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TechTalk
SERVING THE MIT COMMUNITY

CONGRATULATIONS *to the* CLASS OF '09

PHOTOS / **DONNA COVENEY**

ABOVE: Students wait in line to receive their diplomas during Commencement.
BELOW: MIT President Susan Hockfield, left, and Massachusetts Gov. Deval Patrick deliver their addresses.

Gov. Patrick urges grads to embrace 'opportunity for change' at Commencement

David Chandler
News Office

Noting that the current economic crisis is but an opportunity in disguise, Massachusetts Gov. Deval Patrick advised graduates at MIT's 143rd Commencement exercises on Friday, June 5, to take advantage of the skills they have learned at MIT to "write the next chapter of the American story."

As thousands of graduates, friends and family members, faculty, staff and others looked on under cloudy skies in Killian Court, Patrick reminded the Class of 2009 that they were a special breed — more likely to spend their time shaping the future rather than predicting it.

"Be the change you want to see in the world," the governor said. "Achieving any given ideal may demand more than any one individual's contribution, but it surely demands no less."

With today's graduates facing an economy in crisis, Patrick told them not to be fearful but rather to embrace its potential. "Crisis is a platform for change," he said. "Your ideas and contributions will defy prediction."

Some graduating students expressed similar sentiments. MIT students "are really passionate about solving problems. They don't want to just learn for the sake of learning, they want to apply what they're learning," Alia Whitney-Johnson

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Mathematicians take aim at 'phantom' traffic jams

New model could help design better roads

Anne Trafton
News Office

Countless hours are lost in traffic jams every year. Most frustrating of all are those jams with no apparent cause — no accident, no stalled vehicle, no lanes closed for construction.

Such phantom jams can form when there is a heavy volume of cars on the road. In that high density of traffic, small disturbances (a driver hitting the brake too hard, or getting too close to another car) can quickly become amplified into a full-blown, self-sustaining traffic jam.

A team of MIT mathematicians has developed a model that describes how and under what conditions such jams form, which could help road designers minimize the odds of their formation. The researchers reported their findings May 26 in the online edition of Physical Review E.

Key to the new study is the realization that the mathematics of such

▶Please see TRAFFIC, **PAGE 7**

Awards &Honors

EECS associate professor wins EUREKA award

The National Institutes of Health recently awarded a EUREKA (Exceptional, Unconventional Research Enabling Knowledge Acceleration) award to Mehmet Fatih Yanik, the Robert J. Shillman Career Development Assistant Professor in the Department of Electrical Engineering and Computer Science.

The EUREKA program funds exceptionally innovative research that, if successful, will have an unusually high impact and targets investigators who are testing novel, unconventional hypotheses or are pursuing major methodological or technical challenges. Yanik's award is worth more than $1.2 million over four years.

Palacios named ONR Young Investigator

The Navy's Office of Naval Research (ONR) has named Tomás Palacios, an assistant professor of electrical engineering and computer science, as one of its 15 new Young Investigators.

The ONR program is designed to attract young scientists and engineers who show exceptional promise for outstanding research and teaching careers. Palacios was selected from a group of 193 applicants for the honor, which includes a three-year research grant worth up to $510,000.

Palacios' work under the program will be on "Multi-Terahertz Nitride Transistors: Probing the Ultimate Limit of Deeply-Scaled Device Technology." The project aims to understand the limits of high-frequency electronics and to demonstrate record transistors that can revolutionize wireless communications, terahertz imaging and sensing.

Taylor named N.E. track and field coach of the year

MIT coach Halston Taylor was named the New England Women's Track and Field Coach of the Year by the United States Track & Field and Cross Country Coaches Association. Taylor had previously received the New England Women's and Men's Athletic Conference (NEWMAC) Women's Track & Field Coach of the Year award earlier this year.

Graduate student wins leadership award

Department of Mechanical Engineering graduate student Steven Peters recently received the 2009 Student Leadership Award from the Jenzabar Foundation in the category of "campus ministry programs that reach outside campus boundaries." Peters was recognized for his work with the Lutheran Episcopal Ministry at MIT, where he has raised students' awareness of the connection between their faith and the environment, and for helping churches in the Boston area renovate their facilities and enact other changes in order to conserve energy and lower their heating bills.

Obituaries

MIT community mourns loss of Professor David Schauer, 48

Anne Trafton
News Office

David Schauer, a professor of biological engineering and comparative medicine at MIT, died Sunday, June 7, two weeks after suddenly falling ill. He was 48.

Schauer was known for his warmth and easygoing nature, as well as the intellectual rigor of his research, said James Fox, director of MIT's Division of Comparative Medicine, who helped recruit Schauer to MIT 16 years ago.

"When people had the opportunity to meet him, they immediately liked him and felt comfortable with him," said Fox. "His students loved him for his openness and for his ability to sit down with them and help them with their projects or talk about life in general."

Schauer researched the development of bacterial diseases, with a particular focus on understanding how bacterial infection in the gastrointestinal tract leads to conditions such as inflammatory bowel disease, hepatitis and cancer.

He often played intramural sports with his students and enjoyed outdoor activities such as skiing and biking. He was also very active in his temple, Temple Emanuel in Newton, Mass., where he lived with his family.

David Schauer

Born in Queens, N.Y., Schauer grew up in Raleigh, N.C. He earned a bachelor's degree in zoology from the University of North Carolina in 1983, a doctorate in veterinary medicine from North Carolina State University in 1987, and a PhD from Stanford in microbiology and immunology in 1993.

He joined the MIT faculty in 1993 as an assistant professor and was promoted to associate professor in 1999 and full professor in 2005.

"David's passing is a tremendous loss to us, in every dimension. We will miss him immensely," said Douglas Lauffenburger, head of the Department of Biological Engineering.

Students consistently gave him high marks for his teaching, and among his colleagues, Schauer was widely respected for his clear and calm approach to problem solving, both in and out of the lab.

"He was a brilliant scientist, an absolutely wonderful experimentalist," said Peter Dedon, professor of biological engineering. "He made major contributions to education at MIT, as part of the curriculum committee, to teaching, and to science."

Schauer is survived by his wife, Carol; two sons, Nathan, 20, and Sam, 17; his mother, Francine; and two brothers, James and Andrew.

A memorial service will be held at 11 a.m. Wednesday, June 10, at Temple Emanuel, 385 Ward St., Newton, Mass.

Donations in Schauer's memory may be made to Young Judea (youngjudea.org), American Jewish World Service (ajws.org) or Heifer International (heifer.org).

Louis Smullin, former electrical engineering department head, 93

Louis D. Smullin, former head of the electrical engineering department who helped to create MIT's Department of Electrical Engineering and Computer Science (EECS), died peacefully at his residence at Lasell House on Thursday, June 4. He was 93.

"Lou was an enormous force at MIT, one of the people who championed the values that make this place great. That kind of insight and wisdom is needed now more than ever," said Hal Abelson, the Class of 1922 Professor of Electrical Engineering and Computer Science.

Louis Smullin

Born on Feb. 5, 1916, Smullin received a bachelor's degree in electrical engineering from the University of Michigan, Ann Arbor, in 1936, and an SM from MIT in 1939.

Early in his career, Smullin made his mark at several industrial companies. From 1936 to 1938, he worked in the high voltage laboratory of the Ohio Brass Company, Barbertown, Ohio. Upon graduating from MIT in 1939, he went to the Farnsworth Television Company, Fort Wayne, Ind., to develop the design and testing of photomultiplier tubes.

In 1941, Smullin joined the MIT Radiation Laboratory as head of the Radiation Laboratory Transmit-Receive (TR) and Duplexer section. There he supervised the development of methods for testing microwave TR tubes, work which was crucial in the successful development of airborne radar used during World War II. The development saved many lives and had a positive influence on turning the tide in the war.

After a stint with the Federal Telecommunications Laboratory, Smullin returned to the Institute in 1947 to organize and head the Microwave Tube Laboratory of the Research Laboratory of Electronics. He helped plan and set up MIT's Lincoln Laboratory, and in 1952 became head of the Radar and Weapons Division at Lincoln Lab. In 1955, he returned to the Cambridge campus as associate professor of electrical engineering and was made professor in 1960. He was the head of the Active Plasma Systems Group of the Research Laboratory of Electronics.

Smullin was named the electrical engineering department head in 1966, serving through February 1974, when he stepped down to focus on teaching. In the 1970s and 1980s, with Smullin's help, the electrical engineering department evolved into EECS.

"Lou Smullin had the great foresight of building up the computer science wing of the EE department, including the appointment of the first two associate department heads, one for computer science and engineering and one for electrical science and engineering," said Institute Professor Joel Moses.

An experiment for which Smullin is widely remembered occurred in 1962, soon after the first laser was invented. He and Giorgio Fiocco transmitted laser pulses to the moon for the first time, and detected their return in an experiment they called "LunaSee."

Smullin retired from MIT in 1986 and as emeritus professor continued to ride his bike daily to the Institute, continuing his work on cold fusion research until suffering a stroke in 2001.

He is the co-author of a book titled "Microwave Duplexers," and has published numerous technical articles and reports. Smullin was a member of the American Physical Society, the American Society of Arts and Sciences, the National Academy of Engineering, Eta Kappa Nu and Sigma Xi. He was a fellow of the Institute of Electrical and Electronics Engineers, the American Academy of Arts and Sciences, and the American Physical Society.

Smullin is survived by his sparkling wife of 69 years, Ruth Frankel; three children, Susan Jones of Belmont, Mass., Joseph Smullin of Swampscott, Mass., and David Smullin, Bend, Ore.; daughters-in-law Alix Smullin and RuthAnn Smullin; Susie's partner Howard Kaplan; nine grandchildren and three great-grandchildren. They will remember him for his gentleness, his story-telling skills, his endless persistence, and his boundless enthusiasm for science and making the world a better place.

Smullin was preceded in death by son Frank Smullin and daughter-in-law Terry Bonynge.

In lieu of flowers, donations may be made to the Louis D. Smullin (1939) Prize in Teaching Excellence, which rewards faculty members within EECS for teaching excellence with preference toward rewarding those teaching EECS Common Core subjects.

A memorial service is being planned for later this summer.

Leonard Sudenfield, former member of CMSE staff, 83

Leonard Sudenfield, who worked at MIT for nearly half a century, died April 25 after a long battle with Alzheimer's disease. He was 83.

Sudenfield, who was born and raised in the Boston area, served in the U.S. Army during World War II, earning a Purple Heart and a Bronze Star. He began working at MIT in 1948 as a laboratory assistant in the Center for Materials Science and Engineering and went on to hold other titles including metallurgical project technician and engineering assistant.

He also served as an instructor, one of the few persons to do so at the Institute without a college degree, according to his wife, Dorothy (Kushinsky) Sudenfield. Due to his skills on the electron microscope, he was a member of the MIT team that in the 1970s worked to determine why the windows were popping out of the newly built John Hancock Tower in Boston, his wife said. He left MIT in 1995.

He is survived by his wife, sons Paul Sudenfield of Wollaston, Mass., and John Sudenfield of Framingham, Mass.; and daughter Marjorie McCabe, also of Wollaston. A service was held in April. Donations may be made to the Alzheimer's Association, 311 Arsenal St., Watertown, MA 02472, www.alz.org.

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Corporation names new members at Commencement meeting

The MIT Corporation, the Institute's board of trustees, elected nine term members and three life members at its quarterly meeting on Friday morning, June 5, before the Commencement exercises. Dana G. Mead, chair of the Corporation, announced the election results. All memberships are effective July 1.

The new life members are Gordon M. Binder, Gururaj Deshpande and Barrie R. Zesiger. Binder, who has been a Corporation member since 2000, is currently managing director of Coastview Capital LLC, a life science venture capital firm based in southern California, which he co-founded in 2001. Deshpande co-founded Sycamore Networks in 1998; he and his wife, Jaishree, are trustees of the Deshpande Foundation, a philanthropic organization dedicated to the areas of innovation, entrepreneurship and international development. He has been a member of the Corporation since 2000. Zesiger formed Zesiger Capital Group LLC with her husband, Albert L. Zesiger '51, and has been a Corporation member since 1999.

It was also announced at the meeting that Kenneth Wang '71 has been named the 2009-2010 president of the Association of Alumni and Alumnae of MIT. As such, he becomes an ex officio member of the Corporation. He succeeds Antonia D. Schuman '58, who returns to the Corporation for a new five-year term that will conclude in 2014.

As of July 1, the Corporation will consist of 74 distinguished leaders in education, science, engineering and industry; of those, 23 are life members and eight are ex officio. An additional 32 individuals are life members emeritus, participating in meetings, but without a vote.

The new members are:

Gordon Binder

Raja H.R. Bobbili

Brit d'Arbeloff

Rafael del Pino

Gururaj Deshpande

Mohammed Jameel

Cleve Killingsworth

Robert Millard

Alejandro Padilla

Antonia Schuman

Peter Slavin

Barrie Zesiger

Raja H.R. Bobbili

Recent MIT graduate; Management Consultant, McKinsey & Company
Term: Five years (recent classes nominee)
Education: SB in electrical engineering and computer science and SB in economics from MIT (2008)
Current MIT activities: Experimental Study Group Alumni Steering Committee; Institute Awards Selection Committee, Committee Member for the Compton Prize

Brit J. d'Arbeloff

Term: Five years
Education: SB from Stanford University (1957); SM in mechanical engineering from MIT (1961)
Current MIT activities: Several Corporation Visiting Committees; chair of the Council for the Arts@MIT.

Rafael del Pino

Chairman, Grupo Ferrovial SA
Term: Five years
Education: MS in civil engineering from University of Madrid (1981); SM in management from MIT (1986)
Current MIT activities: Sloan School Visiting Committee, MIT Energy Initiative External Advisory Board; Sloan European Executive Board

Mohammed A. Jameel

President, Abdul Latif Jameel Co. Ltd.
Term: Five years
Education: SB in civil and environmental engineering from MIT (1978)

Cleve L. Killingsworth

Chairman, President, and CEO, Blue Cross Blue Shield of Massachusetts
Term: Five years (alumni association nominee)
Education: SB in management from MIT (1974); MPH from Yale University (1976)
Current MIT activities: Political Science Visiting Committee

Robert B. Millard

Partner, Realm Partnership
Term: Five years (second 5-year term)
Education: SB in architecture from MIT (1973); MBA from Harvard University (1976)
Current MIT activities: Corporation member; Executive Committee; vice chair, Investment Management Company Board; several Corporation Visiting Committees

Alejandro Padilla

State Senator, California Legislature
Term: Five years (alumni association nominee)
Education: SB in mechanical engineering from MIT (1994)
Current MIT activities: Urban Studies and Planning Visiting Committee; Society of Hispanic Professional Engineers, MIT Student Chapter

Antonia D. Schuman

Manager of Advanced Systems, Retired, TRW Data Technologies Division
Term: Five years (alumni association nominee; second 5-year term)
Education: SB in mechanical engineering from MIT (1958)
Current MIT activities: president of the Association of Alumni and Alumnae of MIT (2008-2009); Corporation member

Peter L. Slavin

President, Massachusetts General Hospital (MGH)
Term: Five years (first full five-year term)
Education: SB from Harvard College (1979); MD from Harvard Medical School (1984); MBA from Harvard Business School (1990)
Current MIT activities: Corporation member; Engineering Systems Visiting Committee; Medical Management Board

Kenneth Wang

Kenneth Wang

President, U.S. Summit Company
Term: Ex officio for one year, as president of the Association of Alumni and Alumnae of MIT
Education: Friends Seminary School (1967); SB in economics from MIT (1971); MBA from Harvard Business School (1976).
Current MIT activities: Economics Visiting Committee; Architecture Visiting Committee; Dean for Student Life Visiting Committee; Humanities Visiting Committee

Alumni reunion gifts exceed $152 million

Nancy DuVergne Smith
MIT Alumni Association

More than 3,100 alumni and guests gathered last weekend to celebrate their MIT connections and give back to the Institute. Alumni reunion gifts to MIT, reported at the annual Tech Day luncheon at the Johnson Athletic Center on Saturday, June 6, totaled more than $152 million.

A standing ovation greeted the announcement of the Class of 1959's reunion giving total during the luncheon. Bolstered by gifts from 68 percent of its members, the 50th reunion class has now given more than $100 million — a new class record.

The senior class gift broke new ground with a record 65 percent of the class contributing nearly $12,000. Other new records included the 25th reunion class gift of $12.4 million coming from two-thirds of the Class of 1984 and the 10th reunion class set a dollar record with $167,479. The 25th, 40th, 50th and 60th and higher reunion classes count gifts over five years; other classes count gifts in the past year. Final totals include gifts through June 30.

This year's Alumni Association President Toni Schuman '58 thanked alumni for their volunteer efforts and their generosity, then passed the gavel to incoming president Kenneth Wang '71, a New Yorker who is president of U.S. Summit.

Wang said that in a time of economic turmoil, alumni can count on their connection to MIT and its unshakable commitment to educating the best students and solving the world's pressing problems. "We need to help each other, help MIT, and help the world," he said.

Honorary membership in the association was awarded to three MIT staff members: Joanne Cummings, Sgt. Cheryl Vossmer and Clarence Williams. Cummings recently retired as senior associate director of admissions after 40 years in the department. Schuman noted that Cummings' contributions helped ensure the quality of each new class and contributed to MIT's extraordinary 98 percent freshman retention rate — the highest in the country.

Vossmer, a community police officer for the last 23 years, has worked closely with students and served as instructor of Rape Aggression Defense training. "Cheryl is not only the face of campus police for many, she is also the smile of campus police," Shuman noted.

Williams, adjunct professor emeritus of urban studies, has held high-level positions supporting diversity and academic life since 1972 and has taught a course on race and diversity since 1992. He is the author of "Technology and the Dream: Reflections on the Black Experience at MIT, 1941-1999," based on oral histories of 75 MIT alumni, faculty and administrators including former U.N. Secretary General Kofi Annan.

The oldest attendees were also honored at the Technology Day Luncheon, and included Paul Stanton '39 of Framingham, Mass.; James Baird '40 of Concord, Mass.; Fred Schaller '39, SM '40 of Wellesley, Mass.; and Richard Leghorn '39 of Osterville, Mass.

This year's Technology Day program, the Mind's Eye, included introductory remarks by President Susan Hockfield and presentations by MIT professors Rebecca Saxe PhD '03; Pawan Sinha '92, PhD '95; and Patrick Henry Winston '65, SM '67, PhD '70. View the archived program online at http://amps-web.mit.edu/public/techday/2009/.

PHOTO / DONNA COVENEY

PHOTO / DONNA COVENEY

PHOTO / YING SHI

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PHOTO / DONNA COVENEY

PHOTO / DONNA COVENEY

COMMENCEMENT: Thousands attend June 5 ceremonies

Continued from **Page 1**

said in a videotaped interview featured on TechTV and shown before the ceremonies. Whitney-Johnson, who received a bachelor's degree in civil and environmental engineering, will study at Oxford next year on a Rhodes Scholarship.

"Everything we learn we have an obligation to pass on and to use to make a difference in the lives of others," she said.

"With passion and hard work combined, you can really do anything," said Karina Pikhart, who received a bachelor's degree in mechanical engineering, during the videotaped interview.

The Commencement exercises, which had faced threats of rain early in the day, took place under warm and dry conditions. Just before the 1,065 undergraduate and 1,435 graduate degrees were awarded, the sun broke through the clouds for the first time — an "omen" for the graduating class, suggested Dana Mead, chairman of the MIT Corporation.

'The world needs you now'

In her charge to the graduates, MIT President Susan Hockfield echoed Patrick's call for them to put their knowledge to work to bring about great changes. "The world needs you now as it has rarely needed any set of graduates from MIT," she said, adding she was confident they would "use the talents we brought to MIT, strengthened in MIT's furnace of high expectations, to better the human condition around the world."

Hockfield said the financial turmoil of the past year "might lead you to wish that you could be graduating in simpler, sunnier times." But, she said, "This world may not be dispensing easy rewards, but in its urgent call for your intelligence, inventiveness, passion and drive, it offers you an extraordinary gift.

"To successfully battle the great problems of the day — from climate change to computer security, from healthcare to hunger, and from energy to the economy — will take extraordinary feats of science and discovery, engineering and invention. It will take precisely the kind of innovations and innovators that the world has come to expect from MIT."

President Barack Obama has called the nation to action, she said, and that means it is now MIT's — and its graduates' — moment to shine in service.

"The future may feel like an uncharted new country, but you already speak its language," she said.

Hockfield — who noted that her first full academic year at MIT coincided with the freshman year of the Class of 2009 — told graduates that their moment had come.

"Of course, we are really going to miss you here," she said. "But the world needs you right now."

Additional reporting by Anne Trafton

Blocking termites' defense mechanisms

Targeting immune system may offer sustainable pest control method

Anne Trafton
News Office

In what may offer an alternative to chemical pesticides, MIT researchers and collaborators from Northeastern University have discovered a novel way to make pest insects more susceptible to bacterial and fungal infections by blocking part of the immune defenses.

The new technique could offer a more sustainable way to protect crops and buildings from damage by termites and other pest insects, estimated at more than $30 billion per year.

The researchers, including senior author MIT Professor Ram Sasisekharan, reported their findings in the Proceedings of the National Academy of Sciences the week of June 8.

"Dr. Sasisekharan's basic studies on innate immunity in insects have enabled him to devise a strategy to defeat them," said Pamela Marino of the National Institutes of Health's National Institute of General Medical Sciences, which partially supported the work. "The findings may lead to the development of new pesticides that pose a far lesser threat to human health than the chemical pesticides commonly used now."

Sasisekharan and his colleagues focused on specific proteins that insects embed in their nests. They found that the proteins, known as gram-negative bacteria binding proteins (GNBPs), act as a first line of defense against pathogenic bacteria and fungus.

When the proteins encounter bacteria or fungi they chop them up and expose the parts to the insects, priming their immune response.

Once the researchers discovered this function, they decided to try inhibiting the proteins, with an eye toward new methods of pest control. They found that a sugar called GDL (glucono delta-lactone), a naturally occurring derivative of glucose, disables the proteins and makes the insects more vulnerable to infection.

The researchers gauged the effectiveness of GDL in laboratory tests using termites. A few days after being exposed to GDL, all of the insects died from opportunistic pathogenic infections. A control group of termites not exposed to GDL lived twice as long.

Since this defense mechanism is only employed by certain insect species such as termites, locusts and cockroaches, GDL is harmless to beneficial insects such as ants, as well as other animals and plants. The same cannot be said for chemical pesticides now commonly used.

"When you look at the chemical pesticides now used, they're harmful not only for insects but also for humans too," said Sasisekharan, who is the Edward Hood Taplin Professor and director of the Harvard-MIT Division of Health Sciences and Technology (HST).

GDL, commonly used as a food preservative, is biodegradable and inexpensive, making it an attractive alternative to chemical pesticides.

The compound could be incorporated into building materials or paint to protect buildings from termites, said Sasisekharan, or could be made into a spray for use in fields where pests need to be controlled. It could also be used in food processing and storage facilities.

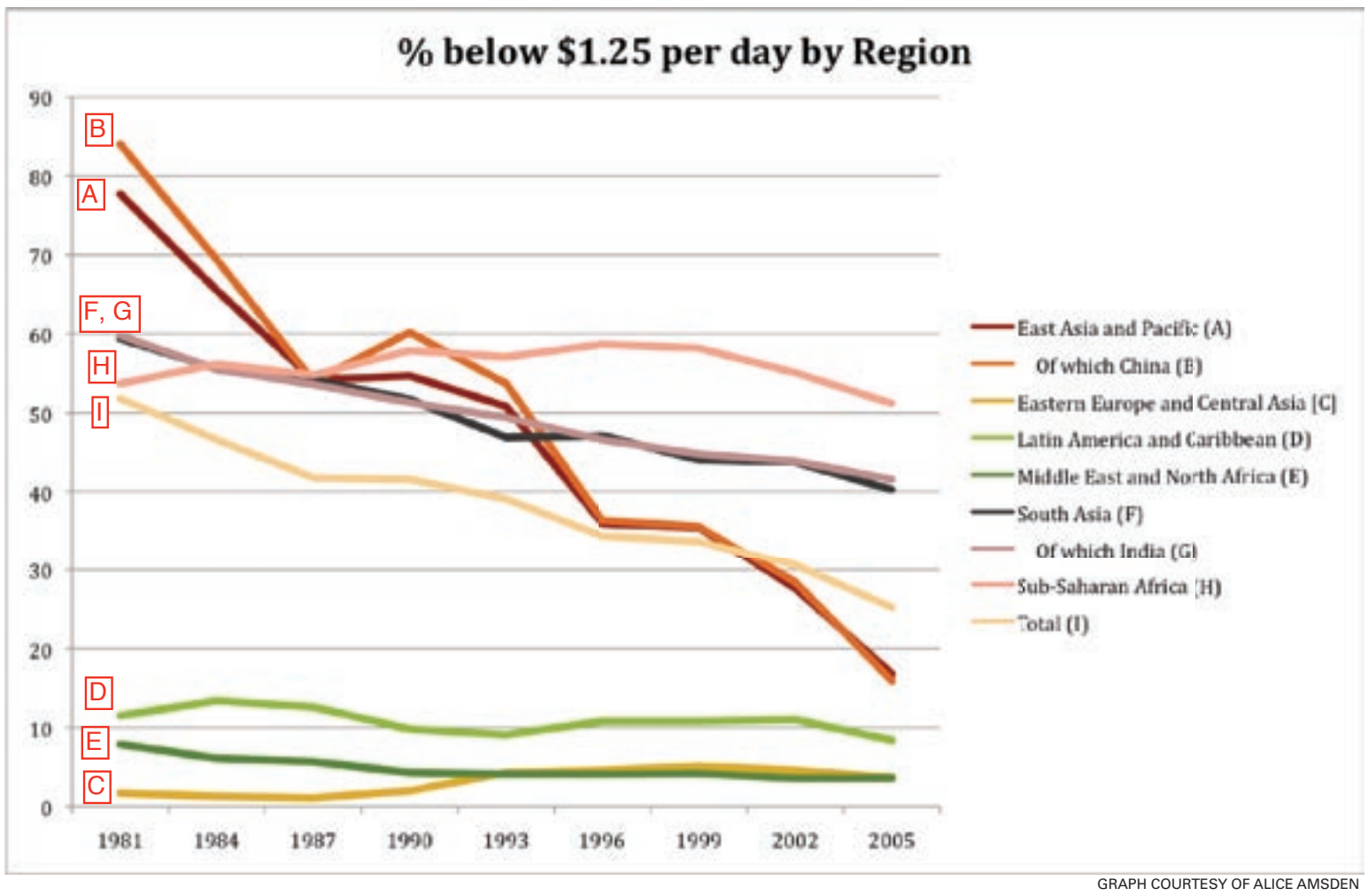
This research also lays the groundwork for possible development of similar agents to target pest insects, said Sasisekharan.

Lead authors of the paper are Ido Bachelet, postdoctoral fellow in HST, and Mark Bulmer, a former Northeastern postdoctoral fellow now at Towson University. Other authors are Rahul Raman, research scientist in HST, and Rebeca Rosengaus of Northeastern University.

The research was funded by the National Science Foundation and the National Institutes of Health.

3 Questions with Alice Amsden

Alice Amsden, the Barton L. Weller (1940) Professor of Political Economy in the Department of Urban Studies and Planning, has spent decades focusing on issues of development and poverty eradication. Recently, Amsden was appointed by the United Nations secretary-general to a three-year seat on the U.N. Committee on Development Policy, a subsidiary of the U.N. Economic and Social Council. The 24-member committee provides inputs and independent advice to the council on emerging cross-sectoral development issues and on international cooperation for development. The MIT News Office recently talked with Amsden about international development.



GRAPH COURTESY OF ALICE AMSDEN

World Bank data from August 2008 indicate that poverty levels, as determined by the number of people who earn a bundle of goods worth less than $1.25 a day, have fallen dramatically in areas such as China and India but stayed constant in sub-Saharan Africa. Source: The World Bank Development Research Group.

Q. Has there been measurable progress in the last decade on global anti-poverty initiatives and, if so, why?

A. Although the World Bank hasn't shouted about it, its data on poverty alleviation are very surprising. They show that from 1981 to 2005 there has been absolutely NO progress made in reducing poverty in Africa. The average African has no more sustenance now than 25 years ago. The same flat progress is evident in Latin America and the Middle East, but their absolute poverty level is lower than Africa's (see the accompanying graph). There's been a lot of noise about Africa, but little accomplished.

Q. Why has development lagged in Africa? Why has poverty fallen faster in China?

A. Poverty is pernicious because of increasing population and diminishing returns. There's also ideology, or believing in something that doesn't conform to the facts. The popular "bottom up" approach to fighting poverty doesn't seem to have performed very well. For 25 years Africa has had a bottom-up approach and nothing has changed. Have we crowded out central governments, when in many cases they are promoting interesting new solutions? Hostility at the grass roots toward government, even popularly elected ones, has stymied technological change. National projects that can make a huge dent in poverty, such as irrigation, electrification and industrialization, have been side-railed.

We see this if we look at the countries where poverty has fallen fastest. They're the East Asian countries that have successfully industrialized. In 1981, East Asia had some of the world's poorest countries. Then investments in job creation soared, which led to spending that stimulated the economy. We know that a lot of energy initiatives should come from the grassroots. But we also know that electrification for a large number of people is very effective. Witness China. China reduced poverty more quickly than India. China is a role model for rural electrification. China's high savings are channeled by government into productive investment and more jobs.

If foreign aid doesn't generate jobs, it isn't sustainable. What good is more schooling if unemployment is all a graduate can expect? What good is vaccinating a child against an infectious disease if her landless parents have no steady income? If one foundation donates to health care, another foundation should give management assistance on what to produce. Taiwan is a good role model because it has always had hundreds of small factories operating in rural regions and towns. Countries that excelled in developing after World War II all started with prewar manufacturing experience. Investments in small factories might help the poorest countries break into this circle.

Q. What is a "Non-Volunteer Organization" and why do you think these could play a role in poverty alleviation?

A. The bottom-up approach is not very economically stimulating because it often involves volunteers who don't get paid, or get paid "in kind" (they administer pills and get some extra to sell on the side, for example). Someone who volunteers has good intentions, but volunteerism crowds out the emergence of paid professionals like nurses, who have steady incomes and are a social group that is able to save and invest. Alongside NGOs we need some "NVOs" (non-volunteer organizations). That has to be part of the anti-poverty movement as much as the volunteer stuff.

MIT Medical: Summer changes for Urgent Care and Inpatient Unit

From June 19 to Aug. 17, MIT Medical's Urgent Care Service in Building E23 will be closed during the late-night hours of 10 p.m. to 7:30 a.m., though care will continue around the clock. Urgent Care will resume 24-hour-a-day operation in Building E23 on Aug. 18.

If you need medical or mental health help during the overnight hours when Urgent Care is closed, call 617-253-1311 (the regular Urgent Care number). Your call will be directed to a triage nursing service, which will provide medical advice and, if needed, page the on-call clinician. The mental health clinician on call can see a student on campus if necessary. Patients with medical problems needing more advanced care may be directed to Mount Auburn Hospital or Children's Hospital.

In a late-night medical or mental health emergency on campus, dial 100 from campus phones or 617-253-1212 from cell phones. Dial 911 if you are off campus. MIT Medical's Inpatient Unit also will be closed from June 19 to Aug. 17. Patients who receive daytime treatments such as medication infusions in the Inpatient Unit will continue to do so. Clinicians and nurse care managers will help other patients make alternative care arrangements as needed.

The closings are part of a larger effort to reduce MIT's expenses by $100 million to $150 million over the next two to three years.

PHOTO / **DAYAN PAEZ**

Smoot in stone

On Thursday, June 4, a plaque was unveiled on the MIT side of the Massachusetts Avenue bridge to commemorate the night in October 1958 when Oliver Smoot '62 was used to measure and mark the span from Boston to Cambridge. Specifically noting the bridge's length of 364.4 Smoots (+/- 1 ear), the plaque, a gift of the MIT Class of 1962, honors the prank's 50th anniversary.

CLASSIFIED ADS

Members of the MIT community may submit one ad each issue. 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.

HOUSING/RENTALS

Winchester — 2 bedroom, 2 baths, 2nd floor apartment, hardwood floors, off street parking, w/d hook up, storage area available. Call Marie at 508-362-4015. Available now.

Vacation home at Point Sebago Resort, Maine. Two bedroom, two bath fully furnished home with AC. Within walking distance of golf course and 1 mile from lakefront beach. Guests have full access to all resort amenities. Please see www.pointsebago.com for more information. $1,200 per week June-August. Fall weekends also available. Contact: airforce@mit.edu

Ocean front summer cabin, Mount Desert Island, ME: 2BD/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.

Cambridge - Large, sunny basement studio TOTALLY furnished with good stuff, incl, flat screen, fully equipped kitchen, queen bed, bicycle, laundry, enclosed yard with picnic table and grille. Terrific neighbors. Walk to MIT. Available July 1. $1150

FOUR BEDROOMS furnished, large, elegant, sunny rooms, with hardwood floors, well equipped kitchen, two full baths including one with whirlpool tub, front loading washer & dryer. Steps to public transportation for easy commute to MIT from Belmont. Off-street parking. Excellent schools. $3,250/month. Lease. No pets. Available September 1st. Contact 617-710-2724 or stewart@wi.mit.edu

Private, tranquil lakefront cabin, Mount Desert Island, ME: 4BD/2.5 BA w/living/dining/kitchen area, picture window, decks overlooking lake; kayaks and canoe. Near Acadia National Park. See "Overview" at daagy.com. Elizabeth at 617-492-3708 or emfox@mit.edu.

MISCELLANEOUS

Looking for a carpooling partner. Work 9-5. Zip 02460 in Newtonville, Walnut Street. Could be occasional driver. Email: laurazh@mit.edu

Research Study of Hearing. Completely noninvasive. Healthy men aged 35-47 needed. Participation involves approximately 9 hours of hearing tests. Compensation provided. Contact Barbara at: 617 573-5585 or hearing@epl.meei.harvard.edu

FOR SALE

Chromcraft square/round 5 pc kitchen set, medium oak finish with laminated wood top 40"x40" plus 18" leaf. Swivel/tilt wood chairs w/fabric, perfect condition. Pictures available upon request 617-253-4617 Paid $1,000 Selling $325.

Final Tech Talk for the academic year

This will be the final issue of Tech Talk for the academic year. For information and news updates throughout the summer, visit web.mit.edu/newsoffice.

Ultracool stars take 'wild rides' around, outside the Milky Way

Astronomers announced this week that stars of a recently discovered type, dubbed ultracool subdwarfs, take some pretty wild rides as they orbit around the Milky Way, following paths that are very different from those of typical stars. One of them may actually be a visitor that originated in another galaxy.

Adam Burgasser and John Bochanski of the Massachusetts Institute of Technology presented the findings on Tuesday, June 9, in a press conference at the American Astronomical Society's semi-annual meeting in Pasadena, Calif. The result clarifies the origins of these peculiar, faint stars, and may provide new details on the types of stars the Milky Way has acquired from other galaxies.

Ultracool subdwarfs were first recognized as a unique class of stars in 2003, and are distinguished by their low temperatures ("ultracool") and low concentrations of elements other than hydrogen and helium ("subdwarf"). They sit at the bottom end of the size range for stars, and some are so small that they are closer to the planet-like objects called brown dwarfs. Only a few dozen ultracool subdwarfs are known today, as they are both very faint — up to 10,000 times fainter than the Sun — and extremely rare.

Burgasser, associate professor of physics at MIT and lead author of the study, was intrigued by the fast motions of ultracool subdwarfs, which zip past the Sun at astonishing speeds. "Most nearby stars travel more or less in tandem with the Sun tracing circular orbits around the center of the Milky Way once every 250 million years," he explains. The ultracool subdwarfs, on the other hand, appear to pass us by at very high speeds, up to 500 km/s, or over a million miles per hour.

"If there are interstellar cops out there, these stars would surely lose their driver's licenses," says Burgasser.

Burgasser's team of astronomers assembled measurements of the positions, distances and motions of roughly two dozen of these rare stars. Robyn Sanderson, co-author and MIT graduate student, then used these measurements to calculate the orbits of the subdwarfs using a numerical code developed to study galaxy collisions. Despite doing similar calculations for other types of low-mass stars, "these orbits were like nothing I'd ever seen before," says Sanderson.

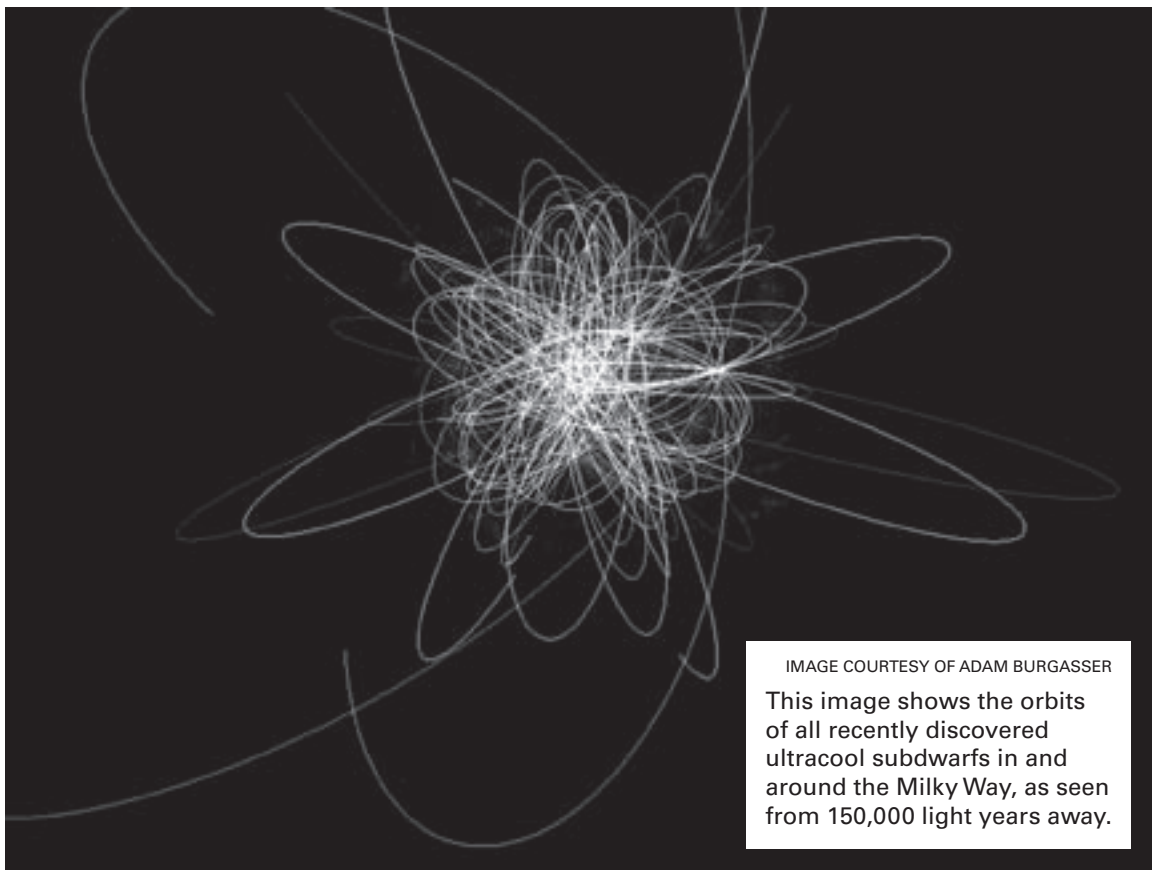


IMAGE COURTESY OF ADAM BURGASSER

This image shows the orbits of all recently discovered ultracool subdwarfs in and around the Milky Way, as seen from 150,000 light years away.

Sanderson's calculations showed an unexpected diversity in the ultracool subdwarf orbits. Some plunge deep into the center of the Milky Way on eccentric, comet-like tracks; others make slow, swooping loops far beyond the Sun's orbit. Unlike the majority of nearby stars, most of the ultracool subdwarfs spend a great deal of time thousands of light-years above or below the disk of the Milky Way.

"Someone living on a planet around one of these subdwarfs would have an incredible nighttime view of a beautiful spiral galaxy — our Milky Way — spread across the sky," Burgasser speculates.

Sanderson's orbit calculations confirm that all of the ultracool subdwarfs are part of the Milky Way's halo, a widely dispersed population of stars that likely formed in the Milky Way's distant past. However, one of the subdwarfs, a star named 2MASS 1227-0447 in the constellation Virgo, has an orbit indicating that it might have a very different lineage, possibly extragalactic.

"Our calculations show that this subdwarf travels up to 200,000 light years away from the center of the Galaxy, almost 10 times farther than the Sun," says Bochanski, a postdoctoral researcher in Burgasser's group at MIT. This is farther than many of the Milky Way's nearest galactic neighbors, suggesting that this particular subdwarf may have originated somewhere else.

"Based on the size of its one billion-year orbit and direction of motion, we speculate that 2MASS 1227-0447 might have come from another, smaller galaxy that at some point got too close to the Milky Way and was ripped apart by gravitational forces," explains Bochanksi.

Astronomers have previously identified streams of stars in the Milky Way originating from neighboring galaxies, but all have been distant, massive, red giant stars. The ultracool subdwarf identified by Burgasser and his team is the first nearby, low-mass star to be found on such a trajectory. "If we can identify what stream this star is associated with, or which dwarf galaxy it came from, we could learn more about the types of stars that have built up the Milky Way's halo over the past 10 billion years," says Burgasser.

The results presented at the meeting are based in part on two studies recently published in the Astrophysical Journal by Burgasser and co-author Michael Cushing, a postdoctoral researcher at the University of Hawaii's Institute for Astronomy.

Other authors of this paper are Andrew West of MIT; Dagny Looper of the University of Hawaii, Manoa; and Jacqueline Faherty of the American Museum of Natural History, New York, N.Y.

IS&T launches service for interactive text messaging

MIT's Information Services & Technology (IS&T) recently launched an interactive text messaging service that provides a new way for community members to access information on the go.

Anyone with a text-messaging-capable phone can use the service, known as MIT Short Message Service, or MIT SMS, to connect to the following sources within seconds:

- People Directory (based on MIT's online directory)
- Shuttle Bus locations (via GPS)
- Stellar (for retrieving class announcements)

To get instructions on using the service, simply text INFO to 648338 (which spells MITEDU on a phone dial pad) or visit http://mobi.mit.edu/about/sms.html.

While MIT provides this service for free, users may be subject to text-messaging fees from their carriers, depending on their plan.

In the future, community members will be able to gain access to even more information via SMS such as MIT news and the Events Calendar. MIT SMS may also expand to provide opt-in notification services for classes, commencement, emergencies and other events. Researchers working on mobile applications may be able to use MIT SMS to facilitate their projects.

For questions and feedback, send e-mail to mobiweb@mit.edu.

TRAFFIC: MIT mathematicians take aim at 'phantom' traffic jams

Continued from **Page 1**

jams, which the researchers call "jamitons," are strikingly similar to the equations that describe detonation waves produced by explosions, says Aslan Kasimov, lecturer in MIT's Department of Mathematics. That discovery enabled the team to solve traffic jam equations that were first theorized in the 1950s.

The equations, similar to those used to describe fluid mechanics, model traffic jams as a self-sustaining wave. Variables such as traffic speed and traffic density are used to calculate the conditions under which a jamiton will form and how fast it will spread.

Once such a jam is formed, it's almost impossible to break up — drivers just have to wait it out, says Morris Flynn, lead author of the paper. However, the model could help engineers design roads with enough capacity to keep traffic density low enough to minimize the occurrence of such jams, says Flynn, a former MIT math instructor now at the University of Alberta.

The model can also help determine safe speed limits and identify stretches of road where high densities of traffic — hot spots for accidents — are likely to form.

Flynn and Kasimov worked with MIT math instructors Jean-Christophe Nave and Benjamin Seibold and professor of applied mathematics Rodolfo Rosales on this study.

The team tackled the problem last year after a group of Japanese researchers experimentally demonstrated the formation of jamitons on a circular roadway. Drivers were told to travel 30 kilometers

per hour and maintain a constant distance from other cars. Very quickly, disturbances appeared and a phantom jam formed. The denser the traffic, the faster the jams formed.

"We wanted to describe this using a mathematical model similar to that of fluid flow," said Kasimov, whose main research focus is detonation waves. He and his co-authors found that, like detonation waves, jamitons have a "sonic point," which separates the traffic flow into upstream and downstream components. Much like the event horizon of a black hole, the sonic point precludes communication between these distinct components so that, for example, information about free-flowing conditions just beyond the front of the jam can't reach drivers behind the sonic point. As a result, drivers stuck in dense traffic may have no idea that the jam has no external cause, such as an accident or other bottleneck. Correspondingly, they don't appreciate that traffic conditions are soon to improve and drive accordingly.

"You're stuck in traffic until all of the sudden it just clears," says Morris.

In future studies, the team plans to look more detailed aspects of jamiton formation, including how the number of lanes affects the phantom traffic jams.

The research was funded by the U.S. Air Force Office of Scientific Research, the National Science Foundation and the (Canadian) Natural Science and Engineering Research Council.

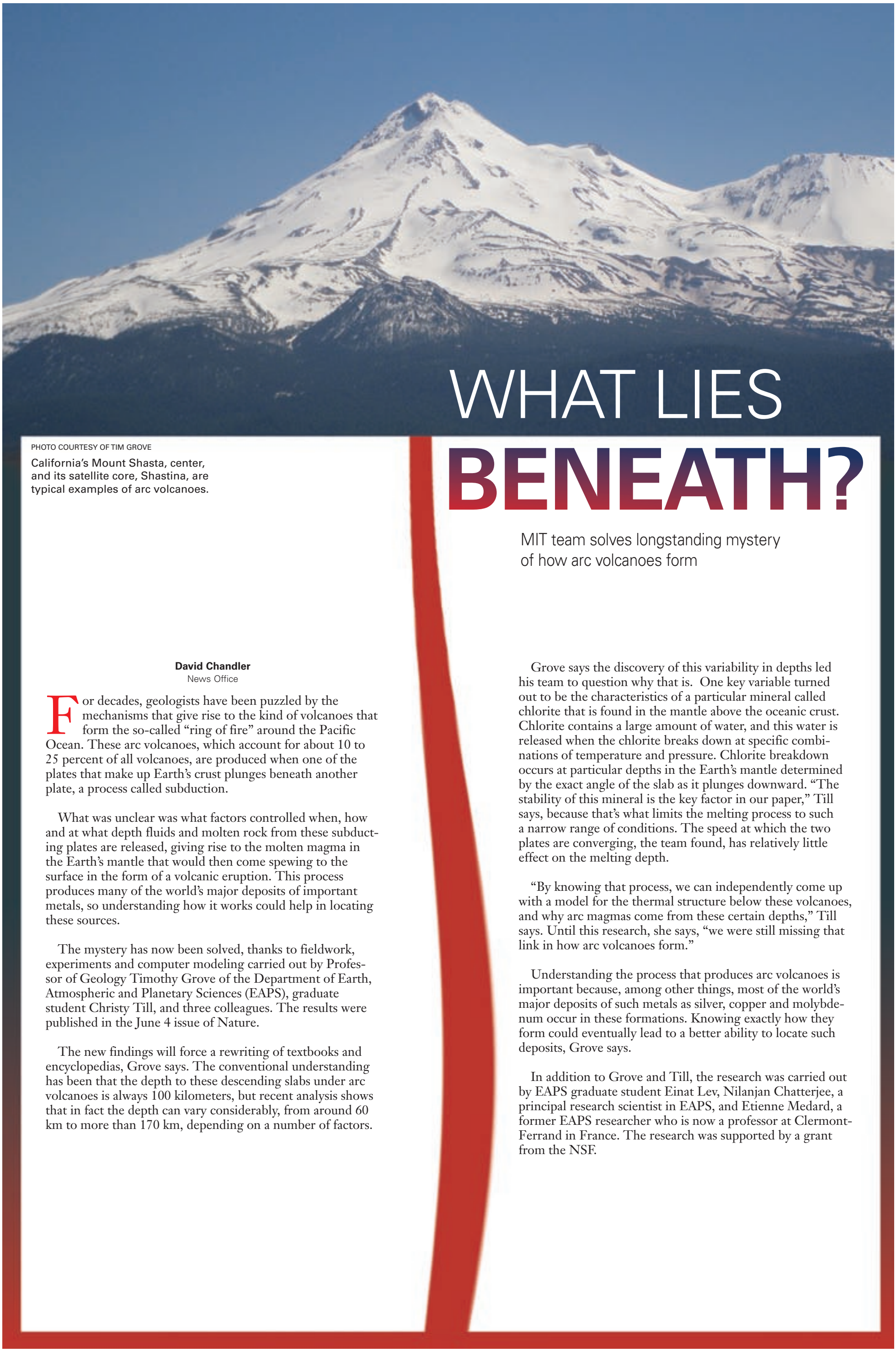


PHOTO COURTESY OF TIM GROVE

California's Mount Shasta, center, and its satellite core, Shastina, are typical examples of arc volcanoes.

WHAT LIES BENEATH?

MIT team solves longstanding mystery of how arc volcanoes form

David Chandler
News Office

For decades, geologists have been puzzled by the mechanisms that give rise to the kind of volcanoes that form the so-called "ring of fire" around the Pacific Ocean. These arc volcanoes, which account for about 10 to 25 percent of all volcanoes, are produced when one of the plates that make up Earth's crust plunges beneath another plate, a process called subduction.

What was unclear was what factors controlled when, how and at what depth fluids and molten rock from these subducting plates are released, giving rise to the molten magma in the Earth's mantle that would then come spewing to the surface in the form of a volcanic eruption. This process produces many of the world's major deposits of important metals, so understanding how it works could help in locating these sources.

The mystery has now been solved, thanks to fieldwork, experiments and computer modeling carried out by Professor of Geology Timothy Grove of the Department of Earth, Atmospheric and Planetary Sciences (EAPS), graduate student Christy Till, and three colleagues. The results were published in the June 4 issue of Nature.

The new findings will force a rewriting of textbooks and encyclopedias, Grove says. The conventional understanding has been that the depth to these descending slabs under arc volcanoes is always 100 kilometers, but recent analysis shows that in fact the depth can vary considerably, from around 60 km to more than 170 km, depending on a number of factors.

Grove says the discovery of this variability in depths led his team to question why that is. One key variable turned out to be the characteristics of a particular mineral called chlorite that is found in the mantle above the oceanic crust. Chlorite contains a large amount of water, and this water is released when the chlorite breaks down at specific combinations of temperature and pressure. Chlorite breakdown occurs at particular depths in the Earth's mantle determined by the exact angle of the slab as it plunges downward. "The stability of this mineral is the key factor in our paper," Till says, because that's what limits the melting process to such a narrow range of conditions. The speed at which the two plates are converging, the team found, has relatively little effect on the melting depth.

"By knowing that process, we can independently come up with a model for the thermal structure below these volcanoes, and why arc magmas come from these certain depths," Till says. Until this research, she says, "we were still missing that link in how arc volcanoes form."

Understanding the process that produces arc volcanoes is important because, among other things, most of the world's major deposits of such metals as silver, copper and molybdenum occur in these formations. Knowing exactly how they form could eventually lead to a better ability to locate such deposits, Grove says.

In addition to Grove and Till, the research was carried out by EAPS graduate student Einat Lev, Nilanjan Chatterjee, a principal research scientist in EAPS, and Etienne Medard, a former EAPS researcher who is now a professor at Clermont-Ferrand in France. The research was supported by a grant from the NSF.