the 2007 MacVicar Day event "I learn best when…," it's that learning is never a one-size-fits-all matter.

David Wallace

On March 2, the MacVicar Faculty Fellows sponsored MIT's annual recognition of undergraduate education with a roundtable discussion moderated by Duane S. Boning, professor and associate department head of electrical engineering and computer science, during which students, faculty and alumni shared

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'Just Jerusalem' design competition focuses on peace, livability in 2050

Ruth Walker
News Office Correspondent

Can MIT help engineer a break with history in Jerusalem?

The steering committee of Jerusalem 2050, a joint initiative of MIT's Center for International Studies (CIS) and the Department of Urban Studies and Planning, hopes that the answer is yes.

To that end, the committee has just launched a design competition called "Just Jerusalem: Visions for a Place of Peace."

The idea is to get purchase on the problems of this fractious city by looking at them as challenges in urban design rather than in international diplomacy.

The name of the competition is a bit of wordplay, meant to suggest not only Jerusalem as a city of justice, but also "Jerusalem alone." The competition is based on the question, What if justice and urban livability, instead of competing nationalist projects, were the organizing principles of Jerusalem?

Diane E. Davis, professor of urban studies and planning as well as associate dean of the School of Architecture and Planning, is a director of Jerusalem 2050. As she explained the Just Jerusalem competition at its launch Friday, March 2, "The key motivation was how to think about making Jerusalem a more peaceful, sustainable and just city, a place that's welcoming and satisfying for all its residents, no matter their politics or religious, nationalist or ethnic identities. Now that's no small task."

Richard J. Samuels

Richard J. Samuels, Ford International Professor of Political Science and director of CIS, introduced the competition as an effort to "start thinking new thoughts" about Jerusalem.

The light-bulb moment for the group struggling to launch the Jerusalem 2050 project was this realization, Samuels explained: "Perhaps if the conflict could be taken out of its national context and put into a more quotidian one—daily life in the city—perhaps then we could imagine a better time and perhaps we could imagine a better way."

Samuels conceded that the Just Jerusalem competition turns on its head the con-

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AgeLab founder outlines technology's new role in the lives of those over 50

Deborah Halber
News Office Correspondent

The houses of the future will monitor our bodily functions through sensors in the bedrooms, bathrooms and kitchens and relay that data to drugstores that will not only fill prescriptions and sell toothpaste but also connect us with health professionals.

The demographics of aging are bringing about massive changes in society in the industrialized world, said Joseph F. Coughlin, founder and director of the MIT AgeLab. He spoke at a Program in Science, Technology and Society (STS) colloquium, "A New Look at Old Age: Science, Technology and Choosing How We Will Live Tomorrow," on Feb. 26.

Joe Coughlin

Coughlin predicts that, by the time we're 50, we're not likely to move. Our houses will enable us to live independently for longer by providing a variety of technologies designed to keep us healthy and provide help if necessary. Modular houses, already fitted with grab bars in the shower and wheelchair ramps, could be dropped into the backyard to accommodate elderly relatives.

Contrary to prevailing notions, older adults are the leading adopters of new technology. Wearable and implantable devices that check blood chemistry and pressure and dispense medications, robots in nursing homes and refrigerators that monitor what we eat are among new technologies for the aging population.

While some changes seem like no-brainers—for instance, expanding originally assistive technologies like garage door openers—others raise disturbing questions about privacy, dignity and personal responsibility.

Soon, 80 percent of older adults will be living by themselves. Would you prefer to live independently even if it meant having a smart toilet gather data on your body weight, glucose and fiber content and upload it to your doctor? Should insurance companies have the right to dictate how we live if they believe that certain health choices will save money on medical care in the long run?

Affordability is also a concern. How

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PHOTO / **DONNA COVENEY**

Tamako Harrington, Judy Daniels, President Susan Hockfield, Jim Harrington, Elizabeth Pierre and Jamie Fabianski celebrated after Jim Harrington won an Excellence Award.

PHOTO / **DONNA COVENEY**

Janet Fischer of the provost's office, center, and her parents Jack (S.B. 1959) and Margaret at the reception held for honorees Feb. 28 at Kresge Auditorium.

Excellence Awards ceremony applauds MIT staff

The annual MIT Excellence Awards ceremony was held Feb. 28 in Kresge Auditorium. Seventeen members of the Institute staff were recognized. They are, by category of award:

Fostering Community: Janet E. Fischer, special assistant, Office of the Provost, and Helen Rose, associate director, Office of Development Research and Systems.

Creating Connections: Edward Moriarty, technical instructor, Edgerton Center; Christopher Resto, administrative director, Undergraduate Practice Opportunities Program (UPOP); Daniel A. Trujillo, associate dean, Community Development and Substance Abuse Program.

Bringing out the Best: Jim Harrington, facilities manager, School of Architecture and Planning; Ronald Hasseltine, assistant dean, School of Science.

Serving the Client: Joseph F. Connolly, assistant director for administration, Research Laboratory of Electronics; Anne Deveau, administrative assistant, history, theory and criticism of architecture and art, School of Architecture and Planning; Anne C. Maloney, senior stock clerk, Laboratory for Nuclear Science; Cynthia McLain, associate staff, Group 62, Information Systems Technology Group, Lincoln Laboratory; Dieter Willner, senior staff, Group 34, Intelligence, Test and Evaluation Group, Lincoln Laboratory.

Innovative Solutions: Sabin Dang, technical assistant, McGovern Institute for Brain Research; Christine L. Moulen, library systems manager, MIT Libraries.

Unsung Heroes: Gary Pascucci, driver procurement and travel services, Lincoln Laboratory; George V. Petrowsky, systems administrator, Information Services & Technology; Patricia Shea, administrative staff, Group 61, Net-centric Integration Group, Lincoln Laboratory.

MIT announces 2007-2008 tuition; financial aid to increase almost 12 percent

MIT has set tuition and fees for 2007-2008 and has budgeted an additional $7 million for financial aid enhancements, bringing its total undergraduate financial aid budget to $68 million, President Susan Hockfield announced.

"The world needs the kind of leaders and thinkers who graduate from MIT. By finding innovative ways to enhance our strong, entirely need-based financial aid program, we are ensuring that an MIT undergraduate education is affordable to all of our admitted students, without regard to their economic circumstances," Hockfield said.

Tuition and fees for the upcoming academic year will increase 4.1 percent to $34,986, while undergraduate financial aid will increase 11.7 percent.

Daniel Hastings, dean for undergraduate education, noted that the Institute has steadily increased financial aid over the past eight years. "Our commitment to making MIT affordable for all who qualify for admission has been unfaltering. This year, as in seven previous years, MIT has increased funds available for financial aid by a factor greater than the increase in tuition. The result: The net price an average student or family pays for an undergraduate MIT education has actually dropped," Hastings said.

Overall, the average MIT scholarship is more than $28,000, supported by endowed funds, gifts from alumni and general Institute funds. Sixty-four percent of undergraduates qualify for need-based financial aid. In 2006-2007, 23 percent of undergraduates pay no tuition, thanks to the Institute's financial aid program, Hockfield noted.

A new program beginning in the 2007-08 academic year will further amplify MIT's financial aid portfolio. Beginning next year, MIT will guarantee funding for a paid research opportunity through the Institute's Undergraduate Research Opportunities Program (UROP) for all upperclassmen who receive financial aid. About 85 percent of MIT undergraduates participate in UROP over the course of their studies at the Institute.

One of the earliest programs of its kind in the United States, MIT's UROP invites undergraduates to participate in research as the junior colleagues of Institute faculty. The UROP program has given generations of undergraduates their first hands-on experiences with research and has opened the doors to ongoing relationships with faculty, Hastings noted.

The new UROP funds will help students who are interested in term-time work to earn money by doing research as junior members of MIT's faculty. "MIT is taking its undergraduate financial aid program to a new level through coherent, guaranteed financial aid awards such as these," Hastings said.

In December, Hockfield announced MIT's intention to launch a major fundraising effort to support undergraduate and graduate education and student life. Over the next five years, MIT plans to raise significant funds to support undergraduate scholarships, graduate fellowships, initiatives growing out of the report of the Task Force on the Undergraduate Educational Commons and programmatic and capital investments in student life.

MIT took a leadership role in the national debate on financial aid just one year ago, when it became the first private university to announce a Pell Grant matching program to ensure the accessibility and affordability for all qualified students.

Fourteen percent of MIT undergraduates receive Pell Grants, which usually are awarded to students from families earning less than $40,000 a year. Since 2006, it has been possible for Pell Grant recipients to graduate from MIT with little or no debt.

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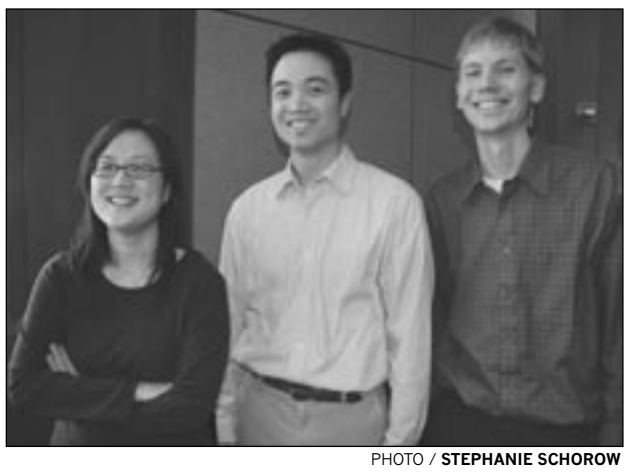

PHOTO / **STEPHANIE SCHOROW**

Annette Kim, assistant professor, urban studies and planning, left, Elliot Hui, postdoc, Harvard-MIT Division of Health Sciences and Technology, and Troy van Voorhis, assistant professor, chemistry, discussed faith and development.

Panel explores links among faith, academia and aid in the developing world

Stephanie Schorow
News Office Correspondent

A forum on the links between faith and development in the Third World became a frank discussion on whether MIT students and faculty could—or should—link their faith to their careers as scientists and educators.

Students and others attending "Faith, Academia and the Developing World: Finding Linkages," held Saturday as part of the March 1-3 Veritas Forum at MIT, pressed the three presenters for answers on topics like the meaning of altruism, how to balance belief with science and even if aspects of MIT life were "evil." Others wondered if those who seek to help the poor should use their status as MIT professionals to press for policy change.

The free-wheeling discussion pleased presenters Troy Van Voorhis, assistant chemistry professor, Annette Kim, assistant professor in the Department of Urban Studies and Planning, and Elliot Hui, a postdoctoral fellow in the Harvard-MIT Division of Health Sciences and Technology, who had hoped for an informal exchange. All three also talked personally and openly about the religious faith that informs their career choices.

"God has a special concern for the poor and oppressed," said Van Voorhis, whose research focuses on modeling electron dynamics, but who also volunteers with Habitat for Humanity and other organizations. "If God cares about that, I care about that."

Kim said that development research should not disregard faith issues, noting that religion may be a factor in why some development programs succeed and others fail.

A community's beliefs are "key to their economic action," she said.

Hui, who got his B.S. in physics and electrical engineering at MIT and his Ph.D. in electrical engineering at the University of California at Berkeley, said he chose to forego research that focused on military applications to concentrate on biomedicine. He also sees a trend in research away from health problems of wealthy nations (like obesity) to problems of poorer nations.

"Suddenly it's really cool to do work in the developing world," he said. Maybe, he admitted, his own choice might be perceived as opportunistic; yet he wanted a career that had more of a social impact. "I think it's something you actively try to explore," he said.

One audience member had a more direct question: "Do you think there are fields of study that are at odds with your faith?"

"I asked these questions as an undergraduate," Kim said. "I think the answer is: 'It depends.'" She suggests looking at the overall "system" to see if an area is a morally acceptable choice. In school it's not immoral to study a particular field, Van Voorhis said; the question is whether once in the field, you feel you are "swimming against the stream."

The presenters were asked if they acted out of a sense of guilt over their well-off lives. "There's no way to work in international justice and have guilt continue to be your motivation," Kim noted. Asked "What is your definition of altruism and is it possible," Van Voorhis said his definition was "doing something of absolutely no benefit to you at all."

For many in the audience, the question was not whether MIT had an obligation to help developing nations, but how to help.

"It is important for people in the developed countries to actually have contact with the people they think they are helping," Hui said. Added Kim, "Instead of just thinking of technology, have an in-depth knowledge of what's happening on the ground."

That knowledge should include, the presenters insisted, a sense of the spiritual—as well as material—needs of a community.

The Veritas Forum at MIT, veritas.org, seeks to explore the practical connections among science, faith and technology. Other forums explored theological issues raised by the Human Genome project and by intelligent robots, whether science and Christianity were at odds and questions of truth-telling in the business world.

Robbin Chapman, diversity recruiting manager, foresees sustainable inclusiveness for MIT

Robbin Chapman (Ph.D. 2006) has joined the School of Architecture and Planning as manager of diversity recruiting, the first person ever to hold that position in the School of Architecture and Planning.

In announcing Chapman's appointment in February, Dean Adèle Santos said, "We have an aggressive set of goals to accomplish in this area and will need the assistance of all members of the school with this effort. I couldn't be more pleased to have someone of Robbin's caliber to lead this activity, to help meet our goals and to make enhancements to the solid foundation that many of you have worked so hard to build."

PHOTO / **JUDITH M. DANIELS**

Robbin Chapman

Q: What is your goal as manager of diversity recruiting?

A: My responsibility is to increase the faculty and graduate student pool of underrepresented minority talent. For the School of Architecture and Planning, at this point, it means African-Americans, Latinos, Chicanos, women, Native Americans and Alaskan natives.

Q: Do other schools have people in this role?

A: Yes. There are different models. But the most important thing is visibility. It needs to be clear that this person is connected at the highest level of her institution or department. This work has to be viewed as integral to everything that's done here.

Q: So you have the dean's full support.

A: Yes. Adèle wants to be clear that this effort is being supported at the highest level of the school. The School of Architecture and Planning is really serious about increasing diversity in the school, and it's about more than just counting heads. Even if you could just bring in higher numbers of people, that's not necessarily going to translate into people staying, people being satisfied, people doing well. You want to be sure you're connecting with people and talking about their entire lives here.

Q: How did your educational path prepare you for this role?

A: All of the time I've been at MIT I've been working with students, helping with peer counseling, listening skills, conflict resolution, stuff like that. And I've also been doing a great deal of work around diversity and diversity recruitment, separate from my graduate work.

Q: What kind of training have you directed?

A: I have taught listening skills, how to work diplomatically with students from varying backgrounds, in a way that's inclusive of everyone. Also, I have taught skills about how to teach people when they have differing ways of thinking and learning.

Q: That sounds like it relates to your dissertation work.

A: It does. I was interested in the different ways that people learn and how that feeds into an existing framework of learning called constructionism. Seymour Papert is the founder of that framework. It's based on the idea that people learn best when involved in building or creating something that is then made public so others can see it.

Q: And how does your new role build on that work?

A: A critical role I have played was as a community builder. I'm trying to serve in a similar role here. I don't want the fact that I'm here to signal that we can just sit back and let me take care of increasing diversity at the School of Architecture and Planning. That's not a sustainable or robust model. The point is we are all responsible for our environment. I'm going to do a lot of the legwork, but together we are going to go through the difficult process of building a community of practice around inclusion.

Q: What are the challenges ahead?

A: We all have baggage that we bring into our interactions with others. Sometimes it's difficult to unpack that baggage. But we're MIT! We're really good at figuring things out, building something new and better.

Corporation accepts 41 faculty promotions

At a meeting held on Feb. 2, the Executive Committee of the MIT Corporation accepted President Susan Hockfield's recommendations for the promotion of 27 assistant professors to associate professor without tenure and of 14 associate professors with tenure to full professor. All promotions are effective July 1.

Profiles of those promoted to full professor will appear in a subsequent issue of Tech Talk.

Those who were promoted from assistant professor to associate professor without tenure are John A. Ochsendorf of architecture, Judith A. Layzer of urban studies and planning, Emilio Frazzoli of aeronautics and astronautics, Forrest M. White of biological engineering, Regina Barzilay, Karl K. Berggren, Luca Daniel, Dina Katabi, Samuel R. Madden and Asuman Ozdaglar of electrical engineering and computer science, Francesco Stellacci of materials science and engineering, Thomas Peacock and Yang Shao-Horn of mechanical engineering, Jay Scheib of music and theater arts, Sarah Song of political science, David S. Jones of science, technology and society, Jared R. Curhan, Shane Frederick, David Gamarnik, Dirk Jenter and David McAdams of the Sloan School of Management, Amy E. Keating of biology, James J. DiCarlo of brain and cognitive sciences, Alice Y. Ting of chemistry, Kiran S. Kedlaya of mathematics, and Nergis Mavalvala and Ian W. Stewart of physics.

Additionally, the following 14 have been promoted from associate professor with tenure to full professor:

Caroline A. Jones and Nasser O. Rabbat of architecture, Hiroshi Ishii of media arts and sciences, Jonathan P. How and Brian C. Williams of aeronautics and astronautics, William H. Green Jr. of chemistry, Rajeev J. Ram and Seth Teller of electrical engineering and computer science, John G. Brisson II and John J. Leonard of mechanical engineering, Daniel Fox and Kai von Fintel of linguistics and philosophy, Thomas DeFrantz of music and theater arts and Angelika Amon of biology.

MacVICAR

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The 2007 MacVicar Faculty Fellows are Yoel Fink, associate professor of materials science and engineering; Jonathan Gruber, professor of economics and associate department head; Charles E. Leiserson, professor of electrical engineering and computer science; James B. Orlin, professor of management science; and David Wallace, associate professor of mechanical engineering.

Daniel E. Hastings, dean for undergraduate education, read student comments about the five fellows: "One of the best lecturers I've experienced at MIT," a student wrote about Fink; Gruber has the "rare ability to turn dry lectures into lively discussions"; a student feels that Leiserson is "walking right beside us in our exploration of the world of algorithms"; Orlin's classes are "full of fun with purpose and include game shows to review the material"; and being Wallace's student is "like an apprenticeship to a master of the trade."

Wallace also participated in the roundtable discussion. Ever the educator, he turned his remarks into a teachable moment. He shoved a life-size cardboard cutout of himself wearing a T-shirt and shorts across the floor. "I learn best when I…," he prompted. "Move around?" someone guessed. "Push myself," he said.

PHOTO / **DONNA COVENEY**

Ruth Perry, literature professor, left, and Bryan Owens, senior in mechanical engineering, discuss learning strategies.

Wallace took a bite out of a hamburger to demonstrate that he likes learning when he "tries new things"; pointed a camera to show he's "focused"; and a "new and improved" sign meant he likes learning when he believes it will lead to a way to benefit society.

Wallace, who said he was once so absorbed in learning that he wrapped a set of chisels in a pair of dress pants and stuck them in his toolbox, said he really learns best "when it's fun. When it's fun, it makes all the things I talked about something I really want to do."

The roundtable also included Ruth Perry, professor of literature; Julie Norman, associate dean in the Office of the Dean for Undergraduate Education; alumnus Dedric A. Carter, executive director of the Office of Engineering Outreach Programs and lecturer in electrical engineering and computer science; junior Dayán Páez; senior Bryan Owens; sophomore Irina Shyklar; and Cambridge–MIT undergraduate exchange

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Adult stem cell survival, promise advanced

Anne Trafton
News Office

MIT researchers have developed a technique to encourage the survival and growth of adult stem cells, a step that could help realize the therapeutic potential of such cells.

Adult stem cells, found in many tissues in the body, are precursor cells for specific cell types. For example, stem cells found in the bone marrow develop into blood cells, bone cells and other connective tissues, and neural stem cells develop into brain tissue.

Those stem cells hold great promise for treatment of injuries and some diseases, says MIT professor of biological engineering Linda Griffith.

Griffith is the senior author of a recent study showing that when presented in the right physical context, certain growth factors encourage the survival and proliferation of bone marrow mesenchymal stem cells grown outside of the body.

The work offers hope that one day, stem cells removed from a patient could be transplanted to an injury site and induced to grow into new, healthy tissue. The research appears in a recent online issue of Stem Cells.

Griffith's team focused on the potential for mesenchymal stem cells to grow into new bone in patients with bone cancer or severe bone injuries. Current treatment for such patients involves replacing the bone with either cadaver bone or, more commonly, a piece of the patient's hip bone.

Ideally, surgeons would like to be able to aspirate bone marrow from the hip, which is a much less painful and invasive process than removing bone, and transplant the stem cells from that marrow into the injury site.

Although patients' own marrow has been used successfully in certain situations, Griffith and her clinical collaborators believe that the inflammatory response following transplant may limit survival of cells under many clinical conditions.

To avoid that deadly response, Griffith and her team sought a way to manipulate the environment surrounding the cells to make conditions more favorable for survival. They zeroed in on a growth factor known as EGF, which plays a role in growth and differentiation of many cells, including stem cells. However, its ability to protect stem cells against the sort of prodeath signals found at the implant site was previously unknown.

When EGF attaches to receptors on the stem cell surface, it activates many pathways that can influence stem cell proliferation, migration and differentiation. However, the cell normally absorbs EGF and degrades it, and the growth factor loses its power to influence cell behavior. This has made EGF notoriously difficult to develop as a clinical product for wound healing.

To control this, the researchers decided to tether EGF to a scaffold, preventing the stem cells from eating it up and allowing continuous EGF exposure on the cell surface.

"Putting them on a scaffold is appealing because then you can control the concentration and location and so forth," Griffith said. The ceramic and polymer scaffold, which remains in the patient's body during healing but then resorbs, also provides structure for the stem cells as they grow

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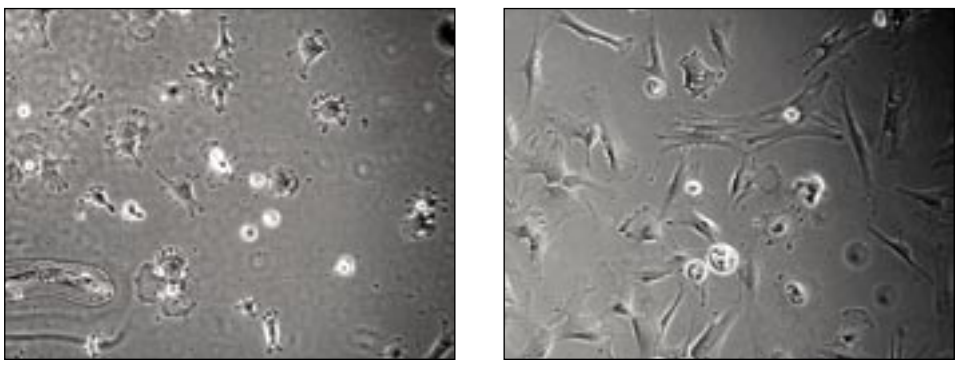
PHOTO / **DONNA COVENEY**

Linda Griffith, professor of biological engineering, is conducting research on adult stem cells, which could one day be used to treat injuries and diseases.



PHOTOS COURTESY / **LINDA GRIFFITH**

MIT researchers have discovered that treating bone marrow stem cells with a growth factor called EGF promotes their survival and growth when the EGF is tethered to a scaffold. At left, stem cells treated with soluble (untethered) EGF are shown, at right are stem cells treated with tethered EGF.

Solar power, clean energy inspire Norwegian entrepreneur

Deborah Halber
News Office Correspondent

The fact that darkness prevails over northern Norway for months at a time did not stop Norwegian entrepreneur Alf Bjørseth from starting a solar energy company.

Norway, a leading oil exporter, is putting enormous resources into emerging, clean and renewable energy technologies. Connecting with MIT and Massachusetts—like Norway, a hotbed of private sector energy-related innovation—is high on the agenda of the Norwegian government.

In conjunction with his first visit to Boston, Norwegian Foreign Minister Jonas Gahr Støre spoke at a March 1 MIT seminar on clean technology and renewable energy. The event was sponsored by Innovation Norway, a state-owned company that promotes Norwegian industrial development and a member of the MIT Industrial Liaison Program.

Bjørseth and other innovation experts were part of a panel during the event, "Innovation Clusters in Massachusetts and Norway: New Opportunities for Transatlantic Cooperation in the Transition to a Clean Energy Economy."

Norway's version of NASA's Apollo project involves diversifying into natural gas from reserves at the Bering Sea, continuing to tap into rich oil reserves and developing carbon sequestration technologies in underground storage reservoirs. "Norway has ambitious goals for capture and storage of CO_2. We aim to build the largest CO_2 capture and storage facility off the west coast of Norway by 2014," Gahr Støre said.

Gahr Støre and Robert C. Armstrong, associate director of the MIT Energy Initiative, outlined existing cooperative programs between MIT and the Norwegian University of Science and Technology (NTNU), Norway's leading technical university. Other ongoing collaborations exist between MIT and the International Research Institute of Stavanger, the Research Council of Norway and the Norwegian oil and gas industry.

Collaborations around marine science and a university chair alternating between MIT and a Norwegian university are among the other potential joint projects.

At a panel discussion moderated by Torger Reve, former president of the Norwegian School of Management, panelists Bjørseth, president of Scatec and former CEO and founder of Renewable Energy Corp.; Olav Bolland of the Department of Energy and Process Engineering at NTNU; Richard Lester, director and founder of the Industrial Performance Center at MIT; and David Marks, co-director of the Laboratory for Energy and the Environment at MIT, addressed models for transatlantic collaboration and how to leverage industry and knowledge clusters in Massachusetts and Norway.

Human ingenuity applied to "better ways to extract, store and transport energy is the only chance we have to break out of the triple straitjacket of security, climate and cost-and-supply problems," Lester said.

AGELAB

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do we ensure technological benefits are equitably distributed across the social spectrum?

Life expectancy in the United States has increased from around 50 to around 80 in the past century. In 20 years, one in four people in the United States will be over age 60. Those numbers are higher in countries such as Germany, Italy, Japan and even China, where birth rates are declining.

The paradox of aging is, now that we're living longer, what are we going to do with all that extra time?

Although most of us will still end up with chronic diseases, we will contract them later in life, and chances are they will not incapacitate us until even later.

Coughlin points out that we live in a society that says you're done at age 65. Retirement, he pointed out, may just go away.

People want to do things, and 30 years of playing golf is not appealing to most.

"We're looking at a (Baby Boomer) generation that has greater expectations that their lives are better and different," Coughlin said. And boomers whine more, he said, and are more likely to demand more aggressive treatments.

With a multidisciplinary team, the AgeLab is looking at how to address public policy, political issues, social issues and technology for a population that may soon be routinely living to be over 100.

"All these technologies make it possible to rethink the social contract," he said. "Right now, we are not geared to meet the needs and demands of an aging society."

MicroRNA found to regulate gene implicated in cancer

Eric Bender
Whitehead Institute

A microRNA directly regulates a gene implicated in human cancers, researchers from the Whitehead Institute and MIT reported in the Feb. 22 online issue of Science.

MicroRNAs are tiny snippets of RNA that can repress activity of a gene by targeting the gene's messenger RNA (which copies DNA information and starts the process of protein production).

The first microRNA was discovered in 1993, in worms. It took seven years for the second one to be found, also in worms. But then the floodgates burst. Many microRNAs now have been found in diverse plants and animals, including hundreds in humans. Moreover, microRNAs found in mammals regulate more than a third of the human genome, as shown in a 2005 study by MIT Professor of Biology David Bartel and colleagues. Bartel is also a Whitehead member and Howard Hughes Medical Institute investigator.

But given the wealth of microRNAs and the ability of individual microRNAs to target hundreds of genes, researchers have struggled to show the biological impact of a particular microRNA on a particular target in mammals (although such connections have been shown in plants, worms and flies). Several groups have demonstrated that over-expression or under-expression of a microRNA can play a role in certain cancers, but have not clarified the genes responsible.

Looking to find a promising target for an individual microRNA, Christine Mayr, a postdoctoral researcher in the Bartel lab, picked Hmga2, a gene that is defective in a wide range of tumors.

In these tumors, the protein-producing part of the Hmga2 gene is cut short and replaced with DNA from another chromosome. Biologists have mostly focused on the shortened protein as the possible reason that the cells with this DNA swap became tumors. But this DNA swap removes not only the gene's protein-producing regions but also those areas that don't code for protein. And these non-protein-producing regions contain the elements that microRNAs recognize.

It turns out that in the non-protein-producing region, Hmga2 has seven sites that are complementary to the "let-7" microRNA, a microRNA expressed in the later stages of animal development. Mayr wondered whether loss of these let-7 binding sites, and therefore loss of regulation by let-7 of Hmga2, might cause over-expression of Hmga2 that in turn would result in tumor formation.

To find out, Mayr created a series of Hmga2 genes in which various numbers of let-7 sites were destroyed. She found clear evidence that when exposed to let-7, the fewer sites that were intact, the more protein was produced.

Next, she tested whether disrupting let-7's ability to repress Hmga2 would lead to tumor creation. In a standard in vitro test of cancer-causing genes, colonies of mouse cells that expressed normal or shortened Hmga2 did not grow significantly, while cells in which Hmga2 contained disrupted let-7 sites did. In fact, the more that let-7 sites were damaged, the greater the number of colonies.

Mayr also worked with MIT Assistant Professor Michael Hemann of the Department of Biology to inject these cells in mice with a compromised immune system. The scientists found that the mice with cells that expressed the version of Hmga2 with the disrupted let-7 sites developed tumors.

Overall, the results highlight a new mechanism for cancer formation. Hmga2, and perhaps certain other genes that are normally regulated by microRNAs, can help give rise to tumors if a mutation in the gene disrupts the microRNA's ability to regulate it. In addition, the results show that the interaction of one microRNA with one of its target genes can produce a certain trait in mammals.

This research was funded by the National Institutes of Health.

PSC grants expand MIT's global reach

Undergraduate and graduate students who work in developing regions outside the United States over Independent Activities Period or over the summer are eligible to receive grants for up to $1,000 from the Public Service Center (PSC). Below is a brief summary of grant-winning projects students worked on during IAP 2007.

Argentina: HIV and sex education counseling in Buenos Aires

Sophia Kamran, a junior in biological engineering, and Keron Lezama, a junior in chemical engineering, traveled to Hospital Rivadavia in Buenos Aires to help the medical workers develop their HIV and sex education counseling services. While they assisted in improving information access for patients, they also improved their own understanding of public health issues in developing countries, learned about cultural issues related to sensitive subjects and gained Spanish fluency.

Brazil: Improving living standards in Rio de Janeiro and Tocantins

Aimee Beasley, a junior in civil and environmental engineering, traveled with D-Lab students and two team leaders to Brazil. She worked with the Esçola do Canuanã, an agriculturally focused boarding school, and with local village members to design simple appropriate technological solutions to daily health, sanitation, electricity, water, communication and economical issues in the rural state of Tocantins. In Rio de Janeiro, in the neighborhoods of Rhocina, Manguiera de Botafogo and Bangu, Beasley worked on solar water disinfection systems for the urban and rural environments. She also helped to implement a tin can chimney designed by a high school student.

Ghana: High-tech education

Xin He, a sophomore in chemical engineering, worked on projects in the rural village of New Longoro, Ghana, with six other MIT students and a faculty member. They taught teachers how to use a laptop they donated and discussed other plans "to better prepare the rural West African students for today's high-tech world." He "returned to MIT very aware and appreciative of all the opportunities and resources available to me. I plan on making full use of everything here and hope to continue contributing to those in need," he said.

Kenya: Water-carrying donkeys empower Masai women

Zawadi Lemayian, a sophomore in management, traveled to Kenya to try to improve educational access for Masai girls, who typically are not allowed to go to school. Water access is a critical need in the area, so Lemayian used some of her grant funds to purchase donkeys for carrying water. By working with the chief and other leaders, Lemayian arranged for the women to control this resource, which resulted in both greater access to water and more respect for women. In addition, Lemayian worked with the chief to convince three families to send their daughters to school this year. Lemayian said, "You only appreciate what you have when you realize how much harder other people's lives are."

Mauritius: Environmental education at the Hindu Girls School

Christopher Cleaver, a junior in aeronautics and astronautics, worked in Mauritius, a small island and a developing state in the Indian Ocean, off the east coast of Madagascar. His project was the School Footprinting Initiative, a three-year environmental education project that challenges students to measure and reduce the environmental impact of their school. Cleaver founded the project, obtained approval from the government of Mauritius, and secured a promise of funding from Shell Mauritius. In addition, he conducted a two-week pilot project with a ninth grade class in the Hindu Girls School, discussing ecological footprinting, data collection and reporting. The project

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PHOTO COURTESY / **MIT SOLAR TURBINE GROUP**

MIT students traveled to Lesotho in January 2006 to work on developing a solar microgenerator that would provide affordable energy.

Chancellor announces launch of Global MIT site

Global MIT, a web site and database that will enable users inside and outside the Institute community to learn about the full range of MIT's international engagement, has been launched, Chancellor Phillip L. Clay announced.

Global MIT is designed to be a publicly accessible compendium of all MIT international and global activities in areas including research, education, internships and community service opportunities. The URL for Global MIT is global.mit.edu.

In his letter to the MIT community, Clay noted that the heart of Global MIT is a state-of-the-art searchable database intended to include all of the Institute's international activities. The database already has more than 700 entries. Clay asked for "participation and assistance in updating information on activities with which you or your group may be involved. We are certain that you will have additions and corrections that should be in place before the site goes live to the world."

He also thanked contributors in advance for "helping us develop this resource, which represents MIT's enormous global impact."

Members of the MIT community can add and edit entries in the database using certificates. The Global MIT editors will review all changes prior to posting. Questions or suggestions about Global MIT may be sent to global-comments@mit.edu.

Model simulates atomic processes key to nanomaterials

Anne Trafton
News Office

Researchers from MIT, Georgia Institute of Technology and Ohio State University have developed a new computer modeling approach to study how materials behave under stress at the atomic level, offering insights that could help engineers design materials with an ideal balance between strength and resistance to failure.

When designing materials, there is often a tradeoff between strength and ductility (resistance to breaking)—properties that are critically important to the performance of materials.

Recent advances in nanotechnology have allowed researchers to manipulate a material's nanostructure to make it both strong and ductile. Now, the MIT-related team has figured out why some nano-designed metals behave with that desirable compromise between strength and ductility.

The team, led by Subra Suresh, the Ford Professor of Engineering in the Department of Materials Science and Engineering, developed a simulation method derived from experimental data that allows them to visualize the deformation of materials on a timescale of minutes. Previous methods allowed for only a nanosecond-scale glimpse at the atomic-level processes.

"It's a method to look at mechanical properties at the atomic scale of real experiments without being bogged down by limitations of nanosecond timescales of the simulation methods such as molecular dynamics," said Suresh, the senior author of a paper on the work that appears as the cover story in the Feb. 27 issue of the Proceedings of the National Academy of Sciences.

Using the new method, the researchers found that the ductility and strength of materials are greatly influenced by a special kind of interface known as the twin boundary—an abrupt internal interface each side of which is a precise mirror reflection of atoms on the other side. Twin boundaries can be introduced in various densities, in a controlled manner, inside a nanocrystalline metal.

For many years, engineers have been able to tinker with the structure of metals to make them stronger. Most commonly used metals, including copper, silver, gold and aluminum, are traditionally made from micrometer-scale "building blocks" called grains, which each contain many millions of atoms.

About two decades ago, materials engineers discovered that when they made those grains smaller, typically tens of nanometers in average size, metals become stronger. Known as nanocrystalline metals, they are several times stronger than conventional microcrystalline metals.

However, as nanocrystalline metals become stronger, they also become more brittle (less ductile). For example, copper with a grain size of 10 micrometers may have a ductility of about 50 percent (depending on exact composition), but at a 10 nanometer grain size, the ductility is below 5 percent, according to Suresh.

Subra Suresh

"In most applications, you need optimum combinations of strength and ductility," Suresh said.

A few years ago,researchers at the Shenyang National Laboratory for Materials Science in China synthesized a novel form of nanostructured metal, nano-twinned copper. The material was created by introducing controlled concentrations of twin boundaries within very small grains of the metal using a technique known as pulsed electrodeposition.

The Shenyang group, working in collaboration with Suresh's group at MIT, demonstrated in the last two years that nano-twinned copper has many of the same desirable characteristics as nano-grained copper, and in addition resulted in a good combination of strength and ductility. By controlling the thickness and spacing of twin boundaries inside small grains to nanometer-level precision, they were able to produce copper with different "tunable"

See **ATOMIC** Page 6

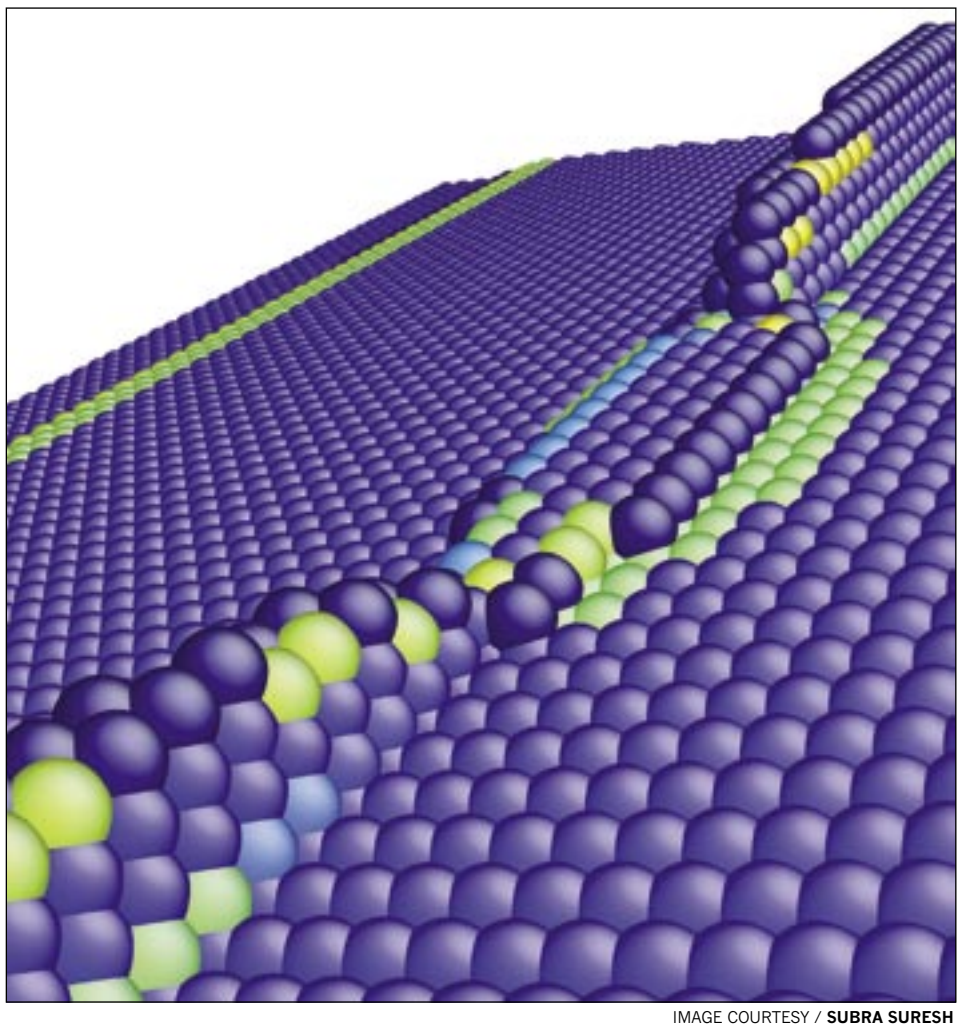

IMAGE COURTESY / **SUBRA SURESH**

This three-dimensional atomic simulation shows the absorption of a line defect by an existing twin boundary in nano-twinned copper.

Doherty professor studies marine organisms

Andrea Cohen
MIT Sea Grant

In work that will improve our understanding of the marine microorganisms that are essential to healthy oceans, an MIT professor is using microfluidics to study these organisms in the lab under conditions close to what they experience in the wild.

For his work, Roman Stocker, assistant professor in the Department of Civil and Environmental Engineering, has been awarded the 2007 Doherty Professorship in Ocean Utilization from the MIT Sea Grant College Program. Every year, the program selects one or two new faculty members for a supplemental award of $25,000 per year for two years.

Endowed by the Henry L. and Grace Doherty Charitable Foundation, the Doherty Fellowship encourages promising, non-tenured professors to undertake marine-related research that will further innovative uses of the ocean's resources. The area of research may address any aspect of marine use and/or management, whether social, political, environmental or technological.

Stocker's research will focus on the marine microorganisms that are at the base of the oceans' food web and are essential to the oceans' healthy functioning. "We're interested in how swimming microorganisms actively respond to their environment," says Stocker, "as that strongly influences how nutrients are recycled in the ocean and ultimately made available to other organisms."

To date, quantifying these microscale interactions has been extremely difficult because they occur on too small a scale to be studied in the field, and recreating their environmental conditions in the lab has previously not been possible. To effectively study fluid mechanics at these small scales, Stocker uses custom-tailored microchannel devices. Tiny channels, with typical sizes of hundreds of microns, are sandwiched between a polymer on the top and a glass microscope slide fused to the bottom. Syringes and pumps generate flows of varying speeds in the channels, and nutrient and flow scenarios mimicking those in the ocean can be created.

"My work in microfluidics gives the biologists the ability to look at microorganisms in their environment in a manner that's impossible in the ocean, where the organisms are too small and the conditions too changeable. In the lab we can very carefully recreate typical conditions of a microbe's environment, and we can accurately track where the creatures go by attaching a video camera to the microscope," explains Stocker.

In his Doherty-funded research, Stocker will look at whether bacteria can find patches of high nutrient concentrations and get to them before they dissipate by diffusion or flow. "If bacteria can rapidly find and consume nutrients, they will be recycling them and ultimately they will be returned to the food web. These processes can totally change our estimate of the carbon cycle in the ocean," he says.

MacVICAR

Continued from Page 3

student Deviyani Misra-Godwin.

Carter said he learns best when he "taps into the power of analogies" by exploring how a specific analogy captures the essence of what he's trying to learn and where it falls apart. "This creates a mental picture definitely worth more than 1,000 words," he said.

Páez, a mechanical engineering major, prefers to learn "conceptually or intuitively and not numerically. In engineering, too much attention can be drawn to the math. I need an overall sense of what is happening physically." Owens said he learns by explaining course material to his immigrant grandparents. Shyklar, who is majoring in brain and cognitive sciences, said she learns best by asking questions. She said professors should provide students with more opportunities to ask anonymous questions so they don't risk feeling stupid in the classroom.

Perry recalled that as a college student, she tried to take "perfect" notes and almost failed out. She realized, she said, students have to interact with the material and not just receive it. In her classes, she likes to pose questions she can't answer. She proposes a question based on her observation of a text and she and the students discuss possible answers together.

Perry has undertaken a new path of learning for herself: She is studying the history and transmission of folk music. To learn the field, she apprentices herself to "someone who knows what I want to know."

Misra-Godwin said students in Cambridge, England, are less eager than MIT students to talk about class material outside the lecture hall. "Students don't ever talk about work outside lectures. That's considered so uncool." Instead, they take part in weekly one-on-one tutorials with senior faculty.

The event also included demonstrations and exhibits on how technology can help learning.

The MacVicar Faculty Fellows Program was named to honor the life and contributions of Margaret MacVicar, professor of physical science and dean for undergraduate education at the time of her death in 1991.

ATOMIC

Continued from Page 5

combinations of strength and ductility.

Internal interfaces such as grain boundaries (which occur between grains) and twin boundaries play a critical role in the strength and ductility of metals.

When there are smaller grains in the metal structure, and hence more grain boundaries for a given volume, there is more interaction between the boundaries and dislocations, or string-like defects in the material that move inside and between grains during mechanical deformation. The larger proportion of these boundaries contributes to the brittleness of the metal.

Adding nano-scale twin boundaries, which effectively subdivide the grains, has a similar strengthening effect, but the twin boundaries do not promote the same level of brittleness as grain boundaries do.

"You can trick the material and optimize both strength and ductility by modifying the interactions between dislocations and these nano-scale twin boundaries inside the grain," said Suresh.

The new study reveals that the ductility of nano-twinned copper can be attributed to changes in the atomic structure of the twin boundaries as the material is deformed.

Metals with more twin boundaries also maintain their electrical conductivity better than metals with more grain boundaries, making them potentially more useful for applications such as computer chip components. Nanocrystalline metals that are both strong and ductile could also be useful for many wear-resistant thin-film coating applications and MEMS (micro-electro-mechanical systems) devices, Suresh said.

The researchers plan to use their new approach to look at such things as the structures of other materials and other types of boundaries.

Suresh's collaborators on the paper include two former MIT graduate students, Ting Zhu, now an assistant professor at Georgia Tech, and Ju Li, now an assistant professor at Ohio State. Other authors are Amit Samanta and Hyoung Gyu Kim, both of Ohio State.

The research was funded by the National Science Foundation, the Office of Naval Research, the Air Force Office of Scientific Research, the Department of Energy, the Ohio Supercomputer Center and the Defense University Research Initiative in NanoTechnology.

PSC

Continued from Page 5

is being launched in eight schools in 2007, with an expansion to 16 and 32 schools planned in 2008 and 2009 respectively.

Southern Africa: Bringing solar energy to Lesotho

Alex Hornstein, a senior in electrical engineering and computer science, traveled to Lesotho to work on a solar energy project at the Bethel Business Community and Development Center with MIT students, alumni and local people. The experience affirmed that it is possible, but difficult, to build a sophisticated device in an isolated rural area, and that creativity and teamwork are essential for success.

Tanzania: Prospecting for future D-Lab projects

Ammar Jiwaji, a sophomore in management, spent his IAP in Arusha, Tanzania, and surrounding villages to investigate prospects for future D-Lab projects for other MIT students. He found interesting project possibilities related to wheelchairs, improved cooking charcoal, health education and agricultural development, he said.

Tanzania: Replacing stolen computers and computer education

Philip Laker-Ojok, a sophomore in chemical engineering, worked with Folkers Rojas, a junior in nuclear science and engineering, to gather computer equipment to donate to the Loreto School in Mwanza, Tanzania, replacing computers that had been stolen.

STEM CELLS

Continued from Page 4

into new bone cells.

"We found that when EGF was tethered to the surface it elicited different cell responses than it did when given to cells in the usual soluble form," Griffith said. "When tethered, it protected the cells from being killed by pro-death inflammatory signals. The soluble version of the factor did not protect cells."

So far all of the experiments have been done in vitro, or outside the body, but the researchers are currently planning studies in animals.

Griffith, who does not work with human embryonic stem cells, believes that adult stem cells offer promising therapeutic possibilities.

"I'm very optimistic about the potential for adult stem cells to be useful clinically for the problems I work on, since there are already some clinical successes based on these cells," she said. "Continuing, careful, methodical work will lead to improved therapies based on adult stem cells. We are aiming to expand the range of therapies that work in the clinic." Griffith is one of several MIT biological engineering faculty members who work with adult stem cells but not human embryonic stem cells.

Griffith is also one among many scientists around the world who have at least some objections to creation of human embryonic stem cells, for a variety of reasons. She says her current focus on adult stem cells is driven largely by the interesting science and the feasibility for near-term clinical use for the types of cells she investigates. However, she also avoids research with human embryonic stem cells following a personal experience with in vitro fertilization almost 10 years ago.

"Like some other scientists I know, my personal views about creating human ES cell lines changed when confronted with the reality of doing so from my own embryos. After this experience, I was not comfortable conducting human ES cell research myself, and I have a better understanding of why some scientists object to all work with human ES cells," she said. She also said she feels her personal views, and those of others, are respected in the scientific community.

Currently, federally funded research is only allowed on certain established lines of embryonic stem cells, although a few states, including California and Connecticut, offer state funding for broader embryonic stem cell research. There are no legal restrictions on funding to study adult stem cells.

Griffith's recent work was funded by the National Institutes of Health and the Harvard School of Dental Medicine.

The lead author on the Stem Cells paper is Vivian Fan, a graduate student in MIT's Department of Biological Engineering and the Harvard School of Dental Medicine. Other authors are Ada Au and John Wright, graduate students in the Department of Biological Engineering; Romie Littrell, lab manager in Griffith's lab; Llewellyn Richardson, research assistant in the Department of Chemical Engineering; and Kenichi Tamama and Alan Wells of the University of Pittsburgh.

CLASSIFIED ADS

Members of the MIT community may submit one classified ad each issue. Ads can be resubmitted, but not two weeks in a row. Ads should be 30 words maximum; they will be edited. Submit by e-mail to ttads@mit.edu or mail to Classifieds, Rm 11-400. Deadline is noon Wednesday the week before publication.

VEHICLES

1997 Isuzu rodeo, 87K, black, automatic, v6, 4X4, great condition, priced to sell, $2200. Contact Katherine at krendon@mit.edu or 781-475-9286.

HOUSING

Apt. for rent, Brookline near BU, third floor of private home, separate entrance, 2BR, fully furnished & equipped. Ideal for visiting foreign guests. One year minimum. Contact farmthe@opifice.com.

House for rent in Somerville nr Union Sq. Parking, modern kitchen, 1.5 BA 2BR, parlor, dinning room, washer & dryer in basement, buses to MIT, Harvard, Tufts. Avail. 4/1. $1400/mo., no utils. Call Belle at 617-452-2458 (day) or 617-926-5531 (eve).

VACATION

Ocean front summer cabin, Mount Desert Island, ME: 2BR/1BA w/living/kitchen area; picture windows, deck overlooking water; stairway to beach. Mins from Acadia National Park, Bar Harbor. $1,000/week June-Sept. Steve at 253-5757 or chorover@mit.edu.

Martha's Vineyard, Oak Bluffs - 2 BR/1.5BA; wraparound deck, outdoor shower, barbecue, sunny, open interior. Near lagoon, tennis & bike trails. $550-975/week. Nina at ninad@mit.edu or view website: http://home.comcast.net/~ndomenico/marthasvineyard/index.htm .

3BR cottage on Wadleigh Pond, Lyman, Maine. Golf, historic Portland & Kennebunkport nearby. Fully equipped. Quiet area, beautiful sunsets. Ideal spot for relaxation. $900/week. Contact maturner@mit.edu. Pictures avail.

FOR SALE

White, contemporary full-size platform bed set w/ ultra-firm mattress, 2 bedside tables, 3-drawers chest, $180. Folding sofa/sleeper, $25. Sony counter/desktop stereo w/speakers, $45. 617-484-0308.

Men's jacket: Size large, brown leather-look, below hip-length, fleece lining throughout, made in Italy, new $40. Call Rosalie at 781-391-1307.

Pottery Barn: Two wood storage cubes/end tables, $25 each; two small wood round occasional tables w/ drawer, $45 each. Japanese wood/paper screens, 2 heights, $45 and $30. 617-484-0308.

Dark German violin made by Johan Andreas Kambl, 1740s, Munich (labeled). $1200, w/ bow. Available for viewing at MIT. Also: Kurdish prayer rug w/ 2 repairs, $850, Bent Willow Rocking Chair (Missouri, c 1950), $400. mross@mit.edu or Marcia 617-258-7851.

Recliner, rocker, swivel chair, blue Fabric with small mauve dots, excellent condition, $75. E-mail: pamarbi@comcast.net or call 781-662-5368.

Tanning Bed Wolff Model Sunquest Pro 16 SE 2004. Operates on 120 Volt household circuit. Like new, rarely used. Asking $100 (paid $2000) or best offer.

MISCELLANEOUS

Writing your thesis? Submitting a paper to a journal? MIT-affiliated editor w/ extensive experience can correct grammar, improve style & enhance the clarity of your document. Flexible rates. E-mail wordplayer06@yahoo.com.

Wanted: Danish Modern, Scandinavian & Eames style Teak or Rosewood furniture from 1950's-1980's. Will give your furniture a good home. Please e-mail adschwartz@alum.mit.edu.

Japanese hip-hop: from 50 Cent to mirror balls and world peace

Stephanie Schorow
News Office Correspondent

Six months of hanging out in smoky, grungy "genbas," or Japanese hip-hop clubs, gave cultural anthropologist Ian Condry insight into how American rap music and attitudes were being transformed by the youth in Japan.

But he couldn't figure out the mirror balls.

Every club, from large to small, had a mirror ball that sent glittering light into the sweaty haze above the Japanese hip-hop fans, artists, music executives and first-timers.

So "I had to develop my own philosophy of the mirror ball," Condry, associate professor of Japanese cultural studies, told

PHOTO / **STEPHANIE SCHOROW**

Ian Condry has a new book, 'Hip-Hop Japan.'

an audience on March 1 during a discussion of his new book, "Hip-Hop Japan: Rap and the Paths of Cultural Globalization" (2006, Duke University Press). That philosophy highlights the relationships within the hip-hop community, he explained.

The mirror ball illuminated "no single star on stage but rather spotlighting and then passing over all of the participants," Condry said, reading from his book. "The dynamic interaction among all these actors is what brings a club scene to life. Mirror balls evoke this multiplicity, splashing attention on each individual for a moment and then moving on—not unlike the furtive glances of desire between clubbers in a zone of intimate anonymity."

Such details were crucial to Condry's insight into how affluent Japanese youth had transformed the music that came straight out of Compton into something distinctly Japanese.

"The evolution of the Japanese hip-hop scene reveals a path of globalization that differs markedly from the spread of cultural styles driven by major corporations such as Disney, McDonald's and Wal-Mart," Condry said. "Indeed hip-hop in Japan is illuminating precisely because it was initially dismissed as a transient fad by major corporations and yet took root as a popular style, nevertheless."

Condry's talk was part of "Cool Japan: Media, Culture, Technology," a Feb. 28-March 3 conference at MIT and Harvard that explored the power and significance of Japanese popular culture.

To illustrate his points, Condry played the video of the song "911" by King Giddra, a Japanese hip-hop group named after a three-headed monster in the Godzilla movie series. The video movingly juxtaposed images of Hiroshima with the destruction of the World Trade Center on Sept. 11, 2001, as the group rapped about the elusive nature of world peace.

Japanese hip-hop—which Condry sees as having the four basic elements of rapping, deejaying, break dancing and graffiti art—quickly jettisoned the use of English, which had lingered in rock music. Japanese rapping has almost no talk of guns and very little mention of drugs but incorporates images of samurai or uses Kabuki performance style and often focuses on global political issues. Yet bravado remains crucial: One female rapper uses the eighth-century poetry style of waka; "yet she does it to say, 'I'm the number one rapper and I can beat the boys,'" Condry said.

Japanese rappers say they're not into American culture, Condry explained in an interview. "They say they're into black culture. They say, 'I don't care abut America per se. But I love Spike Lee movies and I read the autobiography of Malcolm X … and I appreciate what black Americans have struggled to achieve.'"

In the late 1990s, Japanese rap became more commercialized but a wide underground hip-hop movement also emerged, which spread throughout the country among a wide range of social and economic backgrounds. Only in the last four or five years, have "poor Japanese found a voice in hip-hop," he said.

Condry admitted, with a laugh, that there were moments when hanging out in the genbas when he wondered if this was appropriate field work for a cultural anthropologist. Of course, he loves surveys as much as the next academic, but "You become part of the world. You see what's important to them," he said. "To get into that world, you need to learn a lot."

He also admitted that the Japanese hip-hop fans began to imitate him, although politeness prevented them from showing him how he was copied.

The "Cool Japan" conference was sponsored by the MIT Japan Program, Harvard's Reischauer Institute of Japanese Studies, the Harvard Asia Center, MIT Foreign Languages and Literatures and MIT Comparative Media Studies.

PHOTO / **KAMBUI OLUJIMI**

Video and performance artist Coco Fusco, at home in Brooklyn, will visit MIT as part of the Abramowitz Artist-in-Residence Program.

Performance, video artist Fusco examines how visual media shape social issues

Coco Fusco, a Brooklyn-based interdisciplinary artist and writer known for her engaging and provocative video making and performance art, will present two public talks at MIT March 12 and 14 as part of MIT's Abramowitz Artist-in-Residence Program.

Coco Fusco's performances and videos have been featured in numerous exhibitions and festivals around the world, including the Whitney Biennial and the London International Theatre Festival. Most recently, she participated in a symposium on feminist art organized by the Museum of Modern Art in New York.

Her writings have appeared in publications such as the Los Angeles Times, The Village Voice, The Nation, Ms., Art in America and frieze magazine.

Fusco examines how visual media shape perception of social issues, using ethnographic documentary forms, soap operas, talk and variety show formats, surveillance cameras and closed circuit television as her signature media.

Intrigued by the role of women as "victimizers" in the Abu Ghraib prison abuse scandal, Fusco is currently developing a series of new videos and performances about the role of U.S. female interrogators. For her 2006 film, "Operation Atropos," the artist, in a group of six women, took a course designed for civilians who want to learn techniques both for extracting information and resisting interrogation themselves.

"The Couple in the Cage," Fusco's 1993 documentary about her caged Amerindian performance with former MIT visiting artist Guillermo Gómez-Peña, has been screened in more than 200 venues around the world. Her 2004 video, "a/k/a Mrs. George Gilbert," was selected for the 2004 Shanghai Biennale and the Museum of Modern Arts Documentary Fortnight in 2005. Her 2002 video installation, "Dolores from 10 to 10" received an honorable mention from the 2003 Transmediale in Berlin. The exhibition that she curated for the International Center of Photography on racial taxonomy in American photography, "Only Skin Deep: Changing Visions of the American Self," is currently touring the United States.

Fusco, who teaches at Columbia University, is the author of "English is Broken Here" (The New Press, 1995) and "The Bodies That Were Not Ours and Other Writings" (Routledge/inIVA, 2001) and the editor of "Corpus Delecti: Performance Art of the Americas" (Routledge, 1999) and "Only Skin Deep: Changing Visions of the American Self" (Abrams, 2003).

On Monday, March 12, she will present "What You Don't Know Can Kill You: The Art of Coco Fusco" at 8 p.m. in Kirsch Auditorium (Room 32-123, 32 Vassar St.) in a program cosponsored by the MIT Office of the Arts and MIT's Visual Arts Program (Department of Architecture).

On Wednesday, March 14, Fusco will discuss "Gender, Sexuality and the Performance of Interrogation" at 8 p.m. in Room 6-120 (enter at 77 Massachusetts Ave.).

Both events are free; no tickets or reservations are necessary. For more information, call 617-253-ARTS (2787).

The Abramowitz Memorial Lecture, presented by the Office of the Arts, was established at MIT through the generosity and imagination of William L. Abramowitz '35 as a memorial to his father. It has been sustained since his death by the devoted interest of his wife and children. Since 1961, the series has brought renowned performing artists and writers to MIT to perform, present public lectures and collaborate with students in free programs.

JERUSALEM

Continued from Page 1

ventional wisdom in dealing with divided cities by not dealing with political questions first.

So did William J. Mitchell, professor of architecture and media arts and sciences at MIT and one of the international jurors of the competition. But he continued:

"Architecture is a cultural form that forces you to be specific about the organization of daily life. It's about what goes where, it's how you move around, what you confront in your daily life.

"When you put an architectural proposition on the table, people can begin to imagine what their lives could be like in the context of that proposition."

But Just Jerusalem is not just an architectural competition. Entrants are asked to address one of four aspects of the infrastructure of the city: physical, economic, civic or symbolic.

The competition is open to the fields of economics, political science, engineering, architecture and planning, and the arts. The winner in each of the five categories will receive a fellowship of up to a year at MIT. The deadline for entries is Dec. 31.

Samuels noted, "Some have questioned the naïveté of a project that's designed to be utopian in a world that's obviously not that."

But keynote speaker Ira Katznelson of Columbia University described it in terms of a "realistic utopia" that would expand the limits of the possible. He cited urban theorist Jane Jacobs's definition of a "city" as a place full of strangers who must feel safe among each other if the city is to function and thrive.

In Jerusalem, the status of "strangers" is more permanent than in Jacobs's New York, he observed. He suggested political scientist Susan Mendus's ideal of "neighborliness," rather than full multiculturalism, as a realistic goal for Jerusalem.

Leila Farsakh, assistant professor of political science at the University of Massachusetts at Boston, a fellow at MIT's Center for International Studies and a co-director of Jerusalem 2050, suggested that the project might help give rise to a new concept of "citizenship" in Jerusalem.

"We're trying to engineer a break with history," Samuels said. "That's not something that happens very often, but it's happened before, and that's often enough to give us hope that it could happen again, even in Jerusalem."

Ruehr concert celebrates CD release

Lynn Heinemann
Office of the Arts

The titles of MIT Lecturer Elena Ruehr's compositions are almost as evocative as her music. In the case of her new work, "Calling Laura Linney," to be premiered by flutist Sarah Brady this Saturday, March 10 at 8 p.m. in Killian Hall, Ruehr said that her inspiration came from a fascination with the actor's process—in particular, that of Linney, star of the films "Kinsey," "Mystic River" and "The Truman Show," who's been nominated for awards for both her stage and screen work.

Elena Ruehr

Ruehr, who recently received a Radcliffe Institute Fellowship for 2007-2008, said that the process of writing her 2003 dance opera, "'Toussaint Before the Spirits," made her realize how much a composer's work can be like an actor's: to "take a written script and then with excruciating care interpret the timing and inflection of each line," as she described it.

As for Linney, not only is she a great actress, says Ruehr, "but her dad, Romulus Linney, a playwright, was an acquaintance who helped me with the final libretto of 'Toussaint Before the Spirits.'"

Saturday's concert will also celebrate the release of "Toussaint Before the Spirits" on Opera Unlimited's Arsis audio CD.

The concert will also feature a retrospective of Ruehr's flute and saxophone music, including the world premiere of a version for 10 saxophones of "The Voyage Out," "Of Water and Clouds" (performed by Sarah Brady, flute, and Sarah Bob, piano), and the New England premiere of the live version of "The Law of Floating Objects" (performed by flutists Lauren Alford, Sarah Brady, Christine Gustafson, graduate student Ole Nielson and affiliated artist Sue-Ellen Hershmann-Tcherepnin).

While at Radcliffe next year on her fellowship, Ruehr will compose a cantata based on Louise Gluck's most recent book of poems, "Averno," for the McGill University Orchestra and Chorus.

Engineers co-design for clean drinking water

An MIT engineer working toward clean drinking water in Nepal describes in a recent issue of the Journal of International Development how people from developed and developing countries can work together to solve key humanitarian problems, ultimately meeting the basic human needs for security, broadly defined.

Such a collaboration "begins with a relationship among partners in the global village, taking into consideration the specific conditions of the local culture, environment and location," said Susan Murcott, a senior lecturer in MIT's Department of Civil and Environmental Engineering (CEE).

Murcott has personal experience of a global engineering partnership of this kind—she calls it "co-evolutionary engineering design"—through her work in developing countries.

She and students in MIT's CEE master of engineering program have worked for years with citizens of Nepal and, since 2005, of Ghana, to design, test and distribute inexpensive household water filters that simultaneously remove arsenic and microbial contamination from the available water supply. Murcott notes that some 150 million people worldwide are affected by arsenic-tainted water, while an estimated 1 to 5 billion people worldwide lack access to microbially safe water.

As of December 2006, more than 5,000 such filters are operating across Nepal, serving some 40,000 people. An additional 5,000 filters are slated for sales and distribution in 2007 in Nepal, with further outreach into Vietnam, Cambodia and Bangladesh underway.

"The students and I are trying to make a positive contribution to people's lives and to improve our collective chances of development and security," said Murcott.

With co-evolutionary design, technical designers from developed countries become partners with the user communities, who are experts in their local conditions. With the MIT Nepal Water Project, Murcott points out, "Our team's partners have included university-educated people and illiterate peasant farmers. We have identified a common need—safe, clean drinking water for all—and we have worked together successfully for seven years so far."

Any system to provide clean water should consider factors such as sustainability, green engineering and World Health Organization guidelines. In addition, the system must meet the requirements of the local women who typically haul and store water, as well as being affordable to people earning one dollar a day. The same general principles also apply to other co-evolutionary design projects.

Murcott is currently focusing her energies in the northern region of Ghana, thanks to a two-year grant from the Conrad N. Hilton Foundation. Here, a social enterprise—"Pure Home Water," initiated by Murcott with Ghanian partners—is marketing ceramic water filters in one of the poorest regions of Ghana, where cholera, typhoid, guinea worm and other waterborne diseases are rampant. Two Ghanaian social entrepreneurs, together with MIT engineering and Sloan School of Management students, hope to spread ceramic filters to reach more than a million people in northern Ghana in the coming years.

Murcott is also leading MIT teams to Nicaragua, Haiti, Peru and Kenya to address water and sanitation issues in those countries.

She concludes, "We hope to increase awareness of health and safe water issues among the least educated people in remote areas of Nepal and Ghana, subsidize filters for the very poorest people, insure that locally made units are built correctly, and make sure that future teams will effectively and passionately carry the work forward.

"We are confident that this work provides a model of engaged, cross-cultural cooperation that builds self-reliant solutions, at the same time providing a renewed understanding that security for most people in the world relates not to armed conflict but to 'common good' social, environmental and economic challenges, for example, the simple need for safe water."

PHOTO / **DONNA COVENEY**

A team of eight MIT students and their advisor, Susan Murcott, brought their ingenuity and technical skills to villages in Nepal in 2002 to try to solve a very basic practical problem—the need for clean drinking water at very low cost. Above, a young girl pumps water from a well outside Lumbini, Nepal.

PHOTO / **DONNA COVENEY**

Heather Lukacs, former MIT graduate student, chats with a villager at her well in Lumbini.

PHOTO / **DONNA COVENEY**

Barika Poole, former MIT graduate student, tests drinking water.

PHOTO / **DONNA COVENEY**

Former MIT graduate student Hannah Sullivan takes a water sample from a well in the village of Mahilwari, Nepal, assisted by a villager.