Energy-Saving Cars • Collective Trauma • Realist Foreign Policy

HARVARD MAGAZINE

MARCH-APRIL 2008 • $4.95

PHYSICS OF THE FAMILIAR

Why Flags Flutter,
How Leaves Fold,
Why Things Wrinkle—
Mahadevan Knows

Three years old and still better than most things new.

After rigorous inspections only the most pristine vehicles are chosen. That's why we offer a warranty for up to 6 years or 100,000 miles.* In fact, a Certified Pre-Owned BMW looks so good and performs so well it's hard to believe it's pre-owned. But it is, we swear. **bmwusa.com/cpo**

Certified by BMW Trained Technicians / BMW Warranty / BMW Leasing and Financing / BMW Roadside Assistance†

Certified Pre-Owned BMW

bmwusa.com/cpo
1-800-334-4BMW

The Ultimate Driving Machine®

Certified Pre-Owned by BMW

Pre-Owned. We Swear.

*Protection Plan provides coverage for two years or 50,000 miles (whichever comes first) from the date of the expiration of the 4-year/50,000-mile BMW New Vehicle Limited Warranty. †Roadside Assistance provides coverage for two years (unlimited miles) from the date of the expiration of the 4-year/unlimited-miles New Vehicle Roadside Assistance Plan. See participating BMW center for details and vehicle availability. For more information, call 1-800-334-4BMW or visit bmwusa.com.

MARCH-APRIL 2008 VOLUME 110, NUMBER 4

HARVARD MAGAZINE

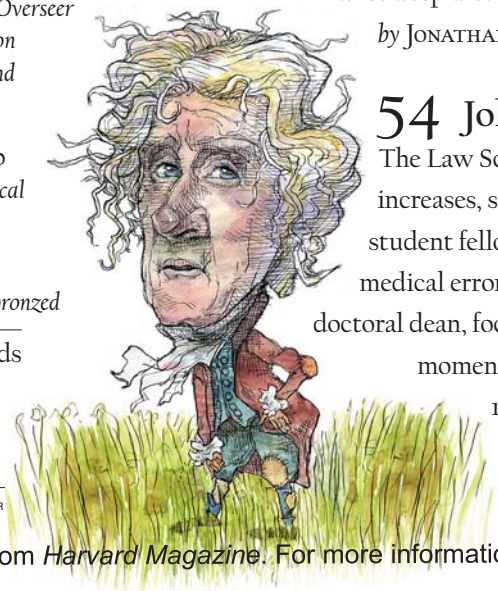
JIM HARRISON

page 54

FEATURES

DEPARTMENTS

On the cover: Illustration by Serge Bloch



TOM MOSSER

page 28

Fairway, village, equestrian, marsh and river homesites available from $300,000 to $4.95 million. Homes from $1.19 million to $3.85 million.

Obtain the Property Report required by federal law and read it before signing anything. No federal agency has judged the merits or value, if any, of this property. This does not constitute an offer to sell or a solicitation of any offer to buy where prohibited by law.

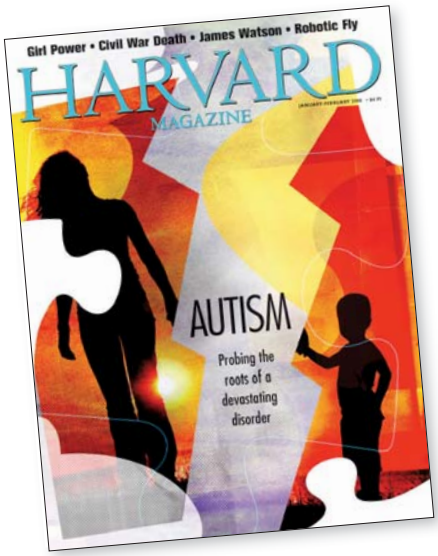
Celebrate.

It is joyful laughter and carefree abandon. It is letting yourself go in the moment, celebrating the astonishing nature of life in a place as beautiful and spectacular as the moment itself. Palmetto Bluff is such a place, and at its center stands The Inn and Spa at Palmetto Bluff. Operated by the renowned Auberge Resorts, The Inn is the perfect retreat to relax, recreate and revel in your discovery of this extraordinary community. Enjoy miles of inland water trails, Jack Nicklaus Signature Golf, the inimitable Auberge spa experience and so much more as you explore the remarkable opportunity that is Palmetto Bluff. To book your stay at The Inn at Palmetto Bluff or to learn more about the settlement that surrounds it, visit us online or call.

PALMETTO BLUFF
South Carolina
www.palmetto-bluff.com
866•308•0093

Cambridge 02138

Alpha girls, repressed memories, Undergraduate insights



SPECTRUM OF AUTISM OPINIONS

As the parent of a child with autism and a writer on the subject for About.Com, I enjoyed reading "A Spectrum of Disorders" (by Ashley Pettus, January-February, page 27). I would like to comment on one point. The author, in describing intensive behavioral therapy for very young children, says "Although ABA [applied behavioral analysis] strikes some parents as an unnatural and excessively regimented treatment, many researchers now agree that, for the most severely affected children, it is necessary to apply the most intensive strategy at the youngest possible age....The exposure of a young child who may not be autistic to intensive behavioral, speech, and language therapies will certainly not harm the child's development."

ABA is generally recommended for 40 hours a week. In addition, as the article notes, most parents don't stop with ABA. They add in a range of additional therapies, some quite intensive and carrying significant risks for the child (chelation therapy, megavitamin supplements, hyperbaric oxygen therapy, and so forth). That means that a two-year-old could be experiencing 50 to 60 hours per week of intensive therapy—leaving no time for typical interaction with peers or with the world around him. It's hard to believe that such intervention "will not harm the child's development," particularly if the autism diagnosis turns out to be incorrect.

There are other options for treatment, not discussed in this article, such as "Floortime" and Relationship Development Intervention (RDI), which are far more developmentally appropriate than ABA. For a child with a "borderline" diagnosis, these offer both the intensity of ABA and far broader, more naturalistic opportunities for engagement with parents, siblings, peers, and the world. They are not as intensively studied, but research so far shows very positive outcomes.

In addition, while researchers *do* recommend intensive early intervention, I have yet to find any research that compares that type of intervention with later treatment. It is, of course, easier for parents and teachers to work intensively with younger, smaller children—but I can find no evidence that it's actually more effective. The push to early-as-possible intervention leads to panic—with parents rushing to provide every possible treatment prior to an imaginary "deadline" when the "window of opportunity" will slam shut. This phenomenon creates all the problems the author notes (financial and marital stress, to name a few)—and encourages parents to seek out and implement every possible treatment, no matter how unresearched or potentially dangerous, before it's "too late."

With so much emphasis on early diagnosis and intensive treatment, combined

HARVARD
MAGAZINE

Editor: John S. Rosenberg
Senior Editor: Jean Martin
Managing Editor: Jonathan S. Shaw
Deputy Editor: Craig Lambert
Associate Editor: Elizabeth Gudrais
Production and New Media Manager: Mark Felton
Assistant Editor: Nell Porter Brown
Staff Writer: Paul Gleason
Associate Web Developer: Blaise Freeman

Art Director: Jennifer Carling

Berta Greenwald Ledecky Undergraduate Fellows
Samuel Bjork, Liz Goodwin
Editorial Intern:
Ashton R. Lattimore

Contributing Editors
John T. Bethell, John de Cuevas, Adam Goodheart, Jim Harrison, Harbour Fraser Hodder, Christopher S. Johnson, Adam Kirsch, Colleen Lannon, Christopher Reed, Deborah Smullyan, Mark Steele, Janet Tassel

Editorial and Business Office
7 Ware Street,
Cambridge, Mass. 02138-4037
Tel. 617-495-5746; fax: 617-495-0324
Website: www.harvardmagazine.com
Reader services:
617-495-5746 or 800-648-4499

Harvard Magazine Inc.
President: Henry Rosovsky, JF '57, Ph.D. '59, LL.D. '98. Directors: Richard H. Gilman, M.B.A. '83, Leslie E. Greis '80, Alex S. Jones, NF '82, Bill Kovach, NF '89, Tamara Elliott Rogers '74, Kay Kaufman Shelemay, A. Clayton Spencer, A.M. '82, Richard Tuck

Harvard Magazine (ISSN 0095-2427) is published bimonthly by Harvard Magazine Inc., a nonprofit corporation, 7 Ware Street, Cambridge, Mass. 02138-4037, phone 617-495-5746; fax 617-495-0324. The magazine is supported by reader contributions and subscriptions, advertising revenue, and a subvention from Harvard University. Its editorial content is the responsibility of the editors. Periodicals postage paid at Boston, Mass., and additional mailing offices. Postmaster: Send address changes to Circulation Department, Harvard Magazine, 7 Ware Street, Cambridge, Mass. 02138-4037. Subscription rate $30 a year in U.S. and possessions, $55 Canada and Mexico, $75 other foreign. (Allow up to 10 weeks for first delivery.) Subscription orders and customer service inquiries should be sent to the Circulation Department, *Harvard Magazine*, 7 Ware Street, Cambridge, Mass. 02138-4037, or call 617-495-5746 or 800-648-4499, or e-mail addresschanges@harvard.edu. Single copies $4.95, plus $2.50 for postage and handling. Manuscript submissions are welcome, but we cannot assume responsibility for safekeeping. Include stamped, self-addressed envelope for manuscript return. Persons wishing to reprint any portion of *Harvard Magazine*'s contents are required to write in advance for permission. Address inquiries to Catherine A. Chute, publisher, at the address given above.

with a panicked rush to the finish line, it's easy to forget some very basic truths.

A child with autism is still a child—and despite all mythology to the contrary, is almost certainly capable of love, joy, and engagement with other human beings.

There is no "window of opportunity." Your child can benefit from therapy throughout his or her lifespan.

It may never be possible to "fix" your child with autism—even if you start early and work hard. But the truth is that many, many people with autism can and do live creative, fulfilled lives.

Lisa Jo Rudy
Falmouth, Mass.

I was disappointed to read the article and to learn nothing new about autism spectrum disorders (ASDs). I found Pettus's article both shallow and misleading. Pettus dismisses the possible thimerosal (ethylmercury) connection to autism, despite the fact that the latest research demonstrates a definitive link between higher levels of mercury in the blood and autism.

Pettus also misuses the term "recover" when she applies it to training such as Applied Behavioral Analysis, which is a therapy. "Recovery" is properly used to describe the process by which autistic children are healed by therapies such as chelation (removal of heavy metals from the body) and diet modifications. I was shocked not to see any mention of the gluten-free, casein-free diet that has helped many parents to recover their autistic children. For an article that claims to discuss the "biological basis of autism" to ignore basic body chemistry is unforgivable.

Finally, Pettus succumbs to rhetoric popular with Big Pharma and shallowly researched mainstream press articles when she claims that "it is not possible to get an accurate count of real cases prior to the early 1990s." Certainly, any diagnosis of a mental disorder is at some level a judgment call, and there has likely been some mislabeling of autism. However, to imply that the increase in autism diagnoses is purely a shift in semantics is to be intentionally ignorant. ASDs did not exist at all prior to the 1930s; environmental factors (possibly combined with a genetic predisposition) are the most likely explanation for the skyrocketing diagnoses of these devastating disorders. To focus only

on possible genetic causes of ASDs is to ignore a whole universe of prevention and therapy. I expected more from Harvard.

Theresa V. (Makin) O'Brien '00
New York City

Editor's note: Other correspondents suggested as causes for autism exposure to plastics, ear infections that compromise language development, aggressive management of childbirth and resulting fetal distress, miscellaneous toxins, other ingredients in vaccines, and use of fetal ultrasound during pregnancy.

Ashley Pettus's thoughtful cover story does an excellent job of calling attention to "the urgent search to understand the biological basis of autism," and the importance of early intervention and treatment in providing the best possible outcome for the 1 in 166 children who suffer from autistic spectrum disorders.

We are learning more than ever about the inner workings of the brain, yet that which we do not know is still painfully evident. Pettus's comment that "solving the puzzle of autism will require close collaboration between those in the laboratory and those on the front lines of patient care" is right on the money, and is consistent with the National Institutes of Health's recent focus on translating scientific discoveries into practical applications.

Similarly to autism, mood disorders such as bipolar disorder and depression are biologically based brain disorders, and there is growing evidence that these neuropsychiatric disorders may be clinically and genetically linked. As is the case with autism, there has been a dramatic increase in recent years in the number of children being diagnosed with bipolar disorder and related conditions. There remains, however, much disagreement among clinicians over the appropriate criteria for diagnosing, as well as treating, mood disorders in children. What is clear is that early and accurate diagnosis and treatment, for both autism and mood disorders, are paramount if we hope to

Contents and Changes

On pages 30 and 36 in this issue, two faculty members contribute essays on matters of public interest, domestic and international, during this American presidential election year. The articles offer a double dose of the magazine's Forum: extended, analytical versions of the familiar newspaper op-ed, sharing both information and opinion with readers. Throughout the year, the magazine will present more such essays, based on our approach to faculty members with especially stimulating arguments to share, and their approach to us. We welcome suggested topics.

At various points in the pages that follow, you will also encounter a new icon (right), which made its first appearance alongside "Tinker, Tailor, Robot, Fly" in our January-February issue (page 8). It lets you know that the magazine's website, www.harvard-magazine.com, contains multimedia content complementary to the text: in the prior issue, a video recording the first flight of a robotic fly, and this time around, using a recipe to accompany a portrait of an accomplished baker, page 19; commentary by a stage designer, page 26; and a visit with an eclectic mathematician, page 46.

Also new on the website are "Alumni Writers" and "Harvard in the News": selected, annotated links to articles by Harvard graduates and to news stories involving the Crimson community, respectively. Both features are updated continuously, along with the staff's "Breaking News" dispatches: on-line stories filed as news occurs, between the bimonthly appearances of your printed *Harvard Magazine*. In most cases, such topical accounts are reported further for the published magazine—as is the case with the December 10 and 12 on-line accounts of the College financial-aid initiative and the appointment of the new Graduate School of Arts and Sciences dean, appearing here, on pages 54 and 63, with more detail and perspective.

Finally, although his work appears as usual throughout this issue, deputy editor Craig Lambert on January 1 began a year-long leave to work on a book and other projects. In his absence, Paul Gleason has signed on as a staff writer. —*The Editors*

HARVARD
MAGAZINE

Publisher: Catherine A. Chute
Finance and Administrative Manager: Irina Kuksin
Director of Circulation: Felecia Carter
Director of Marketing
Cara Ferragamo Murray
Director of Advertising
Robert D. Fitta
Advertising Account Manager
Myha Nguyen
Production/Design Associate
Jennifer Beaumont
Classified Advertising Manager
Gretchen Bostrom
Circulation and Fundraising Manager: Lucia Whalen
Office Manager: Sylvie Papazian
Gift Processor: Sarha J. Caraballo
Business Intern: Lia Poin

Ivy League Magazine Network
Tel. 617-496-7207
Associate Publisher, Sales
Lawrence J. Brittan, Tel. 631-754-4264
New York Advertising Sales
Beth Bernstein, Tel. 908-654-5050
Mary Anne MacLean, Tel. 631-367-1988
Travel Advertising Sales
Northeast Media Inc., Tel. 203-255-8800
Midwest Advertising Sales
Nugent Media Group, Tel. 773-755-9051
Detroit Advertising Sales
Heth Media
Tel. 248-318-9489
Southwest Advertising Sales
Daniel Kellner, Tel. 972-529-9687
West Coast Advertising Sales
Virtus Media Sales, Tel. 310-478-3833
West Coast Travel Advertising Sales
The Holleran Group, Tel. 707-935-9296

achieve the best possible outcomes and quality of life for these children.

Jocelyn Scribano, M.B.A. '86
Board of Directors
Child and Adolescent Bipolar Foundation
New Albany, Ohio

ALPHA GIRLS, AWOL BOYS

Thanks to Harbour Fraser Hodder's exposé "Girl Power" (January-February, page 34), it's wonderful to see Harvard's social scientists charging valiantly toward the trailing edge of social research. Dan Kindlon's high-risk survey of 928 sixth- to twelfth-graders says it all. The 228 males are relegated to control group status. Hello, Harvard! Girls' success hasn't been news for half a generation. What needs research is not the expanded self-esteem and competence of young women but the depression, dropping-out, and lethargy of males. Has feminism succeeded when 69 percent of my eldest's college class is female? The rough intellectual equivalence of the genders but huge disparity in outcomes suggests something bizarre and worth investigating. Is the disconnect caused by the maternalistic fascism of American public education? Perhaps it's in the use of pesticides. Whatever it is, I guess the answer won't come from The Cloister on the Charles.

Evan M. Dudik, M.B.A. '84
Vancouver, Wash.

As the father of three sons and grandfather of two grandsons, I am troubled by academic (and national) attention continuing to be lavished on the 50 percent of our children who, by virtually every statistical measure, are doing better. Talk to a group of parents of sons and you will hear pride, yes, but just as often, if not more, worry about the directionlessness of their lives.

Yes, as the article points out, there is reason to be concerned about how today's "alpha girls" will, as alpha women, be able to combine work and family; but to continue, in 2008, to focus on girls when, as Kindlon says, "Girls are doing the work and boys aren't—boys are playing Grand Theft Auto" does a disservice to half of our children, the half falling farther and farther behind.

When it comes to ambition, boys and young men are in a uniquely difficult position. The "girls' movement" grew out of the women's movement. Today, mothers and fathers can enjoy their daughters' achievements.

But with a generation of women excited by the success of girls and young women, and men who never themselves experienced gender discrimination, boys are left in the lurch. Girls didn't start the girls' movement; women (and many men) did. Boys, sitting in front of Grand Theft Auto, aren't about to say, "Enough!" Adults have to encourage them the way we encouraged our daughters.

Mark A. Sherman, Ph.D. '69
Associate professor of psychology emeritus
State University of New York
New Paltz, N.Y.

"Girl power" overall painted a well-rounded picture of the strengths and challenges of what it means to be female in today's world, but I do have to take issue with the contention that unwanted pregnancy is no longer a factor in girls' lives. How ironic to read that "For the first time in history, females have complete fertility control, which means they aren't getting pregnant, dropping out, having babies," only weeks after the United States learned that our teen birth rate increased in 2006 for the first time in 14 years.

Unfortunately, unintended pregnancy still presents many young women with an enormous challenge. The United States has one of the highest teen pregnancy rates in the industrialized world. Pregnancy and parenting obligations are leading causes of dropout for high-school girls, and only a third of teen moms finish high school. "Complete fertility control" is not yet a reality, least of all to the two million women who face an unintended pregnancy each year.

Erica A. Fletcher, Ed.M. '04
Massachusetts Alliance on Teen Pregnancy
Roslindale, Mass.

As the father of two daughters, I enjoyed Hodder's article. But the author's description of "Title IX of the 1972 Educational Amendments to the 1964 Civil Rights Act" needs to be corrected. Title IX is in fact part of the 1972 Educational Amendments to the Higher Education Act of 1965.

Donald E. Heller, Ed.M. '92, Ed.D. '97
Professor of education and senior scientist
Director, Center for the Study of Higher Education
The Pennsylvania State University
University Park, Pa.

There is a wonderfully ambiguous sentence near the bottom of page 37: "[B]oys... spend less time on schoolwork than girls." Indeed, I knew a number of boys who spent more time on girls than on schoolwork!

David Owens '61
Ann Arbor, Mich.

WAR AND SUFFERING

While the excerpt from Drew Gilpin Faust's *This Republic of Suffering* (January-February, page 44) makes for a fascinating and profoundly moving read, I question some of the parallels between that era and ours drawn explicitly by the editors and implied by Faust. Today we are a nation rather divided than united by suffering, with the majority of enlistments—and therefore deaths and disfigurements, and other damages to body and soul—borne by a small percentage of American families. I was disappointed to find the last word in the piece given to the "elegiac" view of the Civil War voiced by Ambrose Bierce and Oliver Wendell Holmes. The outcome of the Civil War transcended the individual motives of the men who fought for either side: it brought an end to slavery and kept our nation from being torn in two. The purpose of today's conflict is nowhere near so clear. I suspect that a century from now thoughts of those fallen in Iraq will bring to mind lines from a different poet about a different war—Rudyard Kipling's wrenching confession after his son's death in 1915 at the Battle of Loos: "If any question why we died/Tell them, because our fathers lied."

Cassandra Nelson
Brookline, Mass.

SPEAK UP, PLEASE

Harvard Magazine welcomes letters on its contents. Please write to "Letters," *Harvard Magazine*, 7 Ware Street, Cambridge 02138, send comments by e-mail to yourturn@harvard.edu, use our website, www.harvardmagazine.com, or fax us at 617-495-0324. Letters may be edited to fit the available space.

REPRESSED MEMORY REVISITED

Starting with my training at Harvard and continuing through graduate school and into my professional life, I have always been taught the value of rigorous empirical research. Unfortunately, Harrison Pope's research appears to be sadly lacking in any kind of solid empirical grounding (see "Repressed Memory," January-February, page 7). It moves from a highly questionable hypothesis through even more questionable research methodology, and reaches far-ranging conclusions that ignore the vast body of research in traumatic memory carried out during the past two decades. Based on the fact that respondents failed to meet the criteria of the experimenters (which apparently were never openly stated), the authors conclude that traumatic memory is basically a construction of society in the past two centuries. Not only is their methodology highly irregular, their conclusions ignore a huge body of empirical research. To say that something did not exist until recently because no one wrote about it before that is a conclusion that cannot be scientifically justified.

David L. Shapiro '65
Professor of psychology
Nova Southeastern University
Hollywood, Fla.

WINDSOR

SOUTH VILLAGE HOME
Six bedrooms,
seven full and two one-half baths.
Offered for $4,150,000.

SOUTH VILLAGE HOME
Four bedrooms,
four full and one one-half baths.
Offered for $3,695,000.

VILLAGE FAIRWAY HOME
Six bedrooms,
six full and one one-half baths.
Offered for $3,650,000.

VILLAGE HOME
Five bedrooms,
four full and one one-half baths.
Offered for $3,150,000.

WINDSOR HOME
Three bedrooms,
four full and one one-half baths.
Offered for $1,750,000.

TENNIS COTTAGE
Three bedrooms,
three full and one one-half baths.
Offered for $1,495,000.

Windsor is an exclusive seaside village interwoven with a strong sense of neighborliness and community. An extraordinary property, it is comprised of 416 acres bordered on the coast by the Atlantic Ocean and on the west by the scenic Indian River. Narrow tree-lined boulevards and lanes are defined by homes elegant in their understated Anglo-Caribbean architecture. Windsor offers superbly maintained facilities and exemplary service. With only a limited number of equity memberships available, members and their families and guests have immediate access to all the cultural and sporting amenities of a private club, highlighted by golf, tennis, croquet, fitness centre, beach club, gun club and art gallery.

Houses from $1.4 million to $15 million;
Homesites from $300,000 to $4.5 million.
Prices and features subject to change without notice.

WINDSOR

FOR CONSIDERATION
PLEASE CONTACT ELIZABETH C HANLEY, BROKER
WINDSOR REAL ESTATE INC
800 233 7656 772 388 8400
VERO BEACH FLORIDA
WWW.WINDSORFLORIDA.COM

ERRATA

THE WOMAN on the cover of the Pink Martini CD *Hey Eugene!* (January-February, page 19), is *not* lead singer China Forbes '92, but Mildred Eichler, photographed in Queens in 1962. Thanks to fans Jeff Tryens, M.P.A. '95, of Seattle and Wilbert C. Anderson, LL.B. '54, of Portland, Oregon, for the correction.

Lawrence G. Duggan, Ph.D. '71, professor of history at the University of Delaware, and another correspondent point out that the Revolutionary War and Vietnam War lasted longer than the current wars in Afghanistan and Iraq, correcting a misstatement about the nation's "longest war" (January-February, page 45). It should have said that the current wars were now longer than the Civil War and World War II.

Finally, Jim Harrison, not Stu Rosner, took the photograph of Bruce Western on page 55 of that issue.

AT OPHELIA'S FUNERAL, Hamlet has apparently forgotten he killed her father.

DIANNE HUNTER
Professor of English
Trinity College
Hartford, Conn.

UNDERGRADUATE APPRECIATION

THANKS SO MUCH to Liz Goodwin for generously sharing her inner journey from self-doubt to greater trust in her own personhood (The Undergraduate, "Applying Yourself," January-February, page 69). I, too, wrestle with this same bad habit: restlessly seeking approval through outer achievement and validation from others. Perhaps this is universal, though I suspect that it might weigh frequently on many who wind up at Harvard. I am so glad that Goodwin developed the courage to trust both her relationships with friends, and her own gut, heart, and mind, as places she can talk about and mull over what feels right for her, regardless of what others are doing or saying. May we all be so courageous, and help one another to keep growing back to this vital human truth.

BENJAMIN HALL '90, M.DIV. '99
Providence, R.I.

THANK YOU for printing Liz Goodwin's wonderful essay. Having been a dean at Stanford, Dart- *(please turn to page 84)*

Right Now

The expanding Harvard universe

MYSPACE—AND YOURS

"Born Digital"

Forty years ago they were "Born Free," 20 years ago they were "Born in the U.S.A.," but today kids are born digital, and taking their parents "native," too. No matter what your age, says John Palfrey, executive director of the Berkman Center for Internet and Society at Harvard Law School, you can become what he calls a "digital native" by living simultaneously on line and off with the help of technological aids—BlackBerrys or social-networking sites like Myspace that give you an on-line presence all day (and even all night) long. For the past two years Palfrey and his coauthor, Urs Gasser, have been working on a book tentatively titled "Born Digital," in which they hope not only to define this group, but also to examine its norms and recommend policy changes that would minimize the risks of on-line life while fostering its creative potential.

One of the digital native's primary traits is an extensive on-line persona. "[Their] identity is expressed through both off-line and on-line media," explains Palfrey. "And there's not much of a distinction in the digital native's mind between these two." Digital natives pick photographs for their on-line personas on social-networking sites with the same care with which they pick their clothes each morning. They go on line to reveal rather than conceal themselves.

And it's the extent to which they reveal themselves that baffles the uninitiated, most of whom—with different attitudes toward personal privacy—would never think of publishing their phone numbers or home addresses (let alone a photographic record of a Saturday-night bender) on the Internet. Even as digital natives acknowledge the danger their openness may pose in attracting predators, they are "nowhere near as aware of the transference of data [sent] about them across companies," says Palfrey. Native or not, nobody reads the fine print. He is worried: "The amount that somebody is going to be able to know about

Illustration by Lee Calderon

somebody [else] born today, 30 years from now, is completely unimaginable." From sonograms to wedding photographs and the Social Security Death Index, digital records mark nearly every milestone in our lives. And, because storage is plentiful and cheap and the information never decays, those records don't disappear.

Palfrey believes companies should be required to disclose—either in plain English or on an icon resembling a nutritional label—what they do with the information they collect. "What is it that you collect and store about me?" he would ask. "Is it only what I put in, or is it my browsing habits? Do you share [data] with any third parties? How long do you keep all of [it]?" He also advocates updating the copyright code and making social-networking sites such as Facebook more, though by no means entirely, accountable for their users' actions. He generally shies away from sweeping policy measures, such as banning social networks altogether. "Kids will find some other digital public in which to live their lives," he reasons. "You can just keep banning them, but it's 'whack-a-mole.'"

He fears that keeping kids off line would stifle the creativity he sees springing up all over the Web. In amateur videos on YouTube and in blogs, he sees a popular movement toward what he calls "semiotic democracy," which refers to the way each person watching a television show interprets it differently. Digital tools, Palfrey claims, take this a step further: instead of simply supplying meaning to someone else's show, anyone with a digital camera can make his or her own.

Palfrey points to parents and educators, rather than legislators, as children's best guides to the often hazardous terrain of the digital world. But parents and educators, to be effective, must engage with that world and understand how young people behave in it. For instance, while conducting a survey of study habits, Palfrey was unable to find a single digital native whose first step, when assigned a research paper, was toward a library. Instead, students typed their topic into a Google search bar, scrolled down to the reference in Wikipedia (an online encyclopedia edited by its readers), read the entry, and then followed the links to learn more. "The only variant I've heard to that," says Palfrey, "is typing en.wikipedia.org and going straight to Wikipedia." Whether or not Wikipedia is a credible source, teachers need to know that their students consult it before they can present alternatives.

Palfrey hopes that digital natives eventually become creators of on-line content, rather than simply consumers. Shooting and posting a video, or writing a comment on a message board, he argues, is a way of reaching out to an audience that potentially numbers in the millions. "If in fact kids over time find that they can have more of an impact on their society by virtue of what they can do through these new media...I think that leads to a more active form of democratic participation," he says—looking forward to a time when those who choose to be born digital regularly make, unmake, and remake the information world they live in.

—PAUL GLEASON

JOHN PALFREY BLOG:
http://blogs.law.harvard.edu/palfrey

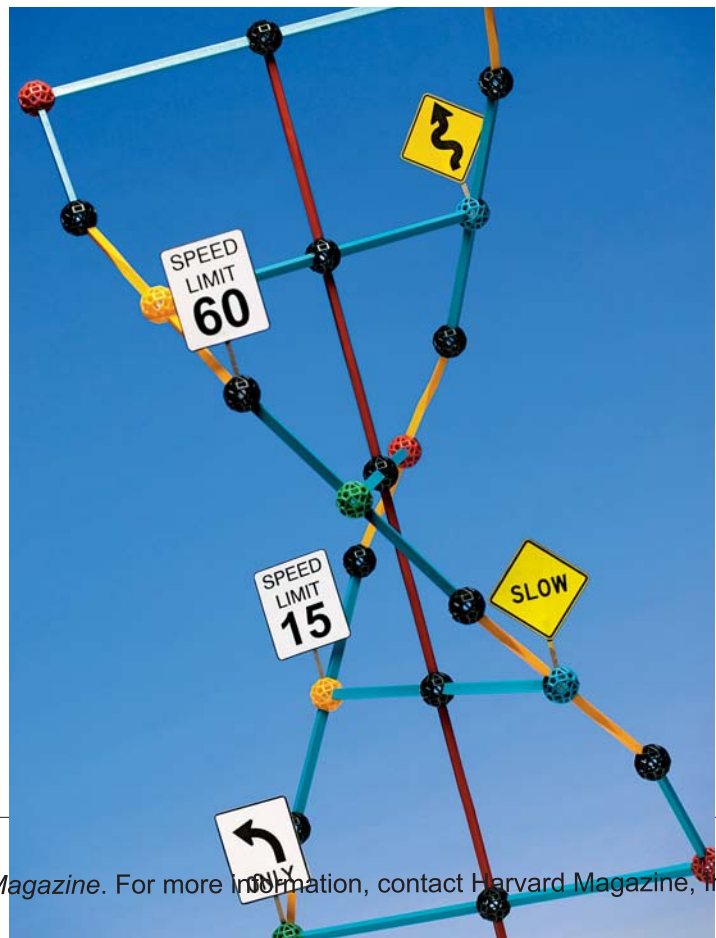
CHECKS ON CHANGE

Life's Speed Limit

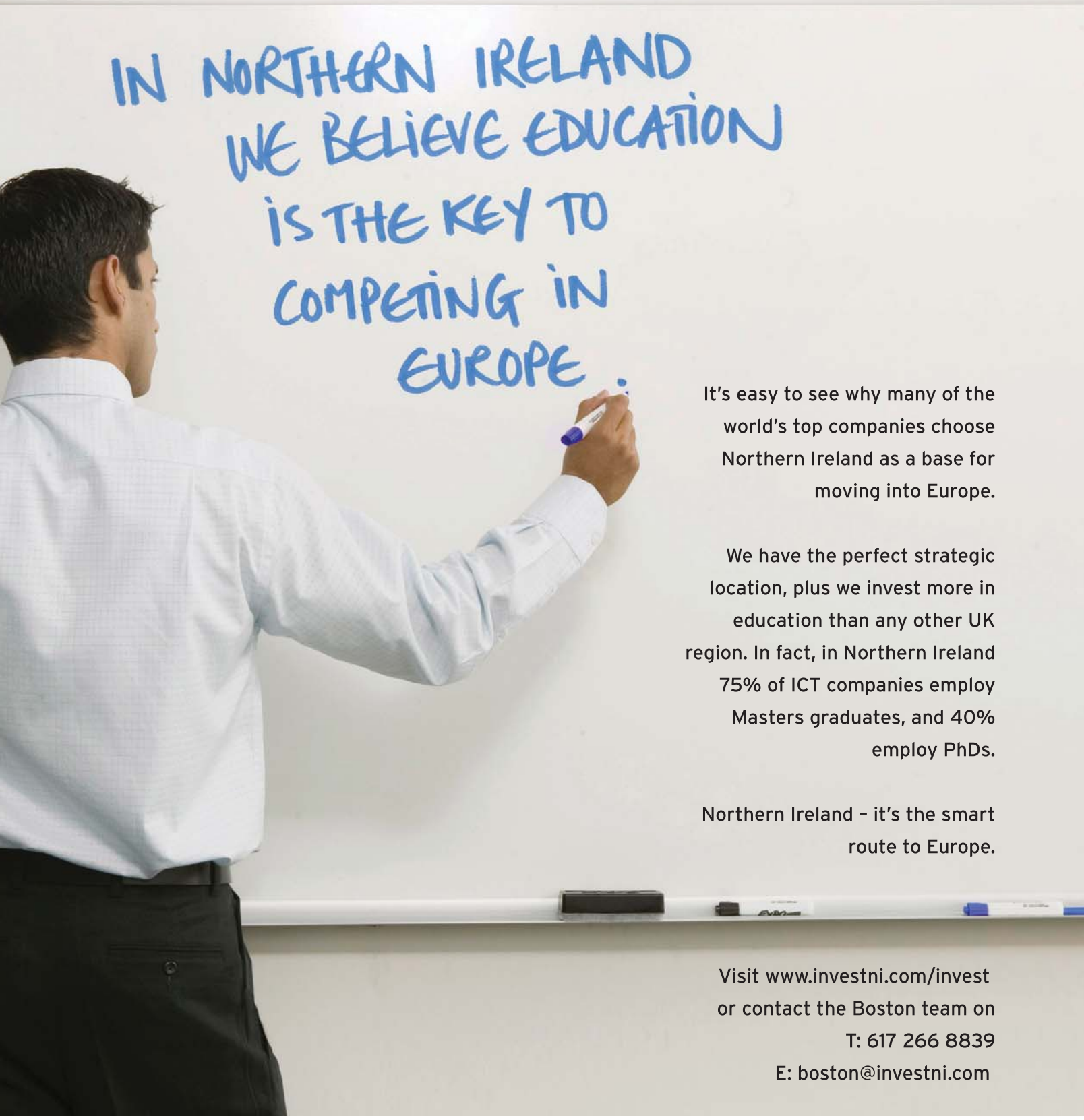
MUTATION is the engine of evolution: organisms would not be able to evolve new characteristics if their DNA did not randomly acquire small changes. But mutations can also be dangerous. If too many life-threatening mutations appear too quickly, an entire species could face extinction. Now a group of Harvard scientists has calculated the number of mutations that can appear in any organism's genome in each generation without threatening a population's survival. And because this "speed limit" on genetic change arises from fundamental properties of molecules, the limit is the same for the simplest viruses and the most complex plants and animals.

The study, which appeared recently in *Proceedings of the National Academy of Sciences*, links two lines of scientific research: the detailed investigation of the physical properties of proteins, and the broader study of evolutionary change. DNA serves as a template for building proteins, which are the primary actors in the cells of organisms. Professor of chemistry and chemical biology Eugene Shakhnovich, the study's lead author, says that a great deal is known about the three-dimensional properties of proteins and how their shape affects their function. "The next step," he explains, "is to understand how the proteins' shape affects the behavior of organisms," including their survival and evolution.

His team, led by research associate Konstantin Zeldovich, focused on a key property of proteins: their stability. Some mutations in



Photograph by Stu Rosner



It's easy to see why many of the world's top companies choose Northern Ireland as a base for moving into Europe.

We have the perfect strategic location, plus we invest more in education than any other UK region. In fact, in Northern Ireland 75% of ICT companies employ Masters graduates, and 40% employ PhDs.

Northern Ireland – it's the smart route to Europe.

Visit www.investni.com/invest
or contact the Boston team on
T: 617 266 8839
E: boston@investni.com

Invest Northern Ireland

Look no further

DNA affect the way proteins fold into three-dimensional structures. Critical proteins must be structurally stable for an individual organism to survive; on a population level, if too many individuals die out because their proteins are unstable, a species risks extinction.

To find the limit on mutations per genome per generation, the team modeled a range of possible stabilities for proteins essential to life. Employing a diffusion equation, widely used in physics, they calculated the balance point at which too many proteins become unstable for a population to survive. The answer they came up with: six mutations per generation.

Shakhnovich notes that this absolute speed limit illustrates why organisms that have very large genomes, such as mammals, must mutate very slowly: it is far more difficult to ensure that fewer than six mutations occur in a genome with billions of potential mutation sites than in one with several thousand. In fact, he says, most organisms operate far below the theoretical speed limit because they have developed elaborate error-correction systems to *ensure* that mutations occur only rarely.

Some diseases, on the other hand, thrive by operating near the fundamental limit of mutation. Viruses, and particularly RNA viruses like HIV, have relatively high mutation rates; only by changing their proteins constantly can they evade their host's immune system. Certain bacteria speed their evolution by shutting down their error-correction systems. Cancer cells grow and spread by mutating more quickly than normal cells.

The six-mutation rule has real-world applications. Certain therapies already take advantage of such limits by drastically *boosting* mutation rates in order to kill their targets: radiation therapy to treat cancer, for example. At the same time, the low mutation rate that allows complex organisms to support large, stable genomes limits their ability to adapt quickly in response to new conditions, as a virus or bacterium would. Global warming, for instance, may pose a particular threat to those species that evolve slowly—and Shakhnovich's team is trying to understand in more detail how the need to maintain a stable genome affects the speed at which organisms can adapt to environmental change.

—COURTNEY HUMPHRIES

EUGENE SHAKHNOVICH WEBSITE:
www-shakh.harvard.edu

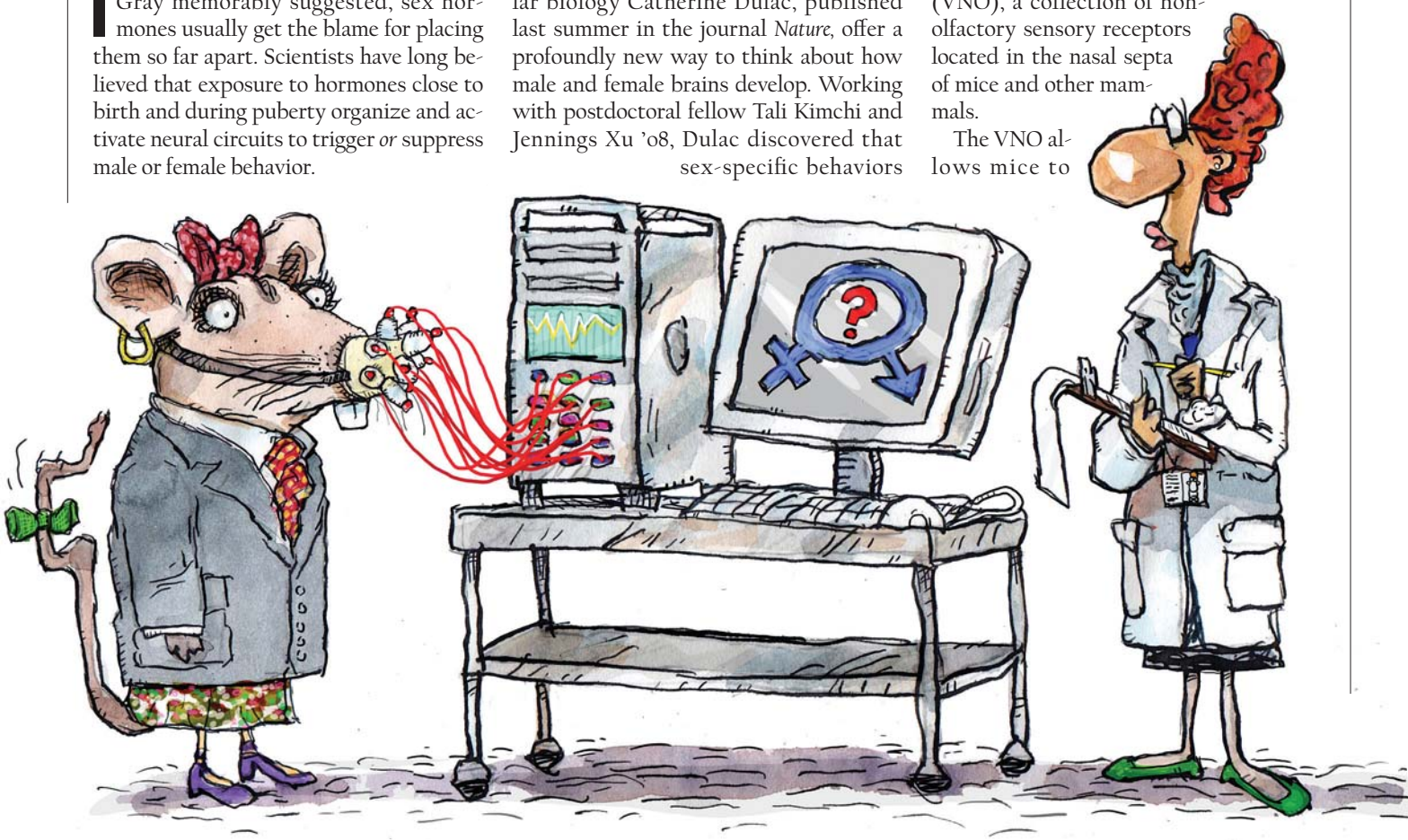
SEXUAL CIRCUITRY

When Minnie Turns Mickey

If males are from Mars and females from Venus, as self-help author John Gray memorably suggested, sex hormones usually get the blame for placing them so far apart. Scientists have long believed that exposure to hormones close to birth and during puberty organize and activate neural circuits to trigger *or* suppress male or female behavior.

But surprising findings in the lab of Higgins professor of molecular and cellular biology Catherine Dulac, published last summer in the journal *Nature*, offer a profoundly new way to think about how male and female brains develop. Working with postdoctoral fellow Tali Kimchi and Jennings Xu '08, Dulac discovered that sex-specific behaviors in mice switch on and off at the command of the vomeronasal organ (VNO), a collection of non-olfactory sensory receptors located in the nasal septa of mice and other mammals.

The VNO allows mice to



sense pheromones: chemicals that animals within a species give off to communicate "who is male, who is female, who is a pup, who is a parent, who is kin, and who is a foreigner," Dulac explains. Her lab is devoted to examining the control of instinctive behavior—particularly social actions such as aggression, maternal behavior, and courtship—within animal brains. In an effort to determine how the VNO affects behavior among female mice, Dulac and her coauthors bred "knock-out mice" lacking the TRPC2 gene, thereby deactivating the VNO.

When Dulac's coauthor Kimchi placed these female mutants in a cage with normal male mice, "what she observed was completely astonishing," Dulac says. "The females started to behave exactly like males." Suspecting an error, the puzzled researchers checked the mice to ensure that they truly were female. But there was no mistake. Though female, with normal hormone levels and estrus cycles, these mice emitted ultrasonic vocalizations normally sung by males to attract mates and, like males, they mounted their cage mates and engaged in pelvic thrusting. When impregnated by male mice, these females also lacked the usual maternal behavior. They neglected their pups shortly after birth and failed to attack intruder males while nursing their young.

Dulac says the researchers wondered if the mice behaved oddly because they had grown up without a functional VNO, which altered their brain development. "In sensory biology," she explains, "there is an important concept known as 'critical period,' which holds that if a sensory modality is not used during early development, it won't function properly, even if it is restored." She cites classic experiments conducted with kittens that were blindfolded from birth. When the masks were later removed, the kittens couldn't see properly because their brains had never developed the appropriate neural pathways to process visual information. But when Dulac's team tested this hypothesis by surgically removing VNOs from adult female mice that had developed normally, the surgically altered females still behaved just like males.

These VNO-free females led Dulac and her coauthors to craft a dramatically new hypothesis about brain development: female mouse brains, they propose, contain a fully functional circuit that produces male behavior, but the VNO serves as a switch to repress male behavior and activate female behavior. In fact, Dulac suspects that all mouse brains contain circuits for both male and female behavior, and pheromonal cues determine which circuit is activated. "From a developmental standpoint," she says, "this makes a lot of sense, because male and female have essentially the same genome, and one genome helps to build one brain." She believes this model may very well apply to other animals, including humans, but further research is needed. "Our new model has many implications," Dulac says, "and it will be exciting to conceive experiments to see how robust [it] is."

Dulac suspects that all mouse brains contain circuits for both male and female behavior, and pheromonal cues determine which circuit is activated. This model may very well apply to other animals, including humans...

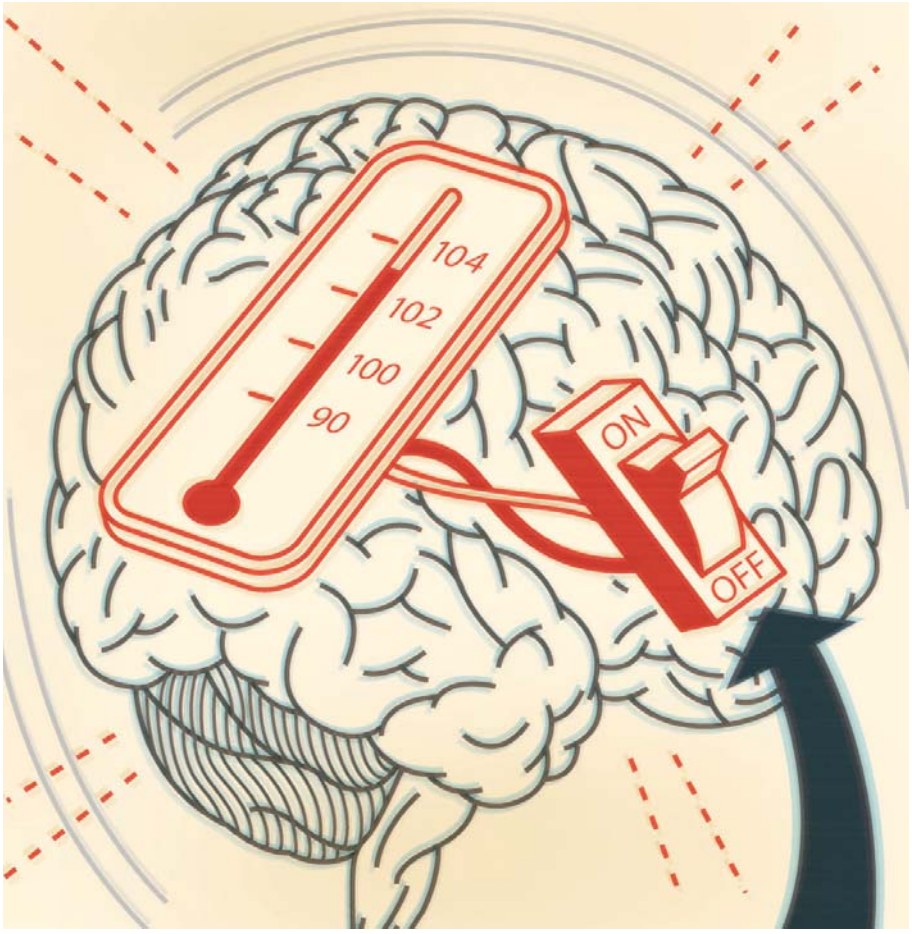
The mouse findings don't apply directly to humans; for starters, we don't have vomeronasal organs to switch between male and female circuits—just pits where the VNO used to be. Evolution failed to preserve the organ, Dulac says, because humans rely more heavily on their eyes than their noses: roughly a third of the rodent brain is dedicated to smell and pheromone detection, where nearly a third of the human brain is devoted to sight.

This fact led Dulac to theorize that visual input in humans may play the same role as pheromones do in mice. "Humans hate to consider that they have instinctive behavior," she observes. "We see ourselves as very rational animals, completely

Illustration by Tom Mosser

in control of what we want to do." Yet humans, she adds, do have a pheromone equivalent: pornography. "It elicits sexual behavior, which is exactly what happens to a mouse smelling a pheromone," she says. "Obviously we can resist some of the stimuli; we have many layers of control for behavior. But there is something here that reminds us of the instinctive behavior in animals." —ERIN O'DONNELL

CATHERINE DULAC WEBSITE:
www.mcb.harvard.edu/Faculty/Dulac.html



BODILY BLUNDERBUSS

"Tyrant Fever's" Trigger

When an infection assails the body, the response is predictable. Fever, loss of appetite, fatigue, that achy feeling—we never get just one without the others. Scientists believe this is because the entire suite of symptoms is governed by hormones called prostaglandins—but they also believe each individual symptom has a separate trigger site in the brain.

Now researchers at Harvard Medical School have identified the site where fever begins. Using genetically engineered mice, a team led by Putnam professor of neurology and neuroscience Clifford Saper, M.D., and postdoctoral fellow Michael Lazarus confirmed their hypothesis that the fever response originates in the brain's hypothalamus region, in a group of nerve cells two millimeters across by five long. (The Harvard team knew which type of hormone was involved because about 10 years ago, researchers in Japan had engineered mice that lacked prostaglandins throughout their bodies and found that such mice didn't develop a fever when injected with bacteria; the Harvard group sought proof that receptors in the brain, rather than somewhere else in the body, trigger fever.)

Because of the genetic manipulation involved, Saper's lab will not try to replicate the finding in humans. Rather, the next step is to find drugs that block the prostaglandin receptors linked to fever. The lab is also collaborating with researchers at the University of Tennessee to begin looking for the spot in the brain where achiness originates. Saper hopes he or others will succeed in isolating the trigger sites for all the symptoms that typically accompany fever. "It would be nice," he says, "to know how to turn off different components of this system."

For its part, the body—by responding with every weapon in its arsenal—mounts the strongest possible defense against disease, akin to fighting a land, sea, and air war all at the same time. This multipronged response succeeds against many types of adversaries; it evolved to keep us alive, but it makes us feel miserable, sometimes unnecessarily. It is impossible for the body to decouple the individual symptoms without making a major change in its response to illness. This is because those symptoms are not responses to individual stimuli; rather, they are *all* responses to the same stimulus, the presence of prostaglandins.

The direct causes of prostaglandin production are the presence of cytokines—hormone-like chemicals that the white blood cells of the immune system produce as part of the body's inflammation response—and the presence of bacterial cell-wall components that (outside a laboratory) are generally an indicator of infection. No matter what the stimulus, whether a cold, the flu, a cut, or a chronic condition such as arthritis or Crohn's disease, the body produces the same response: first inflammation, then prostaglandins, fever, aches, fatigue, and decreased appetite. This happens whenever there is systemic, as opposed to localized, inflammation.

In some cases this response may be overkill. For instance, loss of appetite—which reduces blood glucose if it causes us to eat less—may seem a wise strategy for stemming the growth of bacteria, which thrive in a sugar-rich environment. But when invaders *aren't* replicating in the bloodstream, eating a normal amount may actually *help* the body fend off illness by restoring energy reserves.

By blocking the action of one or more of the trigger sites, doctors and patients of the future could customize the body's re-

Illustration by Harry Campbell

sponse to illness, keeping the symptoms that help and eliminating those that don't. "People with cancer, for example, are always very fatigued," says Saper. "In fact, there's a chronic fatigue syndrome that we don't understand at all, and that may be due to some mechanism that we can get a handle on by looking at what causes fatigue in inflammatory conditions."

Once those sites are identified, scientists will still have much more to learn before the targeted response Saper envisions becomes possible. Researchers understand little about how each symptom works to enhance the immune response. They know white blood cells function better at higher temperatures, but don't fully understand why; without knowing that, it's hard to say whether having a fever is helpful or harmful in treating specific ailments. The functions of achiness and fatigue are even more of a mystery: it makes intuitive sense that conserving energy lets the body marshal its resources to fight off illness, but, says Saper, "Nobody's looked at the mechanism."

Doctors and patients of the future could customize the body's response to illness, keeping the symptoms that help and eliminating those that don't.

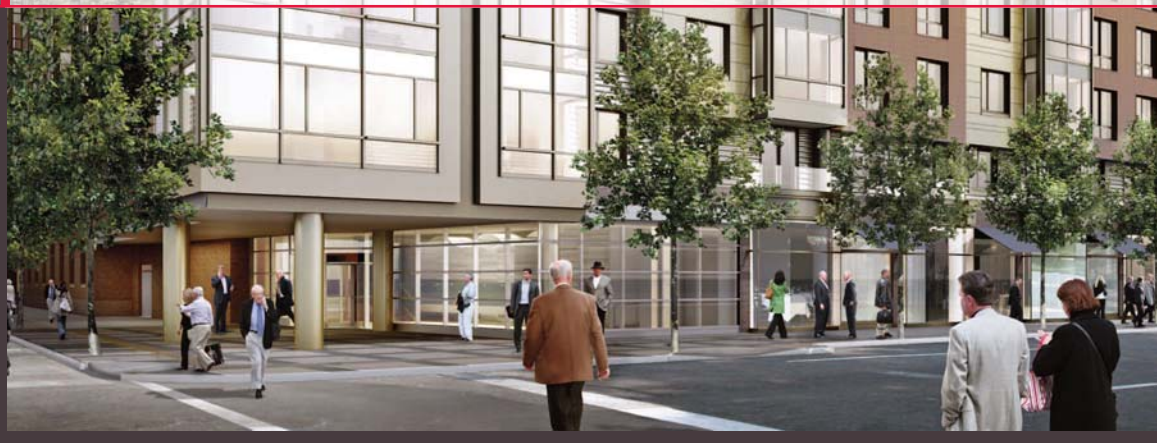
Even without a complete understanding of the immune response, he and his team are forging ahead, seeking ways to block individual symptoms—and the chief over-the-counter antidote for fever offers an instructive model. Aspirin's naturally occurring precursor, willow bark, had already been in medicinal use for millennia before the drug itself was first synthesized, in 1897, and it wasn't until the 1970s that scientists learned *how* aspirin works: by preventing the formation of prostaglandins. Now the hunt is on for other, more targeted, medications that might be used with similar effect.

—ELIZABETH GUDRAIS

CLIFFORD SAPER E-MAIL:
csaper@bidmc.harvard.edu

303
THIRD STREET

UNIVERSITY RESIDENTIAL COMMUNITIES



A cooperative residence for the Harvard, MIT and MGH communities.

A unique residence conceived by Harvard and MIT Alumni, Administrators and Professors to reconnect you with the institutions and the city that have shaped your life. Join those with an affinity for the university lifestyle at University Residential Communities at 303 Third Street. Reservations are being taken now for One, Two and Three bedroom residences for occupancy beginning in the fall of 2008.

Please call 617-374-9303 for a personalized tour.

Information Center
300 Third Street Cambridge, MA 02142
tel (617)374-9303 fax (617)374-9307
urc@bealresidential.com www.303third.net

EXTELL

Marketing Agent: URC / BEAL and Company, Inc.

Montage

Art, books, diverse creations

Joanne Chang, and the process and products of Flour Bakery + Café

Sweet Science

Dedicated to the mission of eating dessert first

by CRAIG LAMBERT

At the Leverett House Grill in the late 1980s, Joanne Chang '91 first turned pro as a baker, selling four freshly baked chocolate chip cookies for a dollar. Now she owns and operates Boston's two Flour Bakery + Café pastry shops, which have won awards for best bakery, coffee shop, cakes, cookie, doughnut, and takeout. *Boston Magazine* even referred to Chang's "masterpieces" in the field of gourmet sandwiches.

And her sweets have now gone national. Last summer, the Food Network's *Throwdown with Bobby Flay* program focused on Chang's acclaimed sticky buns. For each "throwdown," television chef Flay surprises a professional cook with a challenge: he tries to outdo them at their own specialties. The show decoyed Chang into making her recipe before an audience for a fictional series on desserts. Flay appeared and challenged her to a bake-off. Chang, unfazed, said, "Bring it." (The partisan audience, which included many Harvard students, backed their heroine. When Flay deployed a procedure that Chang tactfully called "different," according to the *Crimson*, one student in the audience yelled, "That's how they do it at Yale.") Flay made a variant sticky bun with an orange glaze and cinnamon, but the tasters voted for Chang's traditional caramel glaze with roasted pecans.

Though her sticky buns may be the stuff of legend, Chang's shops offer a wide array of foods, including scones, brioches, banana bread, and tarts, along with pizzas, quiches, and sandwiches that incorporate ingredients like curried tuna, brie, caramelized onions, and cranberry chutney. In her newer shop, in the Fort Point Channel district near South Station, a hip, urban/industrial aesthetic reigns: high ceilings, tall windows, exposed pipes,

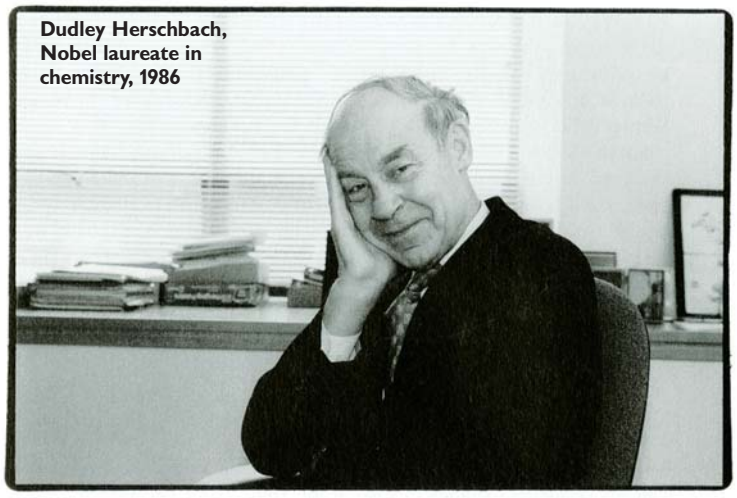
Photographs by Tracy Powell

Off the Shelf

Recent books with Harvard connections

How to Read the Bible: A Guide to Scripture, Then and Now (Free Press, $35), by James L. Kugel, formerly Starr professor of Hebrew literature (see "Final Architect," January-February 2004, page 36). *Not* CliffsNotes; 689 pages of text on reading the Good Book, by the maestro of the Core course "The Bible and Its Interpreters."

Body Drama, by Nancy Amanda Redd '03 (Gotham, $20, paper). The 2004 Miss America contestant, with an assist from the director of Mount Sinai's Adolescent Health Center, writes a frank—and frankly illustrated, with photographs—tour of growing girls' concerns from acne and breast development to weight, pregnancy, and genital warts.



Dudley Herschbach, Nobel laureate in chemistry, 1986

PETER BADGE

Nobel Faces: A Gallery of Nobel Prize Winners, by Peter Badge (Wiley-Blackwell, $95). Badge's eloquent black-and-white portraits of some 270 laureates, with accompanying brief narratives by Chris Richmond; poet Seamus Heaney, biologist Walter Gilbert, chemists Elias J. Corey and Dudley R. Herschbach, and diplomat Henry A. Kissinger are among the Harvardians depicted.

Please Don't Remain Calm: Provocations and Commentaries, by Michael Kinsley '72, J.D. '77 (Norton, $25.95). The writer of opinions (*The New Republic, Slate, Los Angeles Times,* etc., and now *Time*) collects samples from the past dozen years. Reflecting on airport security lines in 2002 ("…the major war effort imposed on civilians…"), he finds a "need to think about it for a few more hours. And I think I know where I'll find the time."

What Is Emotion? History, Measures, and Meanings, by Jerome Kagan (Yale, $27.50). The Starch professor of psychology emeritus wades into the "empirically lean and theoretically contentious understanding of emotional phenomena" and finds himself "adopt[ing] a skeptical stance toward the existence of a small set of basic emotions." Kagan writes, "Poets possess the license to use a predicate any way they wish," but this is very much a scientist's book.

Straddling Worlds: The Jewish-American Journey of Professor Richard W. Leopold, by Steven J. Harper, J.D. '79 (Northwestern, $35). An oral history of historian Leopold, Ph.D. '38. His education included spirited "fist-ball" games (a volleyball variant) with the Law School's Erwin N. Griswold, historian John K. Fairbank, and physicist Percy Bridgman, a future Nobelist and all-out competitor.

The Fortune Cookie Chronicles: Adventures in the World of Chinese Food, by Jennifer 8. Lee '99 (Twelve, $24.99). The author, formerly a Ledecky Undergraduate Fellow of this magazine, now a *New York Times* metropolitan reporter, probes the ethos of the nearly 40,000 Chinese restaurants in the United States, and beyond, fearlessly addressing "the Kosher Duck Scandal of 1989" and, like Margaret Mead, reporting the tragic fate of the "bean-sprout people."

beams and bricks, butcher-block tables and desert-yellow walls. In both locations, sweet flavors rule. On the ground and on line (www.flourbakery.com), Flour proclaims its mission statement: "Make life sweeter—eat dessert first!"

While growing up in Houston, Denver, and Tulsa, Chang, like many girls, made cupcakes for friends. But her first career path was in management consulting; after concentrating in applied mathematics and economics at Harvard, she spent two years with Monitor Company in Cambridge, where she worked on the college recruiting program. "One icebreaker question we used was, 'If you won the lottery tomorrow and money was no problem, what would you be doing?'" she recalls. "After asking hundreds of kids that question, I asked it of myself."

The answer led Chang to enroll in a three-hour adult-education course on starting your own food business, taught by cookbook author Judy Rosenberg, founder of the Rosie's Bakery shops in Boston. That inspired Chang to get a restaurant job; she started at the upscale Biba restaurant as a *garde-manger* cook, making the bar menu, including cold appetizers. But "I wasn't that interested in the savory end of things," Chang says. "I was always attracted to sweet flavors. They're more interesting. And more enjoyable!"

HM

Visit harvard-mag.com/extras to get Chang's sticky-bun recipe and see how they're made.

She moved to Bentonwood Bakery in Newton, then became pastry chef at the Rialto restaurant in Cambridge. She worked in New York for renowned French pastry chef François Payard, formerly of Restaurant Daniel, then returned to Boston at Mistral. Still, "I didn't want to work in restaurants long-term," Chang explains. "A restaurant menu has a very limited scope for desserts. I wanted to do something that would reach more people, and I had always loved pastry shops." In 2000 she opened her first Flour Bakery + Café, in the South End. "It was busy pretty much

From the Leverett House Grill to a wide array of scones, sandwiches, and more

from the start," she says. "We were there at the right time, in the right place."

In cooking, recipes are more or less guidelines, but in baking, precision rules. "There's a formula: 500 grams of flour, 300 grams of butter," Chang says. "Pastries are very meticulous and detail-oriented. Baking powder is chemistry. And once you finish baking a cake, you can't add a tablespoon more of this or that." If Chang wants to add a menu item—say, a chocolate-zucchini muffin—she first reviews Flour's current muffin recipes and those from other cookbooks. "Then I'll tweak it to my liking—maybe more zucchini, less chocolate, moister, with a tighter crumb. We try the recipe a few times till we get what we like, then scale it up."

Outside the kitchen, Chang reviews cookbooks, writes on pastry for *Fine Cooking* magazine, and works on her own cookbook, featuring items from Flour. Her fiancé is Boston restaurateur Christopher Myers, G '90, a co-owner of Radius, Via Matta, and Great Bay. Despite her high-calorie surroundings, Chang stays trim, partly due to a counterbalancing passion for distance running—she has competed in every Boston Marathon but one since 1991.

Moving Pictures, Hard Questions

A film cycle from San Francisco's Tenderloin

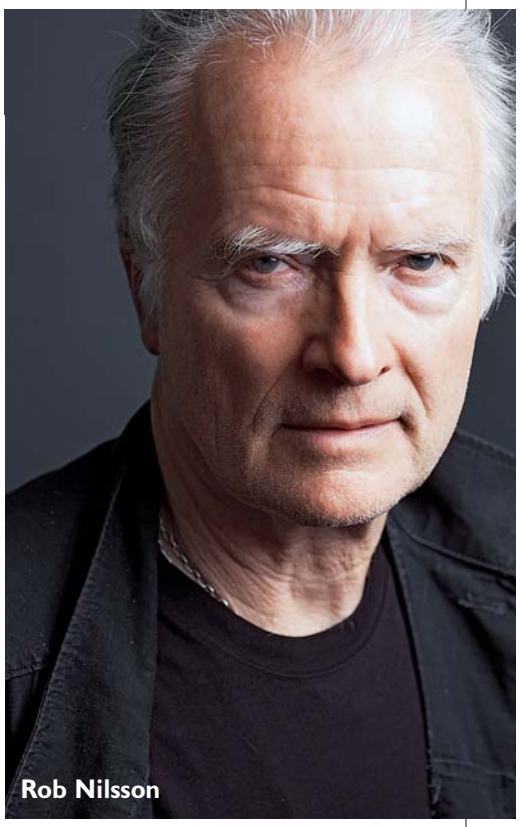
by HOWARD AXELROD

It was a rare rainy night in Los Angeles. Filling up his tank at a local gas station, a man noticed the silhouette of another man, just beyond the gas station's overhang, getting drenched. The two struck up a conversation. The second said he was a novelist, adding that he always carried his work with him. With that, his hand dripping, he brought out a small metal box from inside his jacket, filled with index cards. The first man began to finger his way through. But every card was the same: blank, except for one letter, the same letter, written in the middle of each card.

This may sound suspiciously like the opening scene from a movie, but it's an event from the life of award-winning independent filmmaker Rob Nilsson '61. The "novelist" in the story is Nilsson's brother, Greg, a homeless man, who had gone missing more than 10 years prior to that rainy night in Los Angeles. The man who found him, a good Samaritan who would take Greg in, eventually located Rob Nilsson two years later.

At the time, Nilsson, a winner at the Cannes and Sundance Film Festivals, was running an acting workshop for street people and aspiring actors (some of the attendees were both) in a warehouse in San Francisco's Tenderloin district. The continuing workshop has resulted in nine feature films, comprising the 9@Night cycle that was presented this past fall at the Harvard Film Archive. Using largely untrained actors and operating on a shoestring budget, Nilsson has burrowed into the shadows of the down and out: *Need* portrays the desperation of workers in the sex trade; *Scheme C6* follows a charismatic homeless man, equipped only with a motorcycle, a toothbrush, and an ill-fated plan. In these films the scenes are unscripted and the dialogue improvised by the actors, though the director himself works from "story scenarios."

Since his graduation from Harvard, Nilsson's aspirations have shifted from po-



DAVID FENTON

Rob Nilsson

etry—he cites the Grolier Bookstore (see "Grolier Reincarnated," November-December 2006, page 30) and the 1960s folk scene in Cambridge as early influences, along with a visit to Conrad Aiken, who was then living on Cape Cod—to painting (which he still pursues), to making movies. "Filmmaking, in the end, was the one thing where I could use all the other arts," he says. After stints with the Peace Corps in Nigeria—where his interest in filmmaking began as a lark with friends—and as a cab driver in Boston, Nilsson gained public attention in 1979 with his very first feature film, *Northern Lights.* That low-budget drama, focused on the Nonpartisan League, a populist movement that rallied the farmers of North Dakota in 1916, won the Camera d'Or at Cannes. Nilsson was 40. After a fallow period, he released *Heat and Sunlight* in 1988, a portrayal of a faltering love affair that took the Grand Prize at Sundance.

As his films attest, Nilsson—who looks a little bit like a street version of Clint Eastwood—is less interested in art as escapism than in art that bears witness, that gives some sense of "the way the world seems to be." And one inescapable part of that was his brother, a diagnosed paranoid schizophrenic. In the early 1990s, driving through San Francisco's Tenderloin every day on the way to his editing room, Nilsson couldn't help but be reminded of his missing brother by the people he saw on the street corners. The district, heavily populated by drug addicts, sex workers, and the generally down and out, is typically described the same way as Nilsson's

FOLIO

Not Groucho (but Way Funny)

For a long time, Patricia Marx '75 assumed she "would wake up in the suburbs with three kids and a mother hairdo." It hasn't worked out that way. She remains single and childless, lives on the Upper East Side of Manhattan, and writes humorous books, scripts, and magazine pieces, including columns on shopping for the *New Yorker.* Some of her best friends are people she met at the Harvard Lampoon, a group that reinforced her conviction that "being funny is the most important thing, maybe the only thing that matters."

She has acted on that premise as a writer for the TV shows *Saturday Night Live* and *Rugrats,* a writer of seven screenplays (all sold but none, as yet, produced), and as author of more than a dozen books: children's books such as *Now Everybody Really Hates Me,* adult titles like *How to Regain Your Virginity* and *You Can Never Go Wrong by Lying and Other Solutions to the Moral and Social Dilemmas of Our Time,* and collaborations with various other artists and humorists (Roz Chast of the *New Yorker,* for example) on the 1003 series (*1003 Great Things About Teachers,…About Getting Older,* etc.). These last make good bathroom reading; "If there were no bathrooms," Marx explains, "I'd have no career." And last January, Scribner published her first novel, *Him Her Him* Again *the End of Him,* a hip, funny examination of a woman's decade-long obsession with Mr. Wrong.

Patricia Marx

Photograph by Robert Adam Mayer

Meanwhile, her *New Yorker* shopping pieces bring a comic slant to the consumer's sidewalk safari. "For anyone struggling to overcome shopper's block during the holiday season," she declared in last year's Christmas-gift column, "there can be no hope of getting Jesus Christ's birthday postponed."

Born in the Philadelphia suburb of Abington, Marx was blessed with two "witty" parents who, she says, "didn't give me a bedtime or care what I ate." In a way, her father's office-supply business explains why she started writing: "There were so many Magic Markers around." The Marxes—no relation to Groucho or Karl, she insists—were a family of readers, and her dad also played the piano, a fact, she adds, that "instilled in me a great hatred for music." In general, though, she had "a pretty happy childhood. Now I'm mad at my parents for that—no good material."

In school, Marx was "that person you hate, the one sitting in the back row making fun of the teacher, who secretly does the extra-credit project." Yet that strategy got her into Harvard, where she concentrated in social studies, breakfasted daily on eight glasses of Tab, and became one of the first women elected to the Lampoon. "Being the only female around made me a mascot, which, I'm ashamed to say, was fine with me," she admits. "I don't think I opened my mouth for four years in college; there were too many funny people and I didn't think I could utter a line as funny as theirs. But I did write a lot."

By senior year, in terms of careers, she had "ruled out everything," and so decamped for King's College, Cambridge, on a National Science Foundation fellowship ("I was a mistake"). Marx did not complete her doctorate. ("All I have to show for it is a lot of cashmere sweaters," she says.) In 1979 she returned to New York City to write for *Saturday Night Live,* and has remained in Manhattan since. The city has treated her well; she had the good fortune, for example, to housesit a six-story mansion on upper Fifth Avenue for 15 years, a place where she led a "Holly Golightly life" and sometimes rollerbladed from room to room.

Now she has moved a few blocks away, and she continues to write and shop. ("These shopping pieces are exhausting," she says. "You have to walk around so much. The older I get, the more I like to sit down.") A preference for sitting is one reason she likes writing novels—she's working on her second one now. "I hate not to complain," Marx says of *Him Her Him* Again *the End of Him,* "but it was a joy to write." —C.L.

Tiger Woods with his Gulfstream 450
Became a NetJets Owner in 1997

MOST EXPERIENCE | MARKET LEADER | WORLD'S LARGEST FLEET | MOST AIRCRAFT TYPES | HIGHEST SAFETY STANDARDS | SUPERIOR OWNERSHIP EXPERIENCE | GLOBAL OPERATIONS | A BERKSHIRE HATHAWAY COMPANY

NETJETS FRACTIONAL JET OWNERSHIP PROGRAMS THE MARQUIS JET CARD EXECUTIVE JET MANAGEMENT

NETJETS.COM 1.877.NETJETS

OPEN BOOK

Postmodern Medicine

We are all "medical citizens," embedded as potential or actual patients, with physicians, in a system of social, moral, and organizational understandings. So writes Monrad professor of the social sciences Charles E. Rosenberg in *Our Present Complaint: American Medicine, Then and Now* (Johns Hopkins, $50; $19.95 paper), touching on sources of unease.

Disease has become a bureaucratic—and, thus, social and administrative—as well as biological and conceptual—entity.

What do I mean when I describe disease as a "social entity"? I refer to a web of practice guidelines, disease protocols, laboratory and imaging results, meta-analyses, and consensus conferences. These practices and procedures have over time come to constitute a seemingly objective and inescapable framework of disease categories, a framework that increasingly specifies diagnostic criteria and dictates appropriate therapeutic choices. In America's peculiar hybrid health-care system, layers of hospital and managed care administrators enforce these disease-based guidelines. The past generation's revolution in information technology has only exacerbated and intensified these trends—in parallel with the research and marketing strategies of major pharmaceutical companies.... This web of complex relationships has created a new reality for practitioners and patients alike. Physicians have had their choices increasingly constrained—if, in some ways, enhanced. For the sick, such ways of conceptualizing and treating disease have come to constitute a tangible aspect of their illness experience.

SPL/PHOTO RESEARCHERS, INC.

Premodern medicine: doctor bleeding patient, in an 1804 English caricature by James Gillray.

Of course, every society has entertained ideas about disease and its treatment; patients have never been blank slates.... Think of the generations of sufferers who were bled, sweated, puked, or purged to balance their humors. But never has the infrastructure of ideas, practices, thresholds, and protocols that comes between agreed-upon knowledge and the individual patient been so tightly woven and bureaucratically crafted....

Yet, as I have emphasized, we are left with that inconveniently subjective object, the patient—in whose body these abstract entities manifest themselves. This is the characteristic split screen that faces today's clinician: the tension between illness in the individual patient and disease as crystallized and made socially real in the laboratory's and the epidemiologist's outputs and inscriptions, practice guidelines, and algorithms.... Bedside, clinic, and physician's office are the points at which the mandates of best—and increasingly most economically rational—practice bump up against the unique reality of the individual patient and challenge the physician's traditional autonomy....

It engenders a feeling of paradox, the juxtaposition of a powerful faith in scientific medicine with a widespread discontent at the circumstances in which it is made available. It is a set of attitudes and expectations postmodern as well as quintessentially modern.

ELENA DORFMAN

films: gritty and raw. "It was probably an area I feared more than anything else, because I didn't know not to be afraid of it," he says. But he began to explore, to get out of his car, and to begin searching again for his brother.

At the time, the director was developing a film about a homeless Vietnam veteran, a role Danny Glover had signed on to play. To secure extras, Nilsson and two former students from film classes he'd taught at San Francisco State University created the Tenderloin workshop, recruiting participants primarily from halfway houses. But the movie fell through—Nilsson couldn't get funding, and Glover took a role as a homeless man in another film. "So we had this ongoing workshop, which we were thinking was going to be preparing our secondary cast," Nilsson says, "and it became the heart of our work for the next 14 years."

Those films are often difficult to watch: the subject matter is grave, rarely leavened by humor, and the improvised scenes can hit dead ends. But other scenes are unforgettable. In *Need*, for instance, an aging prostitute, considering suicide from the Golden Gate Bridge, is interrupted by the headlights of a car at the bridge's edge. She walks closer, into the lights, until she sees that the driver is not a cop, but simply a lonely man who has come to drive golf balls into the Bay. And it is unclear what is more painful—the mask of despair she has been wearing, or the momentary fracturing of that mask.

Also memorable is *Chalk*, a pool-hall story that features Nilsson's brother, who

Nilsson and actors on location

came to live with the director in Berkeley after the good Samaritan call came from Los Angeles. "Never been a worse actor," Nilsson says with humor and evident love. "We're doing a scene, and he's just *watching* it. We're saying, 'Greg, you're *in* the scene.'"

Nilsson's movies are not easy to find—distribution continues to be a challenge—but perhaps even less visible is the work he's accomplished in the workshops themselves. "In the street," he explains, "the thing that you have to give up first, because you have to protect yourself, is strong emotion." Working with people who have often gone invisible, not just to others, but in fundamental ways to themselves, Nilsson asks the workshop participants to let go of some of their defenses, if only for a time, through acting exercises. "I'm not asking you for your life," he says, "I'm asking you for the hate, or for the love—for the feeling." While Nilsson admits his approach may be "a little Californian," the workshops have led to some very powerful moments; and the emotion of those moments often carries into the films themselves.

The director can't remember the letter his brother wrote on those index cards, but he says that, over the years, he's always thought of it as Y. The small jump to the word "Why?" is not lost on him. And yet, movie after movie, Nilsson seems to be asking the more poignant question "How?" How do people, marginalized for whatever reason, manage to get along?

Howard Axelrod '95 is writing a memoir.

Past the Peak

Virginia's decline and the myth of American progress
by TED WIDMER

Nearly 50 years after declaring their independence, Americans were electrified by the triumphant return of the Marquis de Lafayette, eager to revisit the scenes of his youthful exploits. To those who remembered the dashing 19-year-old who had come to America's aid during the Revolution, Lafayette was difficult to recognize, with a heavy paunch and not much hair left. But to be fair, the feeling was mutual. Much of America was unrecognizable to him. In the North, large cities had sprung up, and the pace of life had quickened appreciably (Cambridge, Massachusetts, received middling praise as a "bustling village"). But the South was even more disorienting. As he journeyed to Virginia, the state where he had achieved his greatest triumphs, he was flabbergasted to see that it had gone to seed. The proud birthplace of Washington, Jefferson, and Madison had degenerated into something of a backwater, with terrible roads, exhausted farms, and undisguised poverty.

That transformation is the subject of *Dominion of Memories*, an eloquent inquest by Susan Dunn, Ph.D. '73, professor of humanities at Williams College, into the forlorn story of our largest state in the early decades of the nineteenth century. This is a superb bit of local history, explicating the interlocking stories of regions, families, and new generations eager to leave their mark on the world. But it also manages to cast new light on the founders—no easy task—by showing them in a new context, as bewildered old men wandering a scarred landscape, Learlike, seeking to explain what it had all been about. Having survived the British, the French, and the British all over again, men like Jefferson and Madison were permitted (or perhaps condemned is a better word) to live long lives amid mediocre progeny who dimly understood the principles that they had fought for and, worse, tried to twist them into an elaborate justification for slavery, the labor system that singlehandedly accounted for Virginia's decline.

Susan Dunn, *Dominion of Memories: Jefferson, Madison, and the Decline of Virginia* (Basic Books, $27.50)

The topic is refreshing for many reasons. Virginia has always been essential, even in decline, to the nation that it did so much to found. To this day, one can tell a great deal about America's political weather by looking at conditions in polyglottish places like Fairfax County, cheek by jowl with the District of Columbia. But *Dominion of Memories* is appealing for the additional reason that so much of American history is assumed to be forward-moving. Progress, the most overused word in America's vo-

THEATER

Storytelling Spaces

Set designers like Derek McLane '80 are responsible for one of the chief joys of theatergoing: the inevitable surprise we feel when the curtain rises and we are thrust into a previously unimagined world. "A lot of times those first meetings that a director has with the designer are [the] first attempts the director makes to figure out the play, because suddenly the world has to be made physical," says McLane. "We sit down together and we say, 'How are we going to tell the story?'"

The first set McLane designed was for a production of *Guys and Dolls* in the Leverett House dining hall during his sophomore year at Harvard. "By the time we got the actors onstage," he remembers, "I felt like it was a calling. It was like being in love. I felt, viscerally, that this was something I had to go do."

After finishing Harvard, McLane earned an M.F.A. in drama at Yale with a concentration in design. Ever since, on stages from Seattle to London to Melbourne, his sets have given plays physical worlds to inhabit. He has won two OBIEs (Off Broadway Theater Awards) for "sustained achievement" and received a 2006 Tony nomination for his design for the revival of the 1950s musical *The Pajama Game*. McLane has designed *The Voysey Inheritance* for David Mamet, *Macbeth* for New York City's Shakespeare in the Park, and six Stephen Sondheim musicals for the Kennedy Center in Washington, D.C.

Visit harvard-mag.com/extras to see more of McLane's designs and hear him describe their creation.

While designing the set for *I Am My Own Wife*, the 2004 Pulitzer Prize-winning play by Doug Wright, McLane worried that the scenery, as originally written, was too explicitly metaphorical. The main character, a transvestite antiques collector living in Germany during the Cold War, was supposed to perform on a stage strewn with broken furniture. "If I see a play that takes place then and the set is a bunch of destroyed furniture, to me that's post-Dresden firebombing," he says. "I thought that design put too much of an interpretation on the play to begin with. In some ways it needs to be more neutral than that, so you can discover and draw your own conclusions."

But some of the antiques doubled as important plot devices and needed to

DEREK MCLANE STUDIO

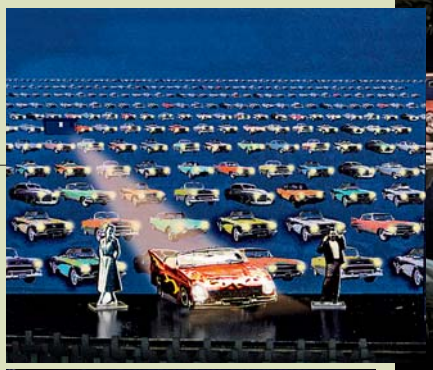
cabulary, is never supposed to stop; yet here it ground to a halt. At the time of the founding, Virginia was the biggest state, and the most populous (one in five Americans lived there). It had the most splendid plantations, and arguably the two most impressive founders in Washington and Jefferson (Madison, not too far behind, was surely in the top five). Four of the first five presidents were Virginian, as was John Marshall, the greatest chief justice in the history of the Supreme Court. John Adams, no slouch when it came to defending New England, wrote, "We all look up to Virginia for examples." Henry Adams, as severe a judge of character as his great-grandfather, considered that the Virginians were "equal to any standard of excellence known to history."

But that standard quickly depreciated in the new century. Virginia's share in the national population plummeted as immigration flowed to northern states (it lost a seat in Congress in 1811, as Massachusetts is about to). Land values sank—the same size parcel of land was worth eight times more in the Northeast. Mount Vernon and Monticello began to crumble, literal symbols of dilapidation. (Dunn includes a striking photograph of an unkempt Monticello, looking like something out of *Hee Haw*). The local political system seemed broken as well—a deeply conservative state government resisted every possible act of progress, from roads to schools, and in 1820, even with a Virginian running for president, only 3 percent of those eligible cast votes. As the North and West began one of the great economic take-off periods in all of human history, Virginians devoted their energy to fighting progress, fiercely if necessary.

One problem was that this state, which had done so much to lead Americans toward democracy, had not developed a very deep democracy of its own. Power was firmly in the hands of the Tidewater elite, to the immense frustration (as Dunn finds in their words and writings) of the rising numbers living on the western side of the Blue Ridge Mountains. Most white males were disenfranchised, and many understood quite clearly that they were being shut out precisely so that they could not interfere with "the Slave Power." This led to deep frictions, and the eventual emergence of the state of West Virginia during the Civil War.

What makes the dilemma all the more fascinating is that two of the greatest theorists of democracy in American history were there watching it all unravel—powerless to stop it and, even worse, somewhat to blame. The story of Thomas Jefferson during the last 15 years of his life is more complex than the myth we have of the sage of Monticello, penning brilliant letters to John Adams and designing the University of Virginia (UVA). In fact, as Dunn makes clear, the great apostle of revolution underwent a series of intellectual revolutions of his own, bringing him closer to the interests of hard-line defenders of slavery: by the end of his life, and well afterwards, they lionized him as an ardent defender of Southern principles. It was not the most elegant final resting place for the author of the Declaration.

JOAN MARCUS



DEREK MCLANE STUDIO

DEREK MCLANE STUDIO

Opposite page: McLane's Tony-nominated set for the *Pajama Game*. Clockwise from left: From *Grease*, a model and a stage shot of Sandy and Danny at the drive-in. A model of the lockers from *Grease*'s opening number

be onstage. McLane solved that problem by building a set with the necessary props—tables, cabinets, clocks, candelabras, and gramophones—cramming a wall of shelves that stretched outside the proscenium, suggesting that the survival story onstage was both personal and emblematic of postwar Germany as a whole.

Creating a unified pattern or texture out of seemingly mismatched pieces, such as a wall of antiques, has become a theme in McLane's work. His design for the current Broadway revival of *Grease* opens with a bank of student lockers in drab greens, grays, yellows, pinks, and blues. A 1950s advertisement for Westinghouse refrigerators, showing dozens of identical units in different colors, inspired the set. "With that kind of celebration of mass production there was also a certain amount of anonymity in the country," McLane says. "The high-school kids all struggle with anonymity, they all struggle with how do you not just be one of those refrigerators, one of those lockers?"

"When it's done right," he concludes, "you can't tell where the design begins and the direction leaves off, or vice versa. There's a seamless connection between those things." During the first number of *Grease*, when the locker doors burst open to reveal the students behind them, McLane's set highlights the characters' internal struggle against anonymity and places it center stage. The set does what he wants all his sets to do: it tells the story.

—PAUL GLEASON

ans to a share in the political process. In 1829, at Virginia's first constitutional convention since 1776, he spoke before a bitterly divided audience and his remarks not only failed to unite the delegates, they were so quiet that he was essentially inaudible. "It was," Dunn writes, "as if the former president and coauthor of *The Federalist* had not even spoken."

The problem, of course, was slavery: the system that implacably opposed all efforts to change it. Madison understood this quite clearly, and wrote that "slavery and farming are incompatible." But the most reasonable man in America was powerless to reason his way out of the predicament. It would have helped Dunn's argument to hear African-American voices more loudly, but even without them, she makes the point that slavery corroded every aspect of this proud state's existence, to the point where Virginia was itself enslaved. The story of the commonwealth's rise, fall, and subsequent rise again offers a helpful lesson to a nation with a habit of taking good news for granted.

"It was as if the former president and coauthor of *The Federalist* had not even spoken."

Dunn argues quite convincingly that Jefferson's effort to found the University of Virginia was more parochial than we remember: he was desperate to find a way to inoculate young Virginians against the ideas they were learning at Harvard and other subversive places. Harvard, he fretted, converted students into "fanatics and tories"—an outrageous charge when what he truly feared was the opposite: students able to reason for themselves. The early UVA was hardly a citadel of academic freedom: in fact, student speeches were banned after one brave Virginian gave an anti-slavery address on Jefferson's birthday. (Harvard continued to attract Southerners; nearly 300 of its alumni would fight for the Confederacy.)

James Madison also had a bumpy road to travel in his final years. Not as outspoken as Jefferson, but still devoted to his caste, he sided with the Tidewater elite when push came to shove, and did little to advance the claims of ordinary Virgini-

Ted Widmer '84, Ph.D. '93, director of the John Carter Brown Library at Brown University, edited the two American Speeches *volumes of political oratory in the Library of America. His next book,* Ark of the Liberties: America and the World, *will be published this summer.*

Chapter & Verse

Correspondence on not-so-famous lost words

Suzanne Ekman hopes someone can identify a source for the following line, possibly from a Mark Van Doren poem: "…but where were you?"

Perry Miles asks which author, when queried about whether any difference existed between the "tyranny of the left and that of the right," replied, "It is the difference between dogs and cats" (or words to that effect).

"inglorious Miltons" (May-June 2006). Richard Barbieri forwards a copy of the poem "After Sending Freshmen to Describe a Tree." He thinks that its author, Robert Hogan, may be the late editor of the *Dictionary of Irish Literature,* a longtime professor at the University of Delaware. The 10-line work begins, "Twenty inglorious Miltons looked at a tree and saw God," and ends, "Not one of the Miltons saw any trees. / If you must see a tree, clean, clear, and bright, / For God's sake and mine, look outside your heart and write."

Send inquiries and answers to "Chapter and Verse," *Harvard Magazine,* 7 Ware Street, Cambridge 02138, or via e-mail to chapterandverse@harvardmag.com.

Illustration by Tom Mosser

New England

REGIONAL SECTION

FROM LEFT TO RIGHT: COURTESY OF ART; THE HARVARD COLLEGE LIBRARY ©PRESIDENT AND FELLOWS OF HARVARD COLLEGE; KRIS SNIBBE/ARTS FIRST

Extracurriculars

SEASONAL

• April 11 at 8 P.M.
www.harvardgleeclub.org
617-495-5730
To celebrate its 150th anniversary (see page 69), the ***Harvard Glee Club*** offers the world premiere of Dominick Argento's *Apollo in Cambridge,* and joins the Holden Choruses for Stravinsky's *Symphony of Psalms.*

• May 1-4
www.fas.harvard.edu/arts
617-495-8690/76
The annual ***Arts First*** festival offers dances, concerts, plays, and other performances in and around Harvard Square. Saxophonist Joshua Redman '91 is the Arts Medalist.

THEATRE

The American Repertory Theatre
www.amrep.org; 617-547-8300
At the Loeb Drama Center
• Through March 16
Julius Caesar. The company presents three of Shakespeare's most vivid characters—Caesar, Brutus, and Mark Antony—as they grapple with tyranny, political ambition, and revolution.
At Zero Arrow Theatre
• April 2-May 4
Elections and Erections—A Chronicle of Fear and Fun, written and performed by satirist Pieter-Dirk Uys, explores political madness and outrageous events.

NATURE AND SCIENCE

The Harvard-Smithsonian Center for Astrophysics
www.cfa.harvard.edu/events.html
617-495-7461
Phillips Auditorium, 60 Garden Street.
• March 28 at 7:30 P.M.
Science-fiction movie night features *Mission to Mars* (2000; rated PG).
Lectures, followed by rooftop viewings (weather permitting), occur as follows:
• March 20 at 7:30 P.M.
"Science News: The Good, The Bad, and the Outrageous" with *USA Today* journalist Dan Vergano.
• April 3 at 8 P.M.
"Crazy About the Moon," a staff lecture for kids aged 8-13.
• April 17 at 7:30 P.M.
Harvard College Observatory associate Charles Lada talks about "The Search for Stellar Origins."

The Arnold Arboretum
www.arboretum.harvard.edu
617-524-1718
• Through March 30
Changing Nature features the photographs of Erik Gehring, who has been shooting images at the 265-acre site during the last two years. www.erikgehring.com.
• April 13, 1-2:30 P.M.
Take a guided stroll through the arboretum to search for blooming plants and other signs of spring. The event is free, but advance registration is necessary.
• April 15 at 7 P.M.
Come to a free lecture by Kenneth Helphand, author of *Defiant Gardens: Making Gardens in Wartime.*

LIBRARIES

http://hcl.harvard.edu/info/exhibitions
Lamont Library 617-495-2450/5
• Continuing
Harvard College Annual International Photo Contest showcases images taken by undergraduates during study trips abroad in 2006 and 2007.
Houghton Library 617-496-4027
• Through April 26
Building on Strength and Broadening

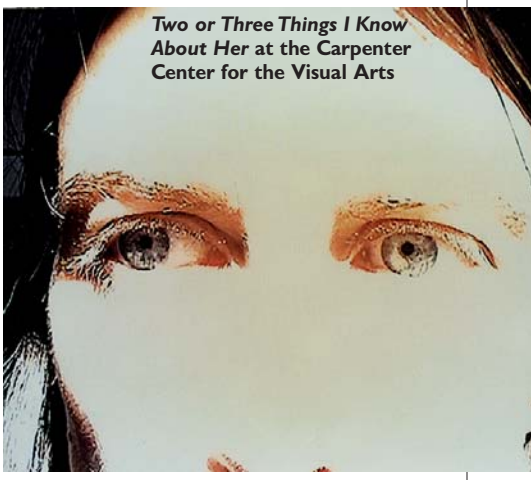
Left to right: *Elections and Erections* at ART; an image from the annual College international photography contest on display at Lamont Library; traditional Korean drumming at Arts First.

Horizons offers works, including Alfred Edward Chalon's watercolor *The Three Graces* (page 28E), that show how recent acquisitions support teaching and research.

EXHIBITIONS

Carpenter Center for the Visual Arts

www.ves.fas.harvard.edu
617-495-2317
• April 3 at 6 P.M.
"An Evening with Jeff Koons." The artist speaks about his work; a reception follows.
• Through April 6
Two or Three Things I Know About Her features the video, sound, and slide work of five New York City artists: Moyra Davey, K8 Hardy, Sharon Hayes, Ulrike Müller, and Wynne Greenwood, and examines the intersection of sexuality, freedom, and urban spaces.



CARPENTER CENTER FOR THE VISUAL ARTS

Two or Three Things I Know About Her at the Carpenter Center for the Visual Arts

Busch-Reisinger Museum

617-495-2317
• Opening March 31
A Taste of Power: 18th-Century German Porcelain for the Table. Four delicate works reveal how this Baroque art form, featured at court festivals and banquets, enhanced status and power.

Fogg Art Museum

617-495-9400/9422
• Continuing: ***Long Life Cool: Photographs by Moyra Davey*** encourage a closer look at everyday images and objects.

Peabody Museum of Archaeology and Ethnology

www.peabody.harvard.edu
617-495-1027
• Opening March 13; lecture at 5:30 P.M.
Storied Walls: Murals of the Americas

Anyone can give

advice about investing.

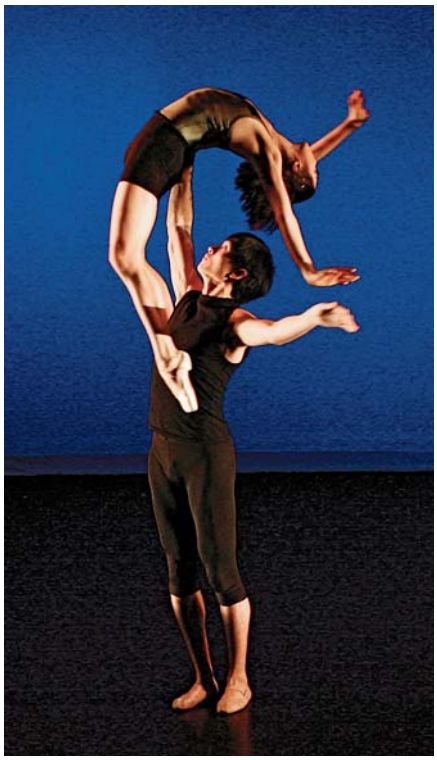
We suggest

investing in advice.

Introducing the Cambridge Trust Thought Series.℠ It's hard to put a dollar value on peace of mind. Financial security. Or a trusted advisor. At Cambridge Trust, our approach features the expertise of both an investment officer and a trust officer managing your assets and guiding your financial future. We also offer the Cambridge Trust Thought Series — an engaging series of talks that feature nationally known authors and speakers discussing topics such as wealth and family dynamics, philanthropy, and healthcare. If you'd like to learn more about upcoming Thought Series events, please contact Michael A. Duca, Executive Vice President, at 617-441-1571 or michael.duca@cambridgetrust.com. We look forward to hearing from you.

Cambridge Trust Company

WEALTH MANAGEMENT



HARVARD DANCE CENTER

examines the social and political meanings of wall paintings from Arizona, Peru, Guatemala, and Mexico. The opening talk is by Boston University assistant professor of archaeology William Saturno.

Semitic Museum
www.fas.harvard.edu/~semitic
617-495-4631
Continuing: ***The Houses of Ancient Israel: Domestic, Royal, Divine*** features a full-scale replica of an Iron Age (ca. 1200-586 B.C.E.) village house.

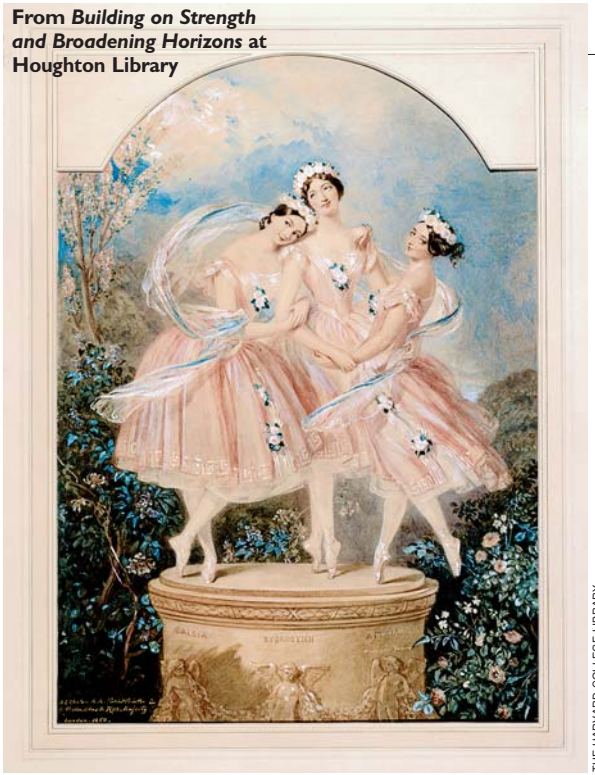
Harvard Museum of Natural History
www.hmnh.harvard.edu
617-495-3045
• Opening March 20
Sea Creatures in Glass. Leopold and Rudolph Blaschka, the same father-and-son team that produced the glass flowers, created hundreds of exquisite glass invertebrates, 60 of which are on display in this exhibit. See delicate anemones and jellyfish, squid, sea slugs, and other sparkling, anatomically correct specimens.

DANCE

The Harvard Dance Center
www.fas.harvard.edu/~dance
617-496-2222; 617-495-8683
60 Garden Street.
• March 19 at 7:30 P.M.
A discussion with the dancers follows the performance, by members of the Boston Ballet Company, of excerpts by choreographers Twyla Tharp and George Balanchine.
• April 4-5 and 11-12 at 8 P.M.
The ***Harvard Contemporary Dance Ensemble*** performs works by Paul Taylor and Trey McIntyre, and the *Threepenny Opera Suite*, by program director Elizabeth Bergman, accompanied by the ***Harvard Wind Ensemble.***

FILM

The Harvard Film Archive
www.harvardfilmarchive.org
Visit the website for complete listings.
617-495-4700
• March 9-10
American director David Gordon Green



From *Building on Strength and Broadening Horizons* at Houghton Library

THE HARVARD COLLEGE LIBRARY

appears in person to discuss his films, including *All the Real Girls*, *Undertow*, and *Snow Angels*, which will be shown as part of the series.

• March 15-28
Manoel de Oliveira. This comprehensive retrospective explores the life and work of the acclaimed Portuguese director who, at 99, is still making films throughout Europe.

MUSIC

Sanders Theatre
www.fas.harvard.edu/~tickets/
617-496-2222
• March 14 at 8 P.M.
The ***Harvard-Radcliffe Collegium Musicum*** performs Bach's Mass in B Minor to help celebrate conductor and director of choral activities Jameson Marvin's 30 years at the University.
• April 19 at 4 P.M.
Harvard Jazz Bands with Benny Golson and Mulgrew Miller.

At Lowell Hall:
• March 15 and April 25 at 8 P.M.
The ***Harvard Wind Ensemble*** performs various works.

HARVARD MUSEUM OF NATURAL HISTORY

Events listings also appear in the *University Gazette*, accessible via this magazine's website, www.harvardmagazine.com.

Haute Naturelle

A tiny restaurant serves regional fare in high French style.

Above: Kitchen with a view, at T.W. Food

The charmingly small, civilly quiet T.W. Food, in the Huron Village area of Cambridge, seems to have arrived in the right place at the right time, and with the right philosophy of dining. The owners, chef Tim Wiechmann (T.W. to you) and his wife, Bronwyn Wiechmann, espouse the grassroots principle—"Eat local"—that is the current rage among foodies.

T.W. Food not only buys regional ingredients—butter from Vermont Butter and Cheese, beef from Concord's Big Ox Farm, bread from B & R Artisan Bread in Framingham—but stresses organic and minimally processed foods, even tilting its wine list to organic and biodynamic vintners. It's all about "getting the sourcing to the plate," as T.W. puts it; those sources are so fresh that the menu changes daily. If you see something you like, well, *carpe diem*, or perhaps *carpe plat*, because it might not be offered tomorrow.

The kitchen treats these local morsels with high French style: T.W. trained at Le Cordon Bleu in Paris and apprenticed at top restaurants there: Taillevent and L'Arpège. He met his wife while working at Ten Tables in Jamaica Plain; they then spent a year in Paris before opening their own place. Wiechmann, though born in Massachusetts, grew up in Switzerland, Austria, Germany, and France, and spent time in South America and Asia (his father, Ulrich Wiechmann, was a globetrotting academic affiliated with Harvard Business School), so his "Slow Food" blend of high-end cuisine with local produce admirably reflects his background.

We settled ourselves at one of only 12 tables—minimalism is a theme here; the menu offers four starters, four main courses, and no hefty portions—to enjoy a complimentary *amuse-bouche:* a pork terrine with red peppercorn and rosemary garnish, served in a delicious buttery puff pastry. (The chilled terrine might have had even more flavor had it been at room temperature.) A scrambled (local) egg with chestnuts and wild black trumpet mushrooms ($12), imaginatively served in a martini glass, presented an offbeat mix of flavors, the woodsy, potent mushroom playing off against the mild egg. The boudin blanc sausage of pork with bread crumbs ($15) was a trifle bland, despite a perfume of black Périgord truffle and a potato mousseline accompaniment. Yet a salad ($11) of simple, clean flavors—razor-thin slices of local apples, Maine heirloom yellow-eye beans—delighted the palate with its variety of farm vegetables and the eye with a spectacular geometric presentation.

The roasted wild monkfish ($29), with black trumpet mushrooms and a sugar-pumpkin sauce, had a delicious buttery flavor and a firm texture. Its somewhat Asian presentation embraced a delicate white daikon radish. Winter root vegetables ($28), including salsify, parsnip, potato, and baby leek, cooked to textural perfection and served in a creamy gratin of blue cheese, rebutted superbly the notion that you can't eat "locally" in cold months.

We ended with a few crisp, dainty profiteroles in a light orange crème anglaise and tried "Scotch and cigars," a chocolate-mousse cake with single-malt Scotch syrup and another crème anglaise, this one infused with flavor from tobacco leaves—given city ordinances, perhaps the only legal way to consume tobacco in a Cambridge restaurant. We preferred the profiteroles, but our local consciousness had been raised. ~ CRAIG LAMBERT

T.W. FOOD
377 Walden Street
Cambridge
Dinner 5-10 P.M.
Monday-Saturday
(617) 864-4745
Reservations recommended.
twfoodrestaurant.com

Photograph by Joel Veak

Hammond Residential

GMAC Real Estate

Belmont Hill near Habitat on half acre. Magical English Manor house with spectacular grounds. First- and second-floor master suites. $1,495,000

Watertown...Immaculately restored c.1919 Colonial. Two fireplaces, many built-ins, French and pocket doors. Enclosed English garden. Two-car garage. $639,000

Cambridge...MUST SEE 2007 Modern Arts & Crafts home with separate entrance office suite. Deck, landscaped yard, and parking. $1,190,000

Cambridge...Near Radcliffe: Former stable transformed! Expansive entertaining spaces, fireplaces, 8 rooms, and exceptional grounds. Beautiful! $1,445,000

Cambridge...Luxurious Avon Hill duplex with four bedrooms and three baths. Gas fireplace, private deck, patio, and parking. $1,699,000

Cambridge...Steps from Harvard Square. Renovated 3-bedroom, 2-bath coop with river views. Period detail, hardwood floors, gorgeous kitchen. $985,000

Waltham...Custom brick 7 room ranch. Full finished lower level. Two-car garage. Circular drive, central air. Bentley College area. Open floor plan. Spacious lot. $649,000

Cambridge...Harvard Square at "Riverview," a beautifully renovated two-bedroom condominium in luxury full-service building. Lovely garden views. $610,000

Watertown...Two extraordinary residences of 3,000+ sq. ft. Elegant period details. State-of-the-art appointments throughout. Garage, yard. $995,000+

Hammond's Belmont Office has moved to Belmont Center! Our new address is 84 Leonard Street.

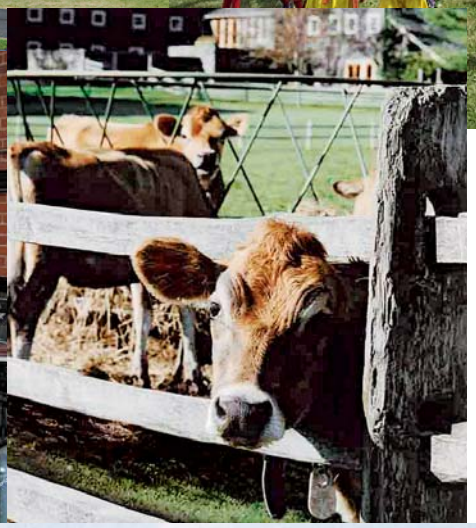
www.hammondre.com

Cambridge, Belmont, Watertown & Somerville
Residential, Commercial, Rentals & Property Management
Cambridge Office 617-497-4400 • Belmont Office 617-484-1900

Out and About

An eclectic look at things to do and see in New England

by Nell Porter Brown



Clockwise from far left: Gedney Farms, Bowdoin College Museum of Art, Maine Swedish Colony Midsommar, Billings Farm and Museum, the Fuller Craft Museum, and the Museum of Work and Culture

As WINTER is nudged out by the first warm days of spring and the refreshing sight of a few green shoots, we all welcome the chance to explore our environs anew. Herewith our array of places to visit throughout the region. Far from complete, the grouping represents a mix of the great outdoors, unheralded museums, atypical jaunts, cozy retreats, and festive public occasions that comprise some of the reasons we cherish New England in the warmer months.

Gillette Castle State Park

East Haddam, Connecticut
ct.gov/dEP/cwp/view.asp?A=2716&Q=325204
860-526-2336 (seasonal hours)

THIS 184-ACRE ESTATE in southeastern Connecticut was developed in the early 1900s by the blue blood-turned-actor William Hooker Gillette (who pioneered the role of Sherlock Holmes with his deerstalker hat and curved pipe). The park features splendid grounds for picnics and hikes, along with a 24-room, German-inspired "medieval castle," handcrafted from local fieldstone—complete with turrets, balconies, and, on the inside, spooky nooks and crannies sure to beguile anyone. The **Goodspeed Opera House** is nearby; so is the beautiful **Devil's Hopyard State Park**, which is renowned for its birdwatching and fishing.

The Fuller Craft Museum

Brockton, Massachusetts • fullercraft.org
508-588-6000

THIS LITTLE-KNOWN GEM aims to become an "international forum for the

CLOCKWISE FROM FAR LEFT: COURTESY OF GEDNEY FARMS; DAN GAIR/BLIND DOG PHOTO, INC.; FRED FIELD; COURTESY OF BILLINGS FARM AND MUSEUM; COURTESY OF FULLER CRAFT MUSEUM; COURTESY OF THE MUSEUM OF WORK AND CULTURE

COLDWELL BANKER
RESIDENTIAL BROKERAGE

GAIL ROBERTS & TEAM

Vice President
1730 Massachusetts Ave
Cambridge, MA 02138
617 245-4044

CAMBRIDGE, MA
This stately Shingle-style/Tudor, c. 1897 is a landmark on Brattle Street. It has 14 rooms, a grand foyer & staircase, 35'+ LR, 10 fireplaces, built-ins, leaded & stained glass windows, high ceilings, porches, balcony & stone terrace. 2-car garage with additional parking. $3,995,000

CAMBRIDGE, MA
Handsomely renovated 8+ room Colonial with slate roof and landscaped grounds. Kitchen/family room with cathedral ceiling, skylights, Viking stove, granite counters and doors to a 21' deck. The 3rd floor suite has a bedroom, bathroom and study. There is central air, a carport plus additional parking. $1,395,000

BELMONT, MA
This architecturally significant property, designed by Carl Koch in 1941, has breathtaking views of Boston. The open living/dining room has a fireplace, built-ins, clerestory windows & access to a deck & landscaped grounds. With 4 beds, cozy library w/ fireplace, this property is truly a remarkable home. $975,000

CAMBRIDGE, MA
Kendall Square – 1920's brick building home to a former barrel factory. Top floor 1 bedroom loft-style condo with high wood-planked ceilings, exposed steel beams, hardwood floors, in-unit laundry, c/a, large 12' x 11' deck and parking. A short distance to the "T", shops, restaurants and Boston. $316,000

CAMBRIDGE, MA
Renovated penthouse in a turn-of-the-century building - Spacious open living/dining, bays, large eat-in kitchen w/ island, granite counters, stainless appliances & skylight, 2+ Beds, 2 ½ Baths, Master w/ fireplace, deck, 2-car garage & c/a. Near Harvard Yard, "T", Savenor's Market & Darwin's Cafe. $778,000

CAMBRIDGE, MA
This handsome 1870's Mansard Victorian with a slate roof sits on a corner lot atop Avon Hill. Features include high ceilings, deep moldings, fireplaces, inlaid floors and many bay windows. It also has landscaped grounds and off street parking for two cars.

CAMBRIDGE, MA
Riverside/Cambridgeport - 2 bedroom penthouse condominium with an open plan and parking. Living/Dining room with parquet floor, kitchen with peninsula and master bedroom with walk-in closet. Close to Central Square shops, restaurants and "T". $307,500

IF YOUR HOUSE WERE PICTURED HERE
IT COULD BE SOLD BY NOW.

CONTACT GAIL ROBERTS

#1 CAMBRIDGE BROKER FOR
COLDWELL BANKER RESIDENTIAL BROKERAGE

gail@roberts.org
gailrobertsrealestate.com
617 245-4044

FULLER CRAFT MUSEUM

recognition and exploration of craft" and features an amazing variety of examples thereof. See the enameled jewelry, wall reliefs, and paintings of Jamie Bennett, along with the "mechanical confections" of artist Gina Kamentsky, a former professional toy and game inventor. (And this summer, don't miss the exquisite sculptures composed of single sheets of paper by Japanese artist Yuko Nishimura, in her first U.S. solo show.)

And any visit to Brockton mandates eating at **Christo's**, a hugely popular (slightly kitschy) restaurant with solid Italian- and Greek-American food; the same family has owned the place since it opened in 1964.

Hotel Dolce Villa

Providence, Rhode Island • dolcevillari.com
401-383-7031

Providence's Federal Hill neighborhood, where Italian can still be heard spoken on the streets, is a perfect weekend trip. This 14-suite boutique hotel (complete with stainless-steel kitchenettes and whirlpool baths) offers white-on-white décor and sits on DePasquale Square, a European-style piazza with a huge fountain in the center. Atwells Avenue has good shopping, and nearby restaurants include **Venda Ravioli, Bob & Timmy's** (for grilled pizza), and **Pastiche**, which proffers the alluring *torta di cioccolata* along with other delectable desserts.

Skateland

Bradford, Massachusetts • skateland.com/page1.html
978-372-3050

For parents who are eager to embrace (or at least curious about) today's youngsters, the Saturday night "Teen Skate to hip hop and R&B" at this premier roller rink offers a snapshot of what goes on when hormonally crazed youth mix with loud music, the opposite sex, and rapid mobility. (Skating on other days of the week—little kids get in free with parents on Saturday mornings—is also recommended.)

Quisisana on Lake Kezar

Center Lovell, Maine • quisisanaresort.com
207-925-3500

Located near the New Hampshire border, Quisisana is an unparalleled summer-camp experience for music lovers of all ages. The Old-World-style resort features cottages, boating, swimming, tennis courts, hiking trails and—the *pièce de résistance*—a staff comprising many of the top young musicians in the country, who nightly perform anything from Broadway hits and operatic arias to classical music and barbershop quartet numbers.

Bowdoin College Museum of Art

Brunswick, Maine • bowdoin.edu/art-museum
207-725-3275

The museum, reopened following a $20.8 million renovation, affords an intimate look at a range of works by such artists as Winslow Homer, Mary Cassatt, and landscapist John Appleton Brown, along with decorative arts, European paintings, some sculpture, ancient artifacts, and an interesting selection of African-American works.

BOWDOIN COLLEGE MUSEUM OF ART

Silver Lake State Park

Hollis, New Hampshire • nhstateparks.com/silverlake.html
603-465-2342

Silver Lake State Park, across the Massachusetts border near Nashua, has 80 acres of woodlands, along with a 1,000-foot sandy beach, picnic tables, playing fields, and paddleboats. On the way there or back, stop at **Parker's Maple Barn** in Brookline, where, during March and April, you can watch syrup being made the old-fashioned way—with a wood-fired evaporator—by guys who have been doing it for years. Breakfast is served all day.

FRED FIELD

Lobster Boat Races

lobsterboatracing.com

Starting June 21 in Boothbay Harbor and continuing on summer weekends throughout coastal Maine, shoreline spectators gather with picnics and coolers to watch lobstermen (and women) push their crafts to the limit for bragging rights and cash prizes. Marvel at the souped-up fishing boats, some festooned with American and pirate flags, whip across the water at 55 miles per hour or more, and see the winners bask unashamedly in the power of victory. Local haunts often host post-race gatherings where everyone comes to drink and argue (in fun) about the day's showings.

Mary Baker Eddy Library and Mapparium

Boston • marybakereddylibrary.org
617-450-7000/800-222-3711

This beautiful neoclassical building houses artifacts related to the founder of Christian Science, which links God's work and good health. It is also a magical place to learn about spirituality, geography, and world leadership. The Mapparium, built in 1935, is a three-story, walk-through glass globe that puts visitors in the center of the earth—at a time when Africa was still divided into European colonies. Listen to an audio tour with quotations from Helen Keller, Martin Luther King Jr., and Winston Churchill, among others, and go to the

Hall of Ideas, where digitized words bubble up through a fountain and overflow onto the walls.

Portuguese National Club

Stoughton, Massachusetts • portuguesenational.com
781-344-9890

If you just want to kick back and relax with a juicy seafood stew, Azorean-style octopus, soft rolls, and a bottle of fresh *vinho verde*, hop the commuter rail from South Station to Stoughton and walk to this beloved local establishment. The club (you don't have to be a member to eat there) also offers pool, table soccer (foosball), an expansive bar—along with nice people who help each other translate your English—and lots of good cheer. They won't take your credit card, but $60 should cover a hearty dinner and several drinks for two, along with a few rounds of games.

Coolidge Hill Reservation

Manchester-by-the-Sea, Massachusetts
thetrustees.org/pages/292_coolidge_reservation.cfm
978-526-8687

Enjoy a walk along lush wetlands and marshes out to Coolidge Point, a majestic expanse of lawn and old shade trees right on the ocean, edged by rocky headlands great for climbing and picnics and private spots for sun-bathing or meditation. The 64-acre site is owned by the Trustees of Reservations, and also offers an easy one-mile trail around Clarke Pond and Magnolia Beach.

Dinosaur State Park

Rocky Hill, Connecticut • dinosaurstatepark.org
860-529-8423

Beneath a geodesic dome on a grassy field a few miles south of Hartford appear Jurassic fossil tracks made 200 million years ago. Visitors can see the tracks up close, along with life-sized dinosaur dioramas and a display showing how the tracks were discovered by a bulldozer operator digging a foundation for a state laboratory about 42 years ago (500 of the 2,000 tracks found are on display; the rest are buried for preservation purposes). The park also features nature trails and an arboretum that aims to grow as many Mesozoic-era plants as possible.

Maine Swedish Colony Midsommar

June 20-22 • New Sweden, Maine
geocities.com/maineswedishcolony
207-896-5874 (for organizer Debbie Blanchette)

THIS SMALL, LIVELY festival honors the summer solstice and Swedish history in the far northeast corner of Maine through an enchanting Maypole (Majstång) dance in which children and adults dress in traditional garb, hand out flowers, and decorate the pole, accompanied by guest musicians and professional folk dancers. On Saturday evening, everyone gathers for the *smörgåsbord* (advance tickets required), followed by dancing and a bonfire. The Swedish colony, originally settled in 1870, reached its peak population in the early 1900s; now, organizers say, roughly 100 people of Swedish heritage still live in the area. A museum with pioneer-day artifacts is also worth a look. The village is a 15-minute drive from New Brunswick (or you can fly to nearby Presque Isle from Bangor or Portland).

BILLINGS FARM AND MUSEUM

Billings Farm and Museum

Woodstock, Vermont • billingsfarm.org
802-457-2355

THIS FARMSTEAD is just one of the special things to see and do in and around Woodstock, a small town with nice shops, antiques, restaurants, and unparalleled mountain-biking routes. Located within walking and biking distance of the town center, the Billings farm provides an intimate look at a working dairy farm and barnyard life, including a tour of the main house (built in 1890), which contains the creamery. The site's mission is to keep alive age-old New England traditions while promoting stewardship of the land for generations to come. The daily butter churning is great fun, as is the chicken program, in which staffers relay every-

Premier Properties

WASHINGTON SQUARE STUNNER

Absolutely stunning home in highly sought-after Washington Square, Brookline. This fabulous 3 bedroom, 2 full + 2 half bath condominium has unbelievable period detail, including intricate wainscoting, carved mantels, original alabaster wall treatments, box-beamed ceilings, and 2 fireplaces. Living and entertaining areas nicely separated from bedrooms/ office space. Separate entrance to first level is perfect for a private home office. Two deeded parking spaces. Enjoy the outdoors with a common patio and beautiful garden. Truly breathtaking! *Offered at $849,000*

WILLIAM RAVEIS
REAL ESTATE & HOME SERVICES
New England's Largest Family-Owned Real Estate Company
191 Grove Street, Chestnut Hill, MA 02467

Kathy Halley, MBA - KHalley@MBA1999.HBS.edu
Mary Gillach, MA, MBA - Mary.Gillach.wg93@Wharton.Upenn.edu
(617) 762-3570 • http://Gillach-Halley.raveis.com

FEATURE YOUR PROPERTY IN THE PREMIER PROPERTIES SECTION:

Reach 84,000 *Harvard Magazine* readers in the New England area.

Your ad will be in an exclusive editorial environment, targeting affluent and educated readers.

It's easy – just email a photo and description to myha_nguyen@harvard.edu and we'll format the ad for you.

OFF BRATTLE STREET CAMBRIDGE

Skillfully renovated in 2005 2-family. Spacious owner's unit feels like a single. Five bedrooms plus study and five baths. Open family room and gourmet kitchen. Separate-entry one-bedroom apartment. State-of-the-art systems. Steps to Huron Village. *Exclusively Offered $2,400,000*

COLDWELL BANKER
RESIDENTIAL BROKERAGE

Barbara Currier
Direct: 617-864-8892 ext. 287
800-255-7545 ext. 287
Barbaracurrier@comcast.net
BarbaraCurrier.com

Ask me about The Harvard Real Estate Assistance Program!

171 Huron Avenue • Cambridge, Mass. 02138

303 THIRD STREET
University Residential Communities

A cooperative residence for the Harvard, MIT, and MGH communities. A unique residence conceived by Harvard and MIT alumni, administrators, and professors to reconnect you with the institutions and the city that have shaped your life. Join those with an affinity for the university lifestyle at University Residential Communities at 303 Third Street. Reservations are being taken now for one-, two- and three-bedroom residences for occupancy beginning in the fall of 2008. Please call **617-374-9303** for a personalized tour.

303 THIRD STREET
www.303third.net

Information Center
300 Third Street
Cambridge, MA 02142
tel (617)374-9303
fax (617)374-9307
urc@bealresidential.com

Marketing Agent: URC / Beal and Company, Inc.

Exclusive Carol & Myra Listing

19 Chauncy Street, 4B

©Jeffrey Dodge Rogers

Treetop views, garage parking, an outdoor pool, and an elevator are some of the delightful features of this gracious two-bedroom, two-bathroom condo that is a short walk to Harvard Square, and its many shops and restaurants. You will be swimming this spring!

Offered at $599,000

Carol Kelly & Myra von Turkovich
Vice Presidents, ABR
Two Brattle Square • Cambridge • MA
617.497.4400 • ext. 241 & 243
carolandmyra@hammondre.com
www.hammondre.com

caroland myra.com

Hammond Residential
GMAC Real Estate

POCONO REGION
Northeastern Pennsylvania

This 486-acre Deerbrook Estate rests serenely amid old-growth forest and fields, surrounded by mountains, a private steam, and ponds. The estate offers privacy, beauty, recreation, and plenty of room for horses. Award-winning gardens encircle the beautifully restored 1870's manor house, whose 4,500 sq. ft. display an exceptional level of craftsmanship and attention to detail. Invest in this outstanding estate just 2.5 hours from New York.

LF
LEWITH & FREEMAN
Real Estate, Inc.
www.lewith-freeman.com

Lewith & Freeman
Real Estate
570-696-3801
Contact
Rhea Simms
570-696-6677

If you would like to list a property in our May-June issue, contact Myha Nguyen: 617.496.4032

HARVARD MAGAZINE

thing you'd want to know about how chickens make eggs, communicate, and live peaceably in close quarters. Also worth visiting is the **Marsh-Billings-Rockefeller National Historic Park.**

Gaspee Days

May 18, May 24-26, and June 13-15
Cranston and Warwick, Rhode Island
http://gaspee.com/GaspeeDaysEvents.htm

On June 9, 1772, Pawtuxet Village was the site of a major act of colonial defiance: When HMS *Gaspee*, a British revenue schooner, ran aground in the bay while chasing a packet ship, patriots boarded the vessel and torched it. Each year, local residents reenact the burning at the finale of the Gaspee Days festival. This year's reenactment takes place on June 15, but related events begin May 18 and include a craft fair, parade, and costume contest, a revolutionary encampment, and a 5K road race. Stay in Providence—just minutes away—or at **Edgewood Manor,** a bed and breakfast in a Greek Revival mansion.

Cross Sound Ferry

New London, Connecticut
longislandferry.com/Default.asp
860-443-5281 (check seasonal schedule)

Boats leave from here for Long Island, Block Island, and Martha's Vineyard. Pack your bikes, and pick a destination. On Long Island, one can tour dozens of East End wineries—many of which are open year-round with special tasting events, music festivals, and galas. Block Island, the smallest town in the smallest state, offers urbane and pastoral pleasures alike, along with great biking and beachside fun.

Cross Sound Ferry

CROSS SOUND FERRY

Panning for Gold in Coos Canyon

Byron, Maine • avcog.org/visit_walking.aspx
207-783-9186

The swift river pours through a 32-foot bedrock gorge at Coos Canyon, about a two-hour drive northwest of Portland, near Mexico. Visitors to the state picnic area on Route 17 can rent panning equipment from Coos Canyon Rock and Gift across the street; the store opened in 1956 and displays some of the prized nuggets found over the years. While prospectors wade through the shoals, swimmers and cliff-divers will love the 20-feet-deep waters. To be on the safe side, ask local residents which parts of the property are public or private, and follow rules to respect the land. Take a hike into the nearby **Angel Falls,** a mountain brook with a 90-foot drop—the largest one reported in Maine—and look into staying at the **Coos Canyon Cabins and Campground.**

La Laiterie

188 Wayland Ave., Providence • farmsteadinc.com
401-274-7177

Wayland square is a hip neighborhood, not far from Brown University, with several boutiques, gift shops, an art gallery, and two used-book stores (**Books on the Square** and **Myopic Books**). This excellent bistro is attached to **Farmstead,** an unusual artisanal cheese shop also owned by husband and wife on-site chefs Matt and Kate Jennings. The menu features sublime food and drink pairings and heavenly homemade pastries. If you venture downtown before or after dinner, take in a show at **Trinity Repertory Theatre** or the **Providence Performing Arts Center.** Or visit the edgier **AS220:** with a taqueria and bar, art gallery, concert stage, studio space, and community darkroom all in the building, the place is a magnet for counterculture and adventuresome tourists alike.

River Bend Farm Bed and Breakfast

Williamstown, Massachusetts
windsorsofstonington.com/RBF
413-458-3121 (open seasonally)

Innkeepers Dave and Judy Loomis helped save this 1770 Georgian Colonial farmstead and have kept it pretty much as it's always been—but now it's open to visitors interested in an authentic, historic overnight experience. Antiques abound, and the décor is genuinely rustic (no froufrou); the only indulgence is the scrumptious breakfast (with Judy's own granola, muffins, and jams). Four comfortable rooms are available, all guests share baths (one with a claw-foot tub), and common rooms for drinking tea, reading, or socializing take up the downstairs. Ask Dave for directions to nearby swimming holes, the state-of-the-art **Williams College** performance center and campus art museum, and the **Clark Art Institute** as well. Note, too, that **Thai Garden** has great sushi.

Pittsfield State Forest / Balanced Rock / Wahconah Falls

Pittsfield/Lanesborough, Massachusetts
mass.gov/dcr/parks/western/pitt.htm
413-442-8992

Walk some of the 30 miles of woodland trails in search of wildlife, streams, and waterfalls—or just plain solitude—and then take a picnic to the swimming beach for a late afternoon dip, or go for a rigorous mountain-bike ride on approved trails. Also in the forest: pay homage to a natural curiosity—the 165-ton limestone boulder balanced upon a small stone below it—or hike in to witness the scenic wonder of **Wahconah Falls.**

Fire Museum / Shoe Museum / Rocky Marciano Exhibit

216 North Pearl Street, Brockton, Massachusetts

brocktonma.com and brocktonhistoricalsociety.org offer limited information; it's best to e-mail curator Derek Canavan (bhscurator@yahoo.com). The museums are open by appointment or, most often, on the first and third Sundays of the month, 2-4 p.m. (From Boston, take Route 24 south, exit at Route 27 north, and go to the first set of lights; the museum buildings are on the left.)

Opened in 1992, **The Fire Museum**, has two beautifully restored 1850s hand-tub pumper engines—"The Protector" and "The Enterprise"—along with hundreds of smaller artifacts, from old boots and equipment to a range of helmets, breathing apparatus, and a delightful set of scaled wooden models of fire engines made by a local firefighting buff. Also on hand is an affecting display that commemorates the 13 Brockton firemen killed in the 1941 Strand Theatre disaster.

For about 160 years, Brockton was a

bustling metropolis, a major manufacturing center for American shoes: a history showcased at the unique **Shoe Museum,** along with hundreds of pairs of, yes, shoes—including Chinese footbinding materials, Native American moccasins, and footwear once worn by slaves. As part of the fast-growing "Celebrity Shoes" exhibit, you can examine Bill Clinton's jogging sneakers, dainty purple pumps that once graced the feet of Mamie Eisenhower, Ted Williams's game-worn cleats, and shoes from Brockton native and world heavyweight champion **Rocky Marciano.** (A separate, special exhibit of privately owned Marciano artifacts—on display for the first time—opens in March.) Also of note are about 40 pairs of military footwear dating from the Civil War through Desert Storm. Stonehill College's on-line archives offer further information: stonehill.edu/archives/Shoe/Specialty/museumcollectionshome.htm.

Scotch Hill Inn

Ogunquit, Maine • scotchhillinn.com
877-423-2240

This simple, tasteful bed and breakfast in the heart of the town is a five-minute walk from sandy beaches, trails, art galleries, and exceptional restaurants. The innkeepers are nurturing, generous hosts who also know how to have fun: they provide three-course breakfasts and, during summer weekends, offer wine and cheese gatherings and themed barbecues. Special massage and spa weekends are available, as are group rates for "Girls Night Out" and off-season packages.

Union Fair

August 17-23
Union, Maine • unionfair.org
207-785-3281

This annual event is both a legitimate and inspiring agricultural festival, and a week of fun-filled, homegrown activities spent communing with fellow human beings—something we often forget can actually be more satisfying than watching TV. For starters, there are the pig scramble, the pie-eating and bubblegum-blowing contests, and the rooster and hen cackling competition, which take place amid the usual carnival rides, fried-dough booths, and games of chance. 4-H Club

members show off their animal handling skills in one arena (a wonderful animal-petting tent is open all the time), while the adults brag about their tractors and livestock in weight-pulling events or strut their stuff in the traditional "He-Man Contest." At night, bands play until late and endless homemade dinners of turkey and gravy are served. Lastly, don't forget to attend the coronation of the "Maine Wild Blueberry Queen."

Gedney Farm

New Marlborough, Massachusetts
gedneyfarm.com
800-286-3139/413-229-3131

Nestled in the southwest corner of the state, this restored Normandy-style barn has 16 elegant but rustic guest rooms surrounded by rolling farmlands, woods, and open space. At the other end of the village is a tasteful spa with yoga and Pilates classes attached to **Mepal Manor,** a deluxe country-house hotel belonging to the same owners. Both lodgings are good places from which to ramble around the Berkshires and visit their main attractions, all within striking distance. Alternatively, the guest houses are fine destinations in and of themselves, far from the hurly-burly that infects so many urban lives.

Antique and Classic Boat Festival

August 23 and 24 • Salem, Massachusetts
by-the-sea.com/bacbfestival • 617-666-8530

The 26th annual show offers a diverse array of watercraft, including hand-powered boats built from the 1890s through the 1960s, vintage powerboats, and classic yachts. It is a family-friendly, inexpensive event that celebrates the region's maritime heritage, promotes preservation, and encourages young boaters to take to the seas. Many owners open their decks and galleys to visitors while reciting tales of their boats' illustrious histories.

Antique and Classic Boat Festival

ANN CAMPBELL

The Inn at East Hill Farm

Troy, New Hampshire • east-hill-farm.com
800-242-6495/603-242-6495

At the base of Mount Monadnock, this low-key family resort has a barn with animals (kids milk the cow and goat, and collect eggs), swimming pools, horseback riding, and pond swimming. Specialty weekends are devoted to, among other things, adult folk dancing, single parents, magic, cooking, and women's wellness.

Museum of Russian Icons

Clinton, Massachusetts
museumofrussianicons.org
978-598-5005

Local plastics businessman Gordon Lankton owns about 300 Russian icons—the largest collection in North America—and has put most of them on display in this museum he founded in 2006. Once owned by members of virtually every segment of Russian Orthodox Christian society, the icons span six centuries and represent styles endemic to different regions. Set in a restored nineteenth-century mill building with stunning interior architecture, the exhibits include multimedia displays on how icons were made, how they relate to world history, and how art can lead to enlightenment.

For lunch and a walk through outdoor beauty, drive an easy 10 minutes away to the **Tower Hill Botanic Garden** in Boylston. Walk in the woods, smell fresh flowers in the conservatory, or dine on the scenic terrace adjoining the on-site Twigs Café.

Cathedral of the Pines

Rindge, New Hampshire • cathedralofthepines.org
603-899-3300 (open seasonally)

Open to visitors of all faiths, this natural sanctuary among rolling hills offers quiet, fragrant pine groves, mountain views, manicured gardens, and shrines throughout its more than 200 acres. The Altar of the Nation, for example, for which stones were donated from battlefields around the world, is a memorial to all American war dead, while the Women's Memorial Bell Tower specifically honors women "who sacrificed their lives in service to our country." Public services are held on Easter, Memorial Day, and Veterans Day, and in season for those seeking solace or spiritual grounding.


Museum of Russian Icons

MUSEUM OF RUSSIAN ICONS

Museum of Work and Culture

Woonsocket, Rhode Island
woonsocket.org/workandculture.htm
401-769-WORK (9675)

This museum tells the story of the Québecois who moved to Rhode Island—trading in farming for factory work—and puts their story in the wider context of the labor movement. Visitors can step inside a Quebec farmhouse and hear the voices of young girls debating whether to leave Canada, or into a model classroom where a nun's voice sums up the children's behavior. On the factory floor, you can sort bobbins, working against the clock, just as children laboring in a textile mill might have done. Grab a meal nearby at **Ye Olde English Fish and Chips,** an 85-year-old New England institution whose name says it all, or at **Chan's,** a Chinese restaurant known for its jazz shows.

ADVANCED MANAGEMENT PROGRAM	SEPTEMBER 2008
GENERAL MANAGEMENT PROGRAM	AUGUST 2008
PROGRAM FOR LEADERSHIP DEVELOPMENT	JULY 2008

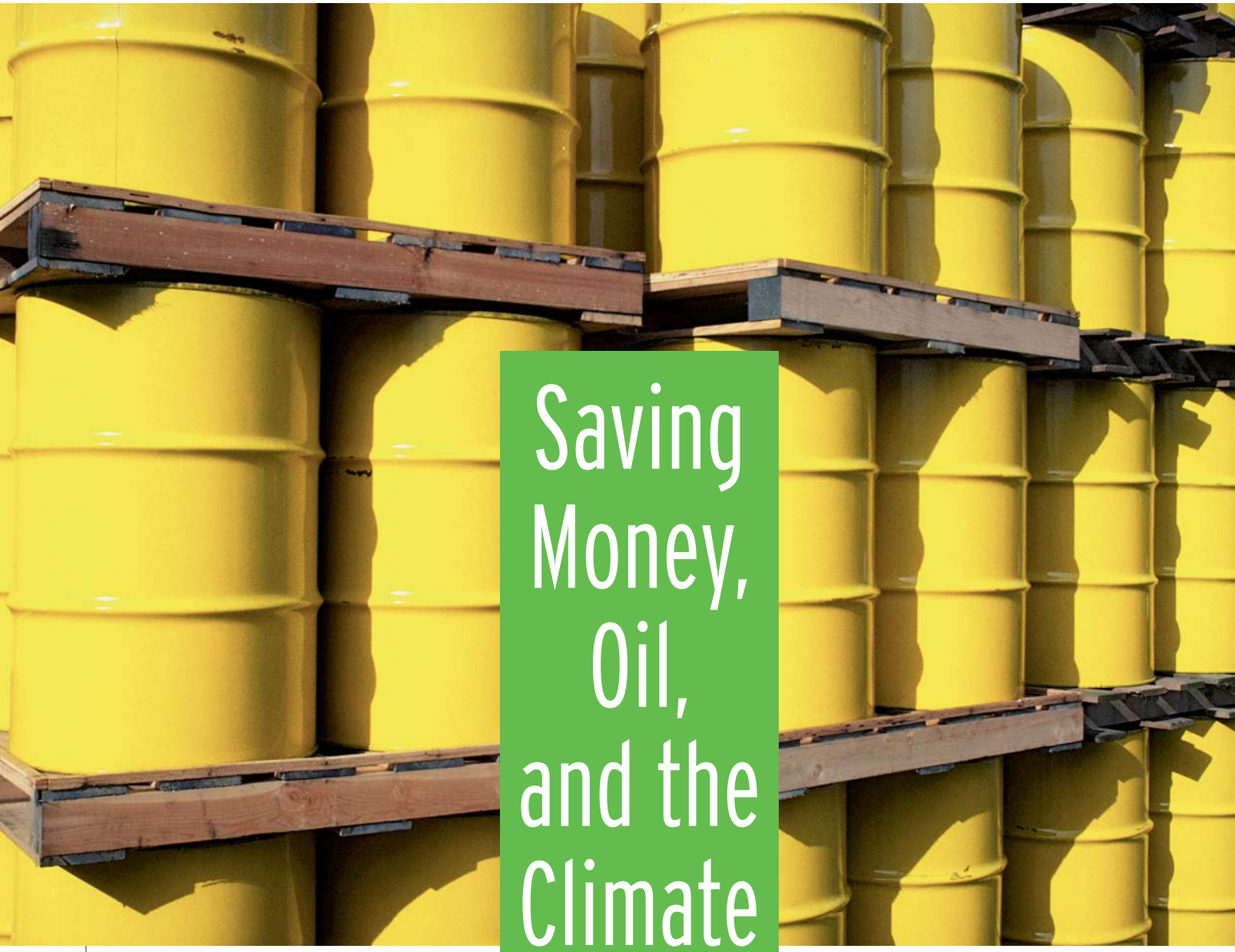
HARVARD BUSINESS SCHOOL

EXECUTIVE EDUCATION

Are you ready to take the next step forward? Then it may be time to experience Harvard Business School Executive Education. We offer a variety of comprehensive leadership programs tailored to the key transitional points in every leader's career.

Make an investment in time that returns value for a lifetime. Take a moment to review your options at www.exed.hbs.edu/pgm/clphdm.

100 YEARS
1908-2008



Saving Money, Oil, and the Climate

Using non-fossil energy sources to power our vehicles

by MICHAEL B. McELROY

The United States is in urgent need of a comprehensive, rational, and—above all—honest policy to guide its energy future, a policy that addresses two key, interrelated objectives: reducing dependence on vulnerable sources of imported oil and reducing emissions of the critical greenhouse gas, carbon dioxide (CO_2). Failure to address the first objective would imply that we are willing to accept possibly serious risks to our national security. Failure to tackle the second would confirm the increasingly prevalent international view of the United States as an irresponsible environmental citizen.

I shall argue that by changing the way we fuel our cars and light trucks—by switching from continued reliance on hundred-year-old, internal-combustion-engine technology to a combination of oil and electrically powered transportation—we could reduce our dependence on imported oil *and* lower our emissions of CO_2, and we could effect this transition at a net *savings* for the U.S. consumer. The key is to build on the success of the hybrid technology introduced by Japanese auto manufacturers (notably Toyota and Honda) in the 1990s.

The United States imported 12.4 million barrels of oil per day in 2006, a slight decrease from 12.5 million barrels per day in 2005 (reflecting reduced demand attributable to a warmer winter and a cooler summer in 2006). Imports in both years accounted for 60 percent of domestic consumption. At an average price of $66.05 per barrel, the bill for imported oil in 2006 totaled $299 billion—39 percent of the nation's trade deficit. With oil prices in early January 2008 climbing above $100 per barrel, the debt for the coming year could well exceed $450 billion (more than 3 percent of the nation's gross domestic product, potentially more than 50 percent of its international trade deficit, assuming values for 2006, the last full year for which these data were available at the time this article was written).

Combustion of oil in 2006 accounted for 44 percent of U.S.

Photograph by Michael T. Sedam/Corbis

emissions of CO_2 (2.6 billion tons of CO_2, from a total of 5.9 billion tons), with 33 percent of the total (2.0 billion tons) attributed to transportation (cars, trucks, trains, ships, and aircraft). Gasoline-powered cars and light trucks were responsible for 40 percent of total oil consumption (18 percent of CO_2 emissions), with diesel-powered vehicles responsible for another 10 percent.

The fuel economy of American cars and light trucks averaged 12.4 miles per gallon in 1960. The oil crises of the 1970s triggered an increased demand for fuel-efficient vehicles, a pattern that continued through the 1980s, with fuel efficiency per vehicle rising from 12.2 miles per gallon in 1975 to 16.9 miles per gallon in 1991. But there has been little improvement since then, a trend reflecting the increased popularity of gas-guzzling pickup trucks and heavy-duty sport utility vehicles (SUVs). Our goal should be to raise the fuel efficiency of our cars and light trucks to an entirely new standard: 100 to 150 miles per gallon is not only feasible but could be accomplished in 20 years or less, limited by the time required for cost-effective turnover of the existing transportation fleet. Compare this with the target defined in the recently enacted United States Energy Independence and Security Act of 2007 (H.R. 6): 35 miles per gallon by 2020.

The Electric Option

Hybrid electric vehicles (HEVs) incorporate a conventional internal-combustion engine working in concert with an electric motor supplied with energy from a nickel-metal-hydride (NiMH) storage battery. The battery is charged "on board" the vehicle as required, using an electric generator run by the engine. The overall energy efficiency is increased by capturing a portion of the energy that would normally be dissipated as heat upon braking the car, employing it to run the generator. When the car halts in stop-and-go city driving, the engine turns off, conserving fuel. When it is time to restart, the electric motor provides the necessary power. The savings in fuel (and CO_2 emissions) that could be realized if the entire U.S. automotive fleet were converted to HEVs could amount to as much as 30 percent of current gasoline consumption, with the additional benefit of improved air quality.

Even greater savings could be realized if HEVs were replaced by so-called plug-in hybrids. With current HEVs, the energy used to propel the vehicles is provided exclusively by their onboard fuel (either gasoline or, potentially in the future, by increased use of more efficient diesel). With plug-in hybrids, a

Photograph by Rungroj Yongrit/epa/Corbis

Running on Wind?

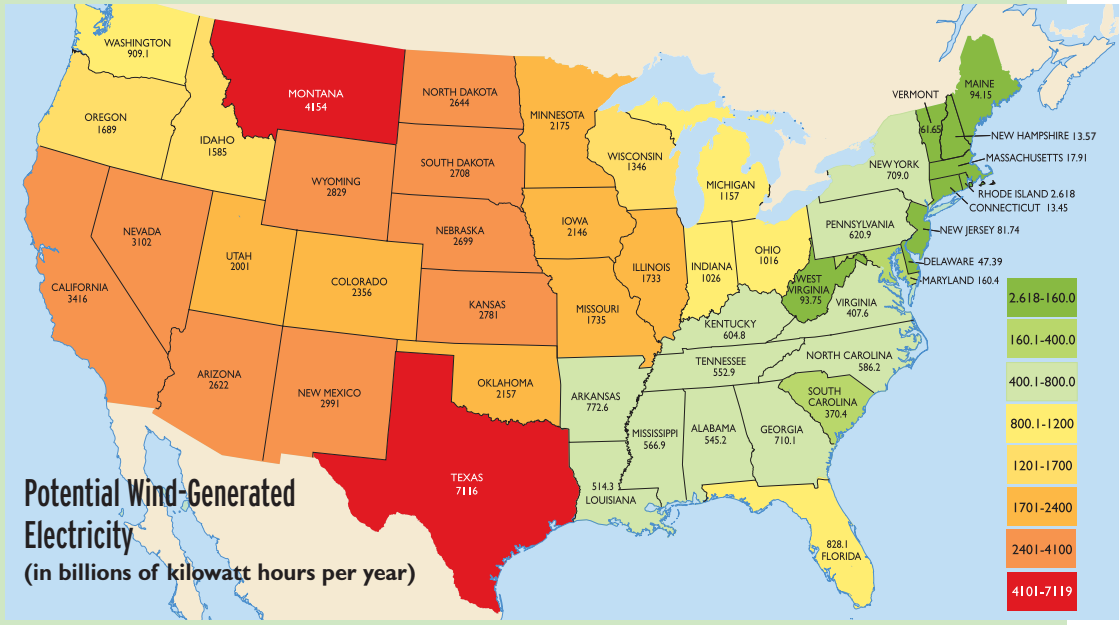
Michael B. McElroy's research group has launched an extensive program to define the potential of wind power as a source of electricity worldwide. The study capitalizes on a unique meteorology database developed by the Global Modeling and Assimilation Office at NASA's Goddard Space Flight Center. Validated by hundreds of regional and global air-quality studies, this data resource refines understanding of meteorologically dependent new energy sources, notably wind and solar, and can powerfully inform national and international strategies for their exploitation.

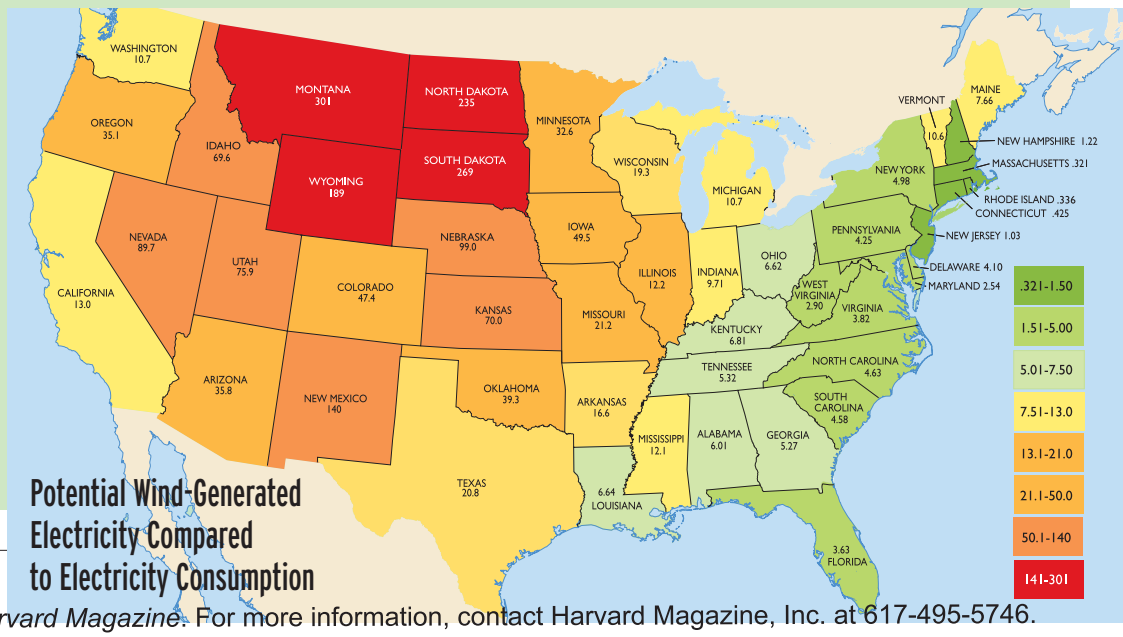
The database provides a record of wind activity every three hours averaged over a spatial grid with individual grid elements measuring 1-degree longitude by 1-degree latitude (equivalent to the area defined by a 100-kilometer by 100-kilometer square at mid latitudes, less at high latitudes, more at low latitudes) covering the entire globe. The McElroy group uses these data to calculate the electricity that could be generated by deploying specific wind turbines. Samples of preliminary results for the United States appear in the accompanying figures. They show, for example, that even for such populous, high-consumption states as California, Texas, and Florida, the potential for electricity generated by wind far exceeds total current consumption.

The results displayed assume deployment of 1.5-megawatt turbines throughout the entire country, excluding unsuitable regions such as urban and forested areas. The study identifies the variability of the wind source, which allows researchers to explore how it could be exploited in an integrated electrical system that must match variable supply to demand. It is worth noting in this context that the batteries on an expanded fleet of plug-in hybrid vehicles could provide an important opportunity for storage of electricity at times when the potential production might exceed the immediate demand. Future work will incorporate realistic economic constraints, such as: costs for installing turbines in specific regions and for extending the electrical grid to distribute the added power; electricity prices; and different turbine designs. The studies could also take into account the effects of future global climate change.

The data presented define the potential or *maximum* power that could be generated using wind. Although these results are restricted to onshore deployment in the United States, the study identifies the potential for wind power offshore as well, and for the globe as a whole. The potential U.S. supply could be increased by about 20 percent if turbines were installed offshore within viable distances from the coast and sea depths, notably in the Northeast and on the West Coast. To date, it has proven difficult to site wind farms in densely populated coastal regions such as Nantucket Sound. There is minimal opposition, however, to placing turbines in more sparsely populated regions of the continental interior, where landowners are now receiving annual rents of up to $3,000 for the installation of a single turbine on their property (siting that has minimal impact on other uses of the real estate).

The accompanying figures were prepared by graduate student Xi Lu, using 2001 as a representative model year.





major portion of the electrical energy consumed by the vehicles could be derived from the local electricity grid. Depending on the energy source used to generate that power, the savings in terms of CO_2 emissions could be even more significant.

The Electric Power Research Institute (EPRI) reported in 2001 a study of the potential environmental advantages of plug-in hybrids. That study examined four cases: a conventional vehicle (CV); a standard HEV without plug-in capability (HEV 0); a plug-in vehicle with sufficient battery capacity to provide for an all-electric range of 20 miles (HEV 20); and a plug-in option with an all-electric range of 60 miles (HEV 60). Performance characteristics were taken as comparable for all four vehicles: gasoline storage on-board sufficient to provide for a range between refueling of 350 miles; a minimum top speed of 90 miles per hour; and a time to accelerate from 0 to 60 miles per hour of less than 9.5 seconds. For the plug-in options, the study assumed that the electricity taken from the grid was generated by combined-cycle power plants (heat that would normally be wasted in conventional plants is instead captured to generate additional electricity) consuming natural gas as feedstock with an efficiency for conversion of chemical to electrical energy of 50 percent (contemporary conventional power plants operate at efficiencies of less than 40 percent).

Depending on the energy source used, the savings in terms of CO_2 emissions could be even more significant.

The study concluded that the reduction in emissions associated with the HEV 60 option could be as much as 60 percent compared to the conventional gasoline-powered automobile, and 30 percent compared to the HEV 0 vehicle. There would also be significant savings in emissions of CO_2 even if the electricity used to charge the batteries of the plug-in hybrid were generated using coal (the "dirtiest" fuel in terms of greenhouse gases). If the electricity taken from the grid to power the plug-in HEV were produced using non-fossil sources of energy (nuclear, solar, hydro, or wind, for example), the savings in emissions could be even greater.

It is instructive to compare the cost of driving using gasoline in a conventional internal-combustion engine with the cost of using power taken from the commercial electricity grid. Approximately 80 percent of the energy content of gasoline consumed in a motor vehicle is wasted: it is converted to heat. Storing energy in a battery and then employing it to drive a motor vehicle is much more efficient: the loss to heat amounts to only about 10 percent. Because the energy content of a gallon of gas is equivalent to about 33.6 kilowatt hours (kWh) of electricity, we would need about 7.5 kWh of electricity to obtain the same *driving* performance as derived from a gallon of gasoline. Electricity delivered to retail customers in Cambridge last December cost 19.7 cents per kWh. At this rate it would take $1.47 to drive the distance covered by a gallon of gas using electricity, a little less than half the then-prevailing price of $3 a gallon for gas. Given that electricity prices in Massachusetts are higher than the national average, savings on a national scale would have been even greater. Further, since one would normally expect to recharge the batteries of the plug-in HEV at night, when demand for electricity is at a minimum, customers could reasonably argue for a reduction in price to go with this off-peak demand.

The average length of a typical vehicle trip in the United States is about 10 miles, according to the 2001 National Household Travel Survey. Of such trips, 17 percent were for travel to and from work, 3.2 percent for work-related business, 46.2 percent for family/personal business, 8 percent for travel to and from school and church, 25 percent for recreation, with the balance, 0.6 percent, for unspecified purposes. To replace 90 percent of current gasoline consumption with power derived from electricity using plug-in hybrids with an electrical range of 60 miles (HEV 60) would require that less than 10 percent of travel by the average vehicle should involve distances of more than 60 miles following the last recharge of the vehicle's batteries. Given that the distance traveled per day by the typical car or light truck in the United States amounts on average to a little more than 30 miles (11,000 miles per year), it seems reasonable to expect that the objective of restricting gasoline-assisted travel to less than 10 percent could be satisfied by a fleet of HEV 60s (which typically would be charged on a daily basis, most likely overnight).

Photograph by Alan Schein Photography/Corbis

Replacing 90 percent of gasoline consumption by electricity would be equivalent to raising the fleet's average fuel efficiency from the present level of about 17 miles per gallon to close to 150 miles per gallon. Were we to accomplish this objective, total oil use would be reduced by 36 percent, cutting the demand for imported oil by as much as 60 percent (a savings of $270 billion per year at current prices for oil). With such a large reduction in demand, one would expect the price of oil to drop and the bill for imported oil to decrease even more, to the point where its contribution to the U.S. international trade deficit would be of minimal concern.

The bill for imported oil could decrease so much that its contribution to the U.S. trade deficit would be of minimal concern.

Replacing 90 percent of current U.S. gasoline consumption with electricity would require an increase of 23 percent in demand for electricity. If a significant fraction of this additional energy were supplied off-peak—at night, for example, when the supply of electricity is normally at a minimum—the increase in electric-generating capacity required to supply it would be relatively modest, potentially as little as 10 percent.

If the proposed transition to plug-in hybrids were implemented, and if the electricity used to charge the batteries of these vehicles were derived from non-fossil sources, the implied reduction in U.S. emissions of CO_2 could amount to as much as 16 percent (assuming a 36 percent reduction in overall consumption of oil).

The Climate Consequences

Given the proposed increase in electricity consumption (and production) from converting to hybrid vehicles, it is important to examine the climate-change effects of this shift in power demand. Combustion of coal accounted for 49 percent of electricity generated in the United States in 2006, followed by natural gas (20 percent), nuclear (19 percent), hydro (7 percent), and oil (1.6 percent), with the balance from renewables other than hydro (wind, biomass, and solar). Coal was responsible for 82 percent of CO_2 emissions from the electric-power sector, and natural gas produced 16 percent of emissions, with oil accounting for only 2 percent. If we are to seriously reduce emissions of CO_2 from the power sector, our objective should clearly be to reduce the relative importance of coal, and to increase the contribution from low-carbon sources such as nuclear, wind, and potentially solar (opportunities for increasing the contribution from hydro in the United States are minimal).

Wind power is the fastest-growing component of the world's renewable-energy portfolio. In its 2007 Alternative Policy Scenario, the International Energy Agency (an organization funded by 27 of the world's largest energy-consuming countries) projected the possibility of an 18-fold increase in wind-powered generation of electricity globally by 2030. The most impressive growth was forecast for Europe where, it was suggested, 30 percent of electricity could be contributed by renewable sources (mainly wind). Europe's commitment to sustainable energy is based in large measure on a conviction that the threat of future climate change is real and urgent. The Bush administration has not as yet seen fit to share this view; should future U.S. administrations do so, there is no doubt that wind power could make an important contribution to the future production of electricity in the United States.

The U.S. Department of Energy's Pacific Northwest Laboratory estimates the country's total annual wind-power potential at 10,777 billion kWh (a number our analysis suggests may be conservative), more than *twice* the amount of electricity consumed in the country in 2006 (4,000 billion kWh): resources available in North Dakota alone could accommodate more than 60 percent of total current U.S. demand (see "Running on Wind?" page 32). Wind power today accounts for only about 1 percent of the nation's supply of electricity, but that contribution is increasing rapidly. For the boom to endure, both federal and state government must demonstrate their long-term commitment to wind energy—and regulators must approve and fast-track authorization for expanding the transmission systems required to connect these potential new sources of power to the national electrical grid.

Chevrolet Volt plug-in hybrid, scheduled for production in 2010

Nuclear power can also contribute to our energy future—depending on how the public perceives the safety factor. There is an urgent need for public education and discourse to identify both the risks and benefits of nuclear power, and for policies that will enhance the latter while reducing the potential of the former. It will be important, for example, to formulate viable plans for both interim storage and longer-term disposal of nuclear waste.

(An international committee convened under the auspices of the U.S. National Research Council in 2001 recommended that: "Decision makers, particularly those in national programs, should recognize the public's reluctance to accept irreversible actions and emphasize monitoring and retrievability.") From a purely technical point of view, both of these challenges appear manageable. With such a strategy in place, nuclear power (together with wind) can provide an economically competitive, environmentally constructive alternative to carbon-emitting fossil fuels.

Pursuing the Wrong Paths?

Effecting the transition from today's carbon-intensive energy system to a less carbon-intensive energy future will require a more focused approach than that defined in last December's energy bill. Among other initiatives, the act would encourage increased use of coal coupled with capture and burial of the resulting CO_2, in addition to greatly expanded production of ethanol.

Current multibillion-dollar federal subsidies encourage the conversion of abundantly available coal to an energy-rich but cleaner alternative, either gas or liquid: so-called clean-coal technology. The problem is that turning coal into liquid requires *more* coal to be consumed and *more* CO_2 to be produced than would be the case if the coal were consumed directly. In principle, this CO_2 could be captured and sequestered: buried in saline aquifers; in abandoned coal, gas, and oil fields; or even in deep-ocean sediments (see "Fueling Our Future," May-June 2006, page 40). But the quantities involved would be enormous: billions of tons per year, with costs estimated conservatively at a minimum of $30 per ton of CO_2, and with significant prospects for NUMBY ("Not under my back yard!") public opposition were such a strategy to be implemented on a large scale.

Converting biomass to ethanol offers a potential means to reduce our dependence on imported oil. Global production of ethanol is projected to rise to more than 15 billion gallons this year—more than half produced by processing corn in the United States (the new energy bill sets a goal of 9 billion gallons for U.S. production in 2008, increasing to 36 billion gallons by 2022, and projecting that by that time, 21 billion gallons would be derived from sources such as cellulose). Hailed initially as a panacea, ethanol has now become an important target for criticism. The Organization for Economic Cooperation and Development has described ethanol as "a cure that is worse than the disease." The controversy reflects concern that demand for ethanol has driven up the price of corn and potentially the price of other food crops that might be displaced by corn (see my article "The Ethanol Illusion," November-December 2006, page 33). Despite hopes that in the future ethanol could be produced from nonfood sources, such as switchgrass and wood chips—so-called cellulosic ethanol (*strongly* promoted in the new energy law)—does it make sense to spend significant resources to convert cellulose to ethanol when *more* energy could be delivered simply by burning the cellulose and converting 30 percent or more of its embedded energy to electricity? (Because the carbon contained in the cellulose is derived from the atmosphere by photosynthesis, this could be accomplished with no net additional emission of CO_2; producing ethanol from either corn or cellulose, on the other hand, is associated inevitably with significant emission of greenhouse gases.)

Promoting Practical Policies

To return to the twin challenges for energy policy posed at the outset: We could save money and markedly reduce our dependence on imported oil by promoting a transition in the transportation sector from today's reliance on gasoline-fueled internal-combustion engines to increased use of electricity delivered to plug-in hybrid vehicles. And we could reduce emissions of CO_2 released from generating electricity by promoting increased use of non-fossil alternatives such as wind and nuclear power.

A phased reduction in use of fossil fuels in the electricity sector could be promoted by a carbon tax (which would raise gasoline prices for drivers, too), or by requiring electricity producers to acquire permits for emission of CO_2. If permits were auctioned for as little as $20 per ton of CO_2, the revenue raised could be as much as $50 billion per year—comparable to the levy now imposed by state and federal taxes on gasoline. Allowing permits to be traded would encourage selection of the most efficient means to reduce emissions. Revenues raised by auctioning the permits could be used to compensate for tax revenue lost due to the reduction in gasoline sales, and potentially also to promote non-carbon energy alternatives.

Weaning Americans from an energy system based largely on carbon-emitting coal, oil, and gas will not be easy. Embedded interests (coal and oil companies and operators of gasoline stations, for example) will inevitably be threatened and will surely resist. It is a challenge, though, that we must meet. The present system is simply not sustainable. ∇

Michael B. McElroy is Butler professor of environmental studies.

Photograph by Benelux/zefa/Corbis

Toward a Liberal Realist Foreign Policy

A memo for the next president

by JOSEPH S. NYE JR.

On January 20, you will inherit a legacy of trouble: Iraq, Iran, Pakistan, Palestine, North Korea for starters. Failure to manage any one of them could mire your presidency and sap your political support—and threaten the country's future. At the same time, you must not let these inherited problems define your foreign policy. You need to put them in a larger context and create your own vision of how Americans should deal with the world.

Some pundits believe that no matter who wins the 2008 election, he or she will be bound to follow the broad lines of President Bush's strategy. Vice President Cheney has argued, "When we get all through 10 years from now, we'll look back on this period of time and see that liberating 50 million people in Afghanistan and Iraq really did represent a major, fundamental shift, obviously, in U.S. policy in terms of how we dealt with the emerging terrorist threat—and that we'll have fundamentally changed circumstances in that part of the world." President Bush himself has pointed out that Harry Truman suffered low ratings in the last year of his presidency because of the Korean War, but today is generally held in high regard, while South Korea is a democracy protected by American troops. Do not accept this over-simplification of history. By this stage of his presidency, Truman had built major cooperative institutions such as the Marshall Plan and NATO. In contrast, the unbridled unilateral style of the neoconservatives and assertive nationalists in the Bush administration produced a foreign policy that was like a car with a hair-trigger accelerator but no brakes. It was bound to go off the road.

The crisis of September 11, 2001, created an opportunity for George W. Bush to express a bold vision. But one should judge a vision by whether it balances ideals with capabilities: anyone can produce a wish list, but *effective* visions combine feasibility with the inspiration. Among past presidents, Franklin Roosevelt was good at this, but Woodrow Wilson was not. David Gergen, director of the Kennedy School's Center for Public Leadership, has described the difference between the boldness of FDR and that of the current president: "FDR was also much more of a public educator than Bush, talking people carefully through the challenges and choices the nation faced, cultivating public opinion, building up a sturdy foundation of support before he acted. As he showed during the lead-up to World War II, he would never charge as far in front of his followers as Bush." Bush's temperament is less patient. As one journalist put it, "He likes to shake things up. That was the key to going into Iraq."

The Context of Foreign Policy

A KEY SKILL you will need is "contextual intelligence." Chapman professor of business administration Nitin Nohria and lecturer of business administration Anthony Mayo have defined contextual intelligence as the ability to understand an evolving environment and to capitalize on trends in changing markets. In foreign policy, contextual intelligence is the intuitive diagnostic skill that helps you align tactics with objectives to create smart strategies in varying situations. Of recent presidents, Ronald Reagan and George H.W. Bush had impressive contextual intelligence, which starts with a good understanding of the current context of American foreign policy, both at home and abroad.

Unfortunately, many academics, pundits, and advisers have often been mistaken about America's position in the world. Two decades ago, for example, the conventional wisdom was that the United States was in decline, suffering from "imperial overstretch." A decade later, with the end of the Cold War, the new conventional wisdom was that the world was a unipolar American hegemony. Some neoconservatives drew the conclusion that the United States could decide what it thought was right, and others would have no choice but to follow. Charles Krauthammer celebrated this view as "the new unilateralism," and it heavily influenced the Bush administration even before the shock of the September 11 attacks produced a new "Bush Doctrine" of preventive war and coercive democratization.

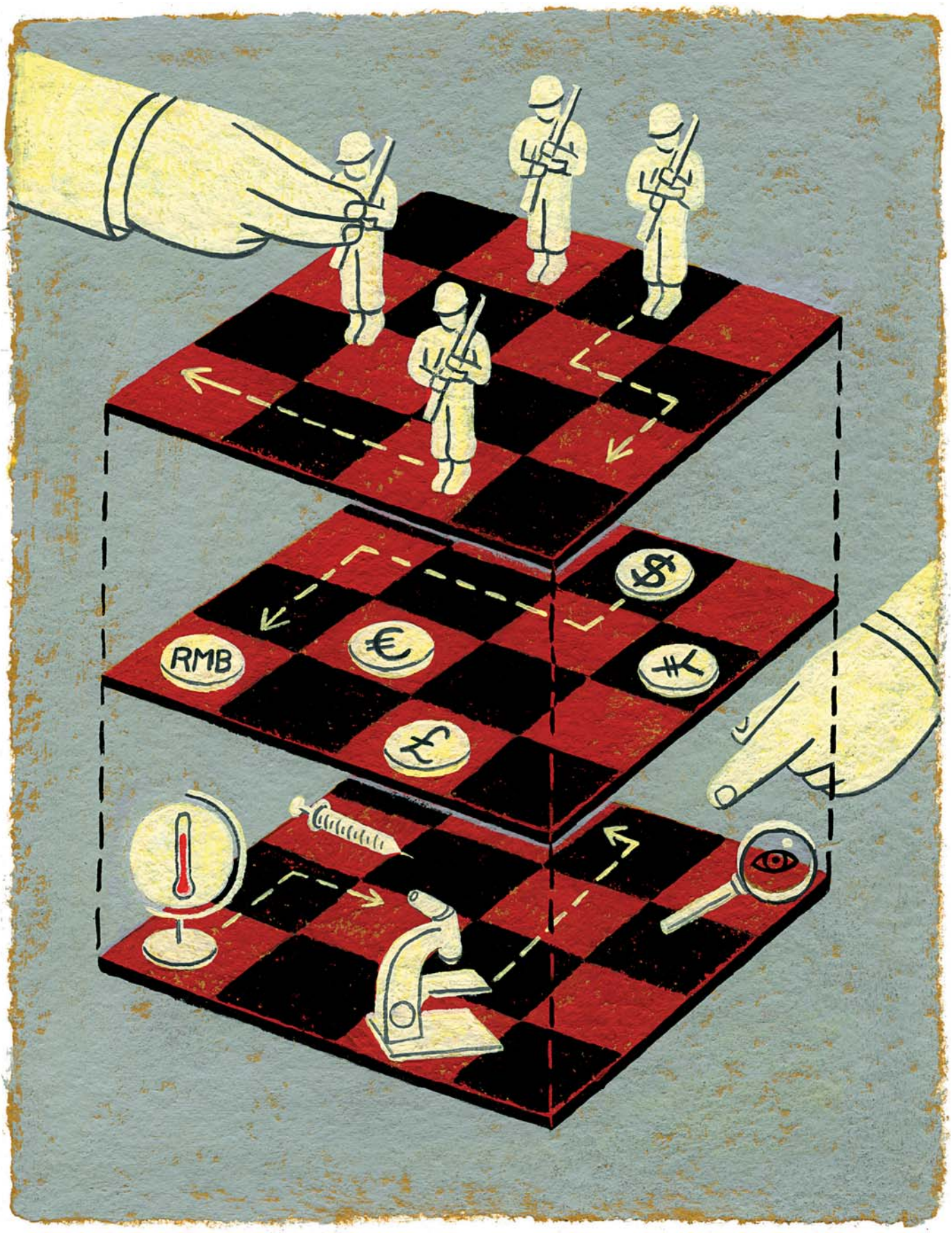
This new U.S. unilateralism of the early twenty-first century was based on a profound misunderstanding of the nature of power in world politics. Power is the ability to get the outcomes one wants. Whether the resources one possesses will produce such outcomes depends upon the context. In the past, it was assumed that military power dominated most issues, but in today's world, the contexts of power differ greatly for military, economic, and transnational issues.

A Liberal Realist Vision

THE OLD DISTINCTION between realists and liberals needs to give way to a new synthesis that you might choose to call "liberal realism." What should a liberal realist foreign policy comprise?

First, it would start with an understanding of the strength and limits of American power. We are the only superpower, but preponderance is *not* empire or hegemony. We can influence, but not control, other parts of the world. The context of world politics today is like a three-dimensional chess game. The top board of military power is unipolar; but on the middle board of eco-

Illustrations by James Steinberg



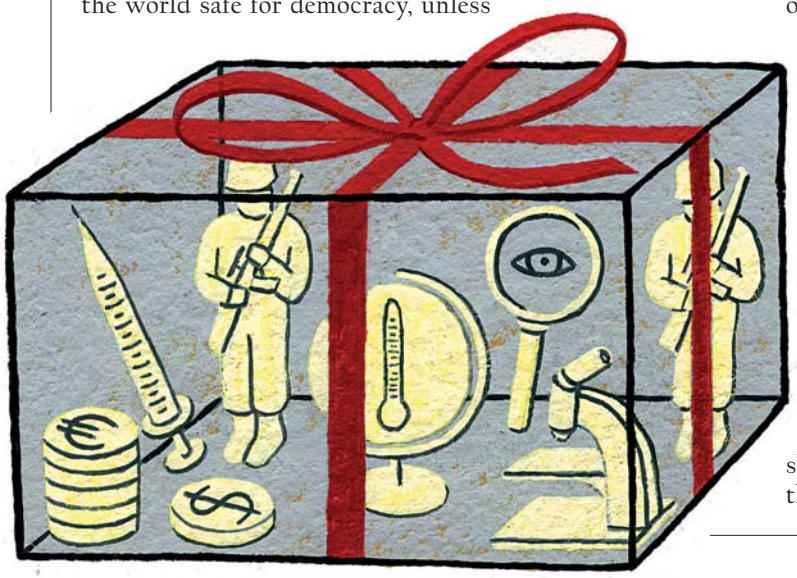
nomic relations, the world is multipolar. On the bottom board of transnational relations (such as climate change, illegal drugs, pandemics, and terrorism) power is chaotically distributed. Military power is only a small part of the solution in responding to these new threats. They require cooperation among governments and international institutions. Even on the top board (where the United States represents nearly half of world defense expenditures), our military is supreme in the global commons of air, sea, and space, but much more limited in its ability to control nationalistic populations in occupied areas.

Second, a liberal realist policy would stress the importance of developing an integrated grand strategy that combines hard military power with soft "attractive power" to create smart power of the sort that won the Cold War. In a war on terrorism, we need to use hard power against the hard-core terrorists, but we cannot hope to win unless we gain the hearts and minds of the moderates. If the misuse of hard power creates more new terrorists than we can kill or deter, we will lose. Right now, we have no integrated strategy for combining hard and soft power. Many official instruments of soft power—public diplomacy, broadcasting, exchange programs, development assistance, disaster relief, even military-to-military contacts—are scattered throughout the government, with no overarching strategy or budget that even tries to integrate them with military power into a unified national-security strategy. We spend about 500 times more on the military than we do on broadcasting and exchanges. Is this the right proportion? How would we know? How would we make trade-offs? And how should the government relate to the nonofficial generators of soft power—everything from Hollywood to Harvard to the Bill and Melinda Gates Foundation—that emanate from our civil society?

Third, the objective of a liberal realist policy should be to advance the principle of "life, liberty, and pursuit of happiness" that has long constituted American political culture. Such a grand strategy would have four key pillars:

- providing security for the United States and its allies;
- maintaining a strong domestic and international economy;
- avoiding environmental disasters (such as pandemics and negative climate change); and
- encouraging liberal democracy and human rights at home and abroad where feasible at reasonable levels of cost.

This does *not* mean imposing American values by force. Democracy is better fostered by attraction than by coercion—and it takes time and patience. Here we should lead by example, heed Ronald Reagan's adaptation of John Winthrop, and act like a "shining city on a hill." Overseas, the United States should try to encourage the gradual evolution of democracy where possible, but in a manner that accepts the reality of diversity. Right now, our calls for democracy are heard as an imperial imposition of American institutions. We need fewer Wilsonian calls to make the world safe for democracy, unless combined with John F. Kennedy's rhetoric of "making the world safe for diversity."



Five Major Challenges

Among all the possible challenges in engaging the world—from a resurgent Russia to our interests in Latin America and Africa—such a liberal realist strategy for your administration should place priority on five major challenges.

Probably the greatest danger to the American way of life would be the intersection of terrorism with nuclear materials. Preventing this requires policies for counterterrorism, nonproliferation, better protection of foreign nuclear materials, stability in the Middle East, and attention to failed states.

Democracy is better fostered by attraction than by coercion—and it takes time and patience. Here we should lead by example.

Political Islam and how it develops is the second priority. The current struggle against extreme Islamist terrorism is sometimes characterized as a "clash of civilizations." More accurately, it is a civil war within Islamic civilization—between a radical minority, which uses violence to enforce a simplified and ideological version of their religion, and a mainstream that has more tolerant views. Although the largest number of Muslims live in Asia, they are influenced by how the heart of this struggle is playing out in the Middle East, an area that has lagged behind the rest of the world in globalization, openness, transparent institutions, and democratization. More open trade, economic growth, better education, development of civil institutions, and gradual increases in political participation may help strengthen the mainstream over time, but so also will the way Muslims are treated in Europe and the United States. Equally important will be whether Western policies toward the Middle East attract or repel mainstream Muslims.

The third major challenge would be the rise of a hostile hegemon as Asia gradually regains the three-fifths share of the world economy that corresponds to its three-fifths of the world population. Forestalling this outcome requires a policy that embraces China as a responsible stakeholder, but hedges against possible hostility by maintaining close relations with Japan, India, and other countries in the region.

The fourth major threat would be an economic depression that could be triggered by financial mismanagement or a crisis that disrupts global access to the Persian Gulf (where two-thirds of world oil reserves are located). Meeting this challenge will require policies that gradually reduce dependence on oil while realizing that we will not be able to isolate the American economy from global energy markets and must not succumb to costly and counterproductive protectionism.

The fifth major threat to our way of life may be termed ecological breakdowns such as pandemics or climate change. Again, part of the solution requires prudent energy policies, combined with leadership on climate change and greater cooperation through international institutions such as the World Health Organization.

Finally, atop these five major threats, a liberal realist policy should look to the long-term evolution of world order, realizing the responsibility of the largest coun- *(please turn to page 84)*

Trails of Tears, and Hope

"Collective trauma" takes a ferocious toll on human societies—yet there are pathways to healing.

by CRAIG LAMBERT

The hamlet of Alkali Lake, about 100 miles north of Vancouver, is home to one of a handful of surviving Shuswap bands of Native Americans in British Columbia. Nearby villages include Dog Creek, 70 Mile House, Horsefly, and Likely. In many ways, the history of the 400 Indians living there resembles that of many other indigenous peoples.

Starting in the 1850s, thousands of Euro-Canadian miners and settlers began pouring into the Shuswap territory, eager to take the Indians' ancestral land. The tribe made easy prey. Diseases that Europeans had introduced during the previous half-century of contact had already reduced their numbers by two-thirds. In 1860, the Canadian government started seizing the native peoples' lands for the settlers, herding the Indians onto much smaller reserves that shrank steadily over the decades. Beginning in 1891, the government forcibly removed Shuswap children from their families for three generations and enrolled them in the Williams Lake Residential Boarding School, 20 miles away, run by Christian missionaries. Its pedagogy involved harsh punishments for speaking the Shuswap language, as well as relentless indoctrination about the inferiority of Indians' culture and heritage. Conditions there, according to a University of British Columbia anthropologist, included hunger, spoiled food, whippings and beatings, public humiliations, and sexual abuse.

By the 1960s, the tribe's social and cultural fabric had unraveled. Unemployment was so high, the vast majority of residents subsisted on government payments. Child abuse and neglect, suicide, domestic violence, and hunger were epidemic. Drinking binges had become the dominant social activity. Tribal members sometimes found on their doorsteps the corpses of fellow Indians who had frozen overnight after collapsing in a drunken stupor. Children often quaffed alongside their parents at parties that roared through the weekend and spilled over into the following week. Not drinking meant exiling oneself from community life. By 1972, one researcher estimated that 93 percent of the Alkali Lake population aged 16 and older were heavy drinkers. Locally, they were known as "the Indians of Alcohol Lake."

In the summer of 1971, two heavy imbibers, Andy and Phyllis Chelsea, left their seven-year-old daughter, Ivy, with her grandparents to go off on yet another weekend binge. When they returned, Ivy adamantly refused to go home with them. This stunned Phyllis Chelsea, and she determined to give up alcohol. Her husband followed suit a week later, and the next year, the Alkali Lake band elected Andy Chelsea its chief. He had campaigned on an anti-alcohol platform.

Even so, sobriety isolated the Chelseas from the band's social life, so they escaped to hockey tournaments and rodeos on weekends. But they also invited a trained counselor in to run "alcohol awareness" sessions that evolved into Alcoholics Anonymous meetings. The Chelseas prohibited neighboring ranchers from trading cases of wine for haying rights, set up sting operations for bootleggers, and took steps to end the practice of Indians "drinking up" their assistance checks. Phyllis Chelsea began teaching Shuswap language classes and created dancing, drumming, and song groups, while

Photograph by Peter Tunrley/Corbis

reviving such traditional practices as the use of sweat lodges. The Chelseas also tapped into contemporary ideas like the California-based "Lifespring" human-potential seminars, which by the early 1980s had enrolled and trained the majority of the band's adult members.

Despite powerful opposition, the band elected Andy Chelsea as chief again and again. Growing numbers of sober adults began to establish a new set of social norms. By the mid 1980s, sobriety had become the rule, as it remains today. The 1986 film *The Honour of All: The Story of Alkali Lake* documents this astonishingly rapid transformation of a devastated people into a model for other native communities throughout North America.

The social catastrophe that ravaged the Shuswap band embodies an extreme form of "collective trauma," says Sousan Abadian, A.M. '87, M.P.A. '88, Ph.D. '99, who has spent time at Alkali Lake and in dozens of other indigenous communities in New Mexico, Arizona, Montana, Minnesota, Alberta, British Columbia, and Manitoba since she began studying this phenomenon in 1994. In her doctoral dissertation, Abadian used that term for the pervasive consequences communities suffer when powerful external forces violate their physical and/or sociocultural integrity.

Such forces can be as random as a one-day tsunami or as systematic as the Holocaust; collective traumas can kill millions in war or genocide or enslave generations. The phenomenon can be

Indian Boarding Schools, Then and Now

In 1906, the U.S. government sent cavalry onto Hopi land in Arizona, "determined to send these people to boarding school," says Gregory Schaaf, director of the Center for Indigenous Arts & Cultures in Santa Fe, New Mexico, and author of the multivolume *American Indian Art Series.* "Why? Underneath the Hopi land was a billion dollars' worth of coal and oil, and a large aquifer. The U.S. government wanted to lease the rights to these resources to private companies and the Hopis wouldn't sign the papers. So the job was to convince people to be loyal to the dominant culture—to produce some people who *would* sign. Send them to boarding schools."

Indian boarding schools were blunt tools: they rank among the most heavy-handed institutions of socialization, indoctrination, and even brainwashing ever seen in North America. From the late 1800s through the twentieth century, scores of such schools throughout the western United States and Canada enrolled Indian students, generally against their will.

Scholars have described the residential boarding schools as "labor camps," or experiments in modified slavery, run in the grueling, regimented manner of military schools. "My grandparents were taken from their homes and put in boarding schools," says Daniel Moya, of the Pojoaque Pueblo outside Santa Fe. "Whenever they spoke their native language, they were beaten and made to eat soap." Emotional and physical abuse was routine, and the curriculum explicitly indoctrinated students with the idea of the superiority of the dominant culture and the inferiority of native traditions.

Over the decades, the educational philosophy of the boarding schools did slowly evolve. Zia Pueblo, an Indian tribe about 20 miles southwest of Santa Fe, had no public schools of its own in the 1940s; all the Indian students went to boarding school, if they were in school at all. When tribal member Sofia Medina enrolled at St. Catherine's Indian School in Santa Fe at age 12 in 1944, she knew only two English words, "yes," and "no," but the Roman Catholic nuns who ran the school did not

Photographs from the Harvard Peabody Museum of Archaeology and Ethnology, ©President and Fellows of Harvard College

a fairly short-lived event with lasting consequences, such as the Rwandan genocide of 1994, or it can extend over centuries—as with American Indians, whose numbers dropped from an estimated 10 million before Columbus landed to 250,000 by the turn of the twentieth century; disease brought by Europeans, and sometimes intentionally spread by colonizers, claimed the vast majority of those native lives.

Though Abadian's concepts are applicable to a broad array of scenarios, from antebellum slavery in the U.S. South to the disappearing aborigines of Australia, she has focused her empirical research on American Indians. "I don't like to compare traumas," she said, speaking to tribal leaders and members of the Mashantucket Pequot Nation in Connecticut last June, "because whether you are drowning in five feet of water or 10 feet, you are still drowning. But the kinds of traumas that native North American peoples have experienced are among the worst; the fact that they have survived at all speaks to their resilience."

In a later interview, Abadian, a multidisciplinary independent scholar who is writing a book on collective trauma and its healing in American Indian communities and other postcolonial societies, notes, "The most extreme types of collective trauma are sociocultural: it's not just an aggregation of individual traumas, but disruption of the fundamental institutions of society, and of its 'immune system' that can restore people and repair a culture. Whenever I go to a dinner party in Cambridge and talk about my work, the response almost always is, 'Well, my people were trau-

CLOCKWISE FROM OPPOSITE TOP: ©PEABODY MUSEUM, HARVARD UNIVERSITY, PHOTOGRAPH 2004.24.30439A, 2004.24.30440A, 2004.29.5636, 2004.29.5637

Native American girls (far left) and teenage boys (left) on arrival (top) at a boarding school in Hampton, Virginia, and 14 months later (below). From the Peabody Museum of Archaeology and Ethnology collections.

punish the girls for speaking their native tongue. Tuition was $50 per year, and even that was a severe strain on Medina's parents. She came home only once a year, in August.

St. Catherine's was essentially a parochial school. "I was more or less brainwashed with the Catholic religion," Medina says. "The nuns taught us that all our dances and traditions were 'false gods.' After I dropped out of school in the eleventh grade, I had no interest in the pueblo. My sister got mad at me because I would not participate in the dances."

After Sofia married, her father-in-law explained native spiritual traditions to her—"Why the cornmeal, why the feathers," she says. Now she goes to traditional ceremonies and shares her knowledge with younger Indians if they ask. "It is hard to understand, because Indians do not write about God on paper, like the white men do," she says. "It is all up to each person, how they are going to take it."

Sofia's son Fred Medina attended two Indian boarding schools before graduating from Jemez Valley High School. He also completed technical studies at Southwest Indian Polytechnic Institute, and has a career as a lab technician. In the boarding schools he experienced, there was "no shaming of us for being Indians," he says. "Wounded Knee [the 1973 protest by American Indian Movement activists at Wounded Knee, South Dakota] turned around a lot of things for all Indians. We recognized ourselves as not being second-class, but up there with everybody else." But the native language has been slipping away. Though Zia Indians were fluent in their native tongue in the 1970s, Fred says Indian children today are bilingual only until about sixth grade, after which English wins out. Today's youth live out the converse of his mother's experience: "Now, kids know how to say only 'yes' or 'no' in the native language."

Sofia's granddaughter (and Fred's niece) Kim Toribio enrolled at the highly regarded Santa Fe Indian School from seventh grade until eleventh grade (1983 through 1989), then completed her senior year at a public high school in Albuquerque. Kim came home to Zia every weekend from her boarding school. The staff was entirely Native American. "They cared about you," she says. "They'd bend over backwards to get you scholarships," and many in her graduating class of 23 went on to college. Kim herself earned an associate's degree in business administration and now has an administrative job working with office automation software. "Santa Fe Indian was a good school," she says. "I have no complaints."

matized, too, and we're doing fine now. The Germans, Japanese, and Koreans were traumatized during World War II and the Korean War, so why were they able to get on their feet, and not native peoples?' "

Events that are more intense, last longer, affect a greater proportion of a community, and damage vital reparative institutions are deadlier, she says. "After the Holocaust, for example, Jewish immigrants to the United States still had synagogues, rabbis, and their Torah. Jews residing in places like North America and the Middle East provided a comparatively stable refuge that preserved essential Jewish traditions and eventually fueled postwar Jewish healing and renewal processes.

"But native peoples had no equivalent of an 'America' to which they could escape and create a new base—ironically, North American governments were their tormentors," Abadian continues. "Here, as a result, the collective traumas of colonization affected nearly 100 percent of indigenous peoples. Healthy child-rearing practices were disrupted or warped by involuntary boarding schools. Native spiritual practices and traditions were banished, and missionaries often replaced them with foreign religious forms that tore apart the community's social cohesion. It is like an epidemic hitting a society when its doctors and healers have been exterminated. No one escaped the ravage."

"It is like an epidemic hitting a society when its doctors and healers have been exterminated. No one escaped the ravage."

Abadian's theory of collective trauma is "a very illuminating and unexplored way of looking at the problems of Native Americans," says Lamont University Professor Amartya Sen, winner of the 1998 Nobel Prize in economics, who calls himself "fortunate" to have advised her dissertation at the Kennedy School of Government (KSG). "Sousan has a huge combination of imagination, intelligence, and concern for empirical data. The literature on trauma is quite well developed and has been extensively used in other contexts, and the problems of Native Americans are also well recognized. The connection of the two is where her work has made a difference."

Although Abadian's theories have not yet been applied to development studies around the world, "There are enormous prospects of that happening," says Sen, noting their relevance to posttraumatic conditions in impoverished regions like Rwanda, South Africa, and in the area around Assam and Manipur in northeast India, where intercommunity civil wars have led to social collapse and a high prevalence of alcoholism, drug use, and AIDS. "Those are three examples," Sen declares. "I can give a hundred others. It is pioneering, highly original work that can be used to understand traumas elsewhere."

Take regions of chronic international conflict, for example. From 1999 until 2001, an informal group of 16 scholar-practitioners met each Thursday morning at the Program on International Conflict Analysis and Resolution (PICAR) in Harvard's Weatherhead Center for International Affairs. The group, which included people native to "hot spots" like Sudan, Israel, Colombia, and Sri Lanka, sought to discover why attempts to resolve international conflicts so often failed, to identify what was lacking in the field of conflict resolution, and to investigate the role trauma plays in perpetuating conflict.

"Sousan was a beam of light for us," says Donna Hicks, an associate of the Weatherhead Center who was deputy director of PICAR for nine years. "Our goal was to look at all the research on trauma—but Sousan had *done* that already. She directed the discussions for months. At the end of this grappling, we realized that this was the direction conflict resolution had to go in—the direction of healing trauma. It wasn't something anyone was talking about at the time—it was too hot to touch. People don't want to expose emotional wounds."

Such wounds are both deep and widely shared in a traumatized society, and, in Abadian's analysis, they are typically the fundamental reason why such cultures cannot develop economically, socially, or politically until they address collective trauma and begin to heal it. "[D]efeating a people has as much to do with destroying their sense of purpose—their confidence in their world-view and meaning system—as it does with physical conquest," Abadian writes, adding that traumatic stressors "engender in the victim characteristic feelings of deep violation and hopeless impotence in the face of violation."

One severe example is the description of the profoundly traumatized Ojibwa of Grassy Narrows in northwestern Ontario, quoted by Yale sociologist Kai Erickson in his seminal 1994 book on social traumas, *A New Species of Trouble:*

> I could never escape the feeling that I had been parachuted into a void—a drab and lifeless place in which the vital spark of life had gone out....It wasn't just the poverty of the place, the isolation, or even the lack of a decent bed that depressed me....What struck me most about Grassy Narrows was the numbness of the human spirit. There was an indifference and listlessness, a passivity that I could neither understand nor do anything about. I had never seen such hopelessness anywhere in the Third World.

This degree of demoralization involves a loss of identity as a people. "Most Native Americans have to piece together their Indian-ness from many different sources. I know a female Indian who took an Indian studies class at Stanford and learned more about the history of Fort Peck [a tribal reservation in northeastern Montana] than she had by living there!" says Dennis Norman, faculty chair of the Harvard University Native American Program (HUNAP) and associate professor of psychology in the department of psychiatry at Massachusetts General Hospital (MGH) and Harvard Medical School (HMS); Norman himself is of Cheyenne, Choctaw, and Anglo extraction.

Most of the social problems that characterize American Indian life may be rooted in historical trauma. Norman notes that rates of suicide, poverty, domestic violence, injury by accident, substance abuse among youth, and unemployment are all significantly higher among American Indians than among the general population. "How do you best explain all these social, economic, and health issues?" he asks. "No one can contest that there is historical trauma; the question is what does it mean, how is it manifested now, and what can we do now?"

"The social and economic conditions we are seeing—the vio-

lence, suicide, addictions, endemic poverty, alcoholism—are to a large extent the *symptoms* of trauma," Abadian says. "If you attack symptoms separately without attending to the underlying condition, other symptoms will show up. Right now, in many parts of the world, people are doing bits and pieces of what needs to be done to address poverty and violence. But because they come from particular specialties, few take an integrated approach, and almost no one also recognizes the incidence and the effects of trauma. Monetary assistance, housing, better schools, reforming political and legal institutions, are all essential for improving native people's lives. But all these efforts will fall short if you aren't also channeling resources into addressing trauma."

The Mashantucket Pequot Nation, the Native American tribe that is a principal owner of one of the world's largest, most lucrative gambling complexes, the six-casino Foxwoods resort in southeastern Connecticut, is living proof that prosperity alone cannot eradicate the social ills that Indians suffer. Even today, the relatively prosperous Pequot tribe, like many other Indian tribes, struggles with substance abuse, child neglect, and community and domestic violence, according to Markos Samos, special assistant to tribal council member Charlene Jones. "The underbelly of violence," Abadian points out, "is trauma."

Underlying trauma may also explain why the social disorders of affected communities seem so intractable. "When there is trauma that hasn't been dealt with, trying to move a society forward is like driving a car with one foot on the accelerator and one foot on the brake," Abadian explains. "It lurches forward, then stops, stalls, sometimes swerves into a ditch—it's uneven, uncontrolled. Something is stuck."

Traumatized people suffer from a deeply damaged sense of trust. "Unless they are severely traumatized, humans have a pretty significant 'positivity bias,'" explains Catherine Ayoub, associate professor of psychology at Children's Hospital, MGH, and HMS, who studies the effects of trauma on children. "We trust that we'll get through the day OK. When we go out on the sidewalk, we don't assume, 'Someone out there is out to get me.'

"But early traumas, whether from violence, sexual abuse, or other violations, can disrupt the embedding of this positivity bias," Ayoub continues, "and the earlier this derailment happens, the less opportunity you have to build that...foundation of trust. What do we do if we have repeated experiences that tell us the world is dangerous? Toddlers subjected to repeated maltreatment have developed a 'negativity bias' as young as age two. To the traumatized, life feels like war, 24/7."

"Trauma tends to throw individuals into a state of crisis—a crisis of faith: 'How could this have happened to me?' " says Abadian. " 'Why couldn't I have stopped it? Where were my protectors—parents, police, authorities, God—when I needed them?' Traumatized people lose their trust in themselves, in other people, and in God. People who have been traumatized can be deeply pessimistic about the world. It has social, economic and political ramifications when an entire society experiences severe collective trauma and loses trust."

Furthermore, parents can pass down mistrust and trauma to their children over generations. Cultures that undergo enduring collective trauma raise their children in a traumatized environment, often communicating a sense of hopelessness and futility to the young, but conveying little sense of one's power to change life circumstances. "Native peoples talk a lot about sovereignty: economic and political sovereignty," says Abadian. "Those are necessary but insufficient. You also need *personal* sovereignty to put economic and political sovereignty to good use. I am using 'personal sovereignty' as a way to underscore the additional importance of healing and wellness."

Sousan Abadian

"I come from a colonized people," says Abadian, "people who survived against all odds." Born in Tehran, she understood historical trauma on a personal level from an early age: she is a Zoroastrian. Descendants of ancient Persians who once numbered in the millions, Zoroastrians have suffered relentless persecution since the Arab invasion of Persia 1,400 years ago; they now total only an estimated 150,000 worldwide. "When my parents were young, they weren't allowed to touch anything in the markets because the Muslims considered Zoroastrians—like Jews and Baha'i—to be unclean," she *(please turn to page 85)*

Photograph by Craig Lambert

VITA

Ko K'un-hua

Brief life of Harvard's first Chinese instructor: 1838-1882

by RAYMOND LUM

YALE WAS THE FIRST American college to offer instruction in Chinese, in 1877; apparently, no one signed up. The next year, a group of Boston and Salem businessmen engaged in the lucrative China trade decided that Harvard, their alma mater, should also offer Chinese, to prepare a generation of young men to assist and succeed them. A Boston newspaper editorialized, "The day is probably coming when the hieroglyphics on tea chests and firecracker boxes will be as intelligible to the average Yankee boy as the signs over the shops of his native village are now."

China and Harvard were hardly strangers: five alumni were already employed by that nation's Imperial Maritime Customs Service. Run by an international staff who were required to learn Chinese, the service also managed China's telegraph and postal systems, handled emigrant labor issues and the payment of indemnities to foreign nations, and often represented the country abroad. The Bostonians even consulted the service's longtime inspector general, Sir Robert Hart, who advised against the idea, writing, "A Chinese literary man can undertake no more dreadful drudgery than...teaching Chinese to a foreigner....Men who join the Customs have plenty of time after joining to acquire the language...."

The project went forward nevertheless: $8,750 to finance it was raised in China, and Harvard president Charles William Eliot noted that the Corporation had begun planning to raise a subscription as well. Edward Bangs Drew, A.B. 1863, A.M. '68, the alumnus with the most seniority in the customs service, was asked to find a suitable candidate and recommended Ko K'un-hua, with whom he had studied briefly. Ko had spent five years working for the British embassy and two more at the American consulate in Shanghai, but did not speak English. In a confidential letter to Eliot after Ko had been selected, Drew did reveal some concerns that apparently were not generally acknowledged. Ko, he wrote, was very learned, but not a recognized scholar, not having obtained any degrees by examination; he had purchased his official title. (The impecunious Chinese government frequently sold titles that granted some social status and the right to wear certain garb ordinarily reserved for scholars and officials.)

Drew also revealed that Ko was suspected of having published a critical essay about local officials, who were threatening prosecution. Eliot subsequently, if not consequently, telegraphed to cancel the agreement, but it was too late: Ko had already quit his job, rented his house, and prepared his family for the journey; he would lose face if the agreement were canceled. Furthermore, Sir Robert Hart had been asked to accept three more alumni into the customs service, presumably in return for Harvard's taking Ko.

Ko reached Boston with his wife and children in the fall of 1879. The books he brought were Harvard's first in any Asian language: seeds that grew into the Harvard-Yenching Library's current million-volume East Asian collection, the largest in any academic library outside Asia. He informed Drew of his safe arrival in a letter (now in the library's archive) written in the formal style and elegant calligraphy expected of a Chinese scholar. Yet uncertainty about his position remained. Only two days after his arrival, an unidentified faculty member reportedly said, "Who is going to learn Chinese, and how it is to be got into our College, are questions that have not even been considered." That first year, indeed, Ko had only one student: Pope professor of Latin George Martin Lane, A.B. 1846, who taught him English in return. Ko used poems that he wrote himself to instruct "Liu En," relying on his teenage son, who had studied English in China, to copy and translate them.

The few remaining photographs of Ko reveal a dignified middle-aged man in the long, high-necked, heavy garments of a scholar-official of the Qing dynasty. His embroidered robes would have been nearly unbearable in a Boston summer, but Ko did not experience many of those: a few months before the end of his three-year contract, he died of pneumonia. (Harvard paid for his family's return to China, and Edward Drew raised funds to educate his sons.)

Eulogies remarked on Ko's gregarious nature, gentlemanly manner and humor, and ability never to forget a face. His success was recorded in an obituary in the *Boston Daily Advertiser*: "...he has had only four or five pupils; but...the results obtained have been most satisfactory...[O]ne who has studied with him...has acquired the ability to converse easily with Mandarins, and is nearly ready to establish himself in some business in China."

At the Harvard memorial service, with Ko's students, numerous faculty members, and President Eliot among the mourners, the dean of the Divinity School said Ko had brought to the streets of Cambridge "Oriental color...Oriental splendor...Oriental repose." Ko "was a stranger in the fullest sense of this word....The most common facts...that enter into all our common life, were totally unknown to him...[but we] realized that he had a history and civilization behind him; that when we met him it would have to be on more equal terms than we had dreamed." Ko's mandarin's hat—surmounted by the jeweled button denoting high civil rank—lay atop the coffin. Thus ended Harvard's initial endeavor to teach Chinese. It would be almost four decades before the language was restored to the University's curriculum.

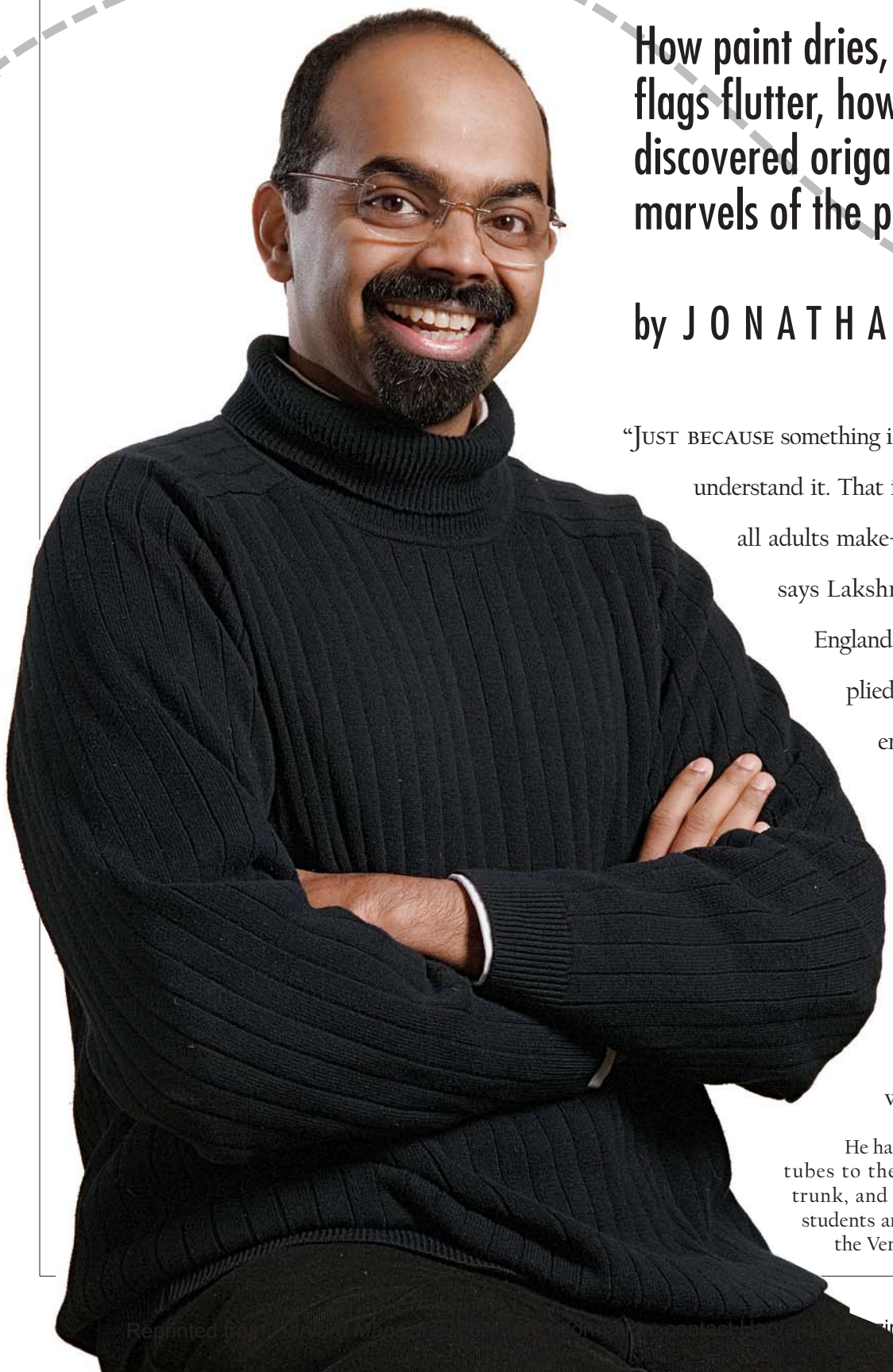
Raymond Lum, Ph.D. '85, is librarian for Western languages in the Harvard-Yenching Library, Asian bibliographer in Widener Library, and instructor in Chinese in the Harvard Extension School.

Photomontage by Naomi Shea. The photograph of Ko and the text at upper right—an excerpt penned by Ko's son from a poem his father wrote in honor of Edward Drew—are reproduced courtesy of the Harvard-Yenching Library.

The Physics of the Familiar

How paint dries, the way flags flutter, how Nature discovered origami, and other marvels of the physical world

by JONATHAN SHAW



"JUST BECAUSE something is familiar doesn't mean you understand it. That is the common fallacy that all adults make—and no child ever does," says Lakshminarayanan Mahadevan, England de Valpine professor of applied mathematics. Mahadevan enjoys explaining mathematically the phenomena of everyday life: practicing the old-fashioned method of scientific inquiry called natural philosophy, where one wonders about *everything*.

He has compared instability in nanotubes to the wrinkling of an elephant's trunk, and explained, together with his students and postdocs, how the leaves of the Venus flytrap can buckle shut fast

Photographs by Jim Harrison

enough to trap a fly.* With former postdoctoral fellow Enrique Cerda, now a physics professor in Chile, he has devised equations to describe how fabric drapes on a clothed figure or from a table. Inspiration is everywhere. "Look around the room," he tells his students. "Look out of the window." Mahadevan sees trees lifting water from roots to crown, or perhaps a drop of paint drying in the sun, and wants to understand in a deep sense what is happening right before his eyes.

What will happen as the drop of paint dries? Why should we care?

"In the same way, you may ask, 'Why should you climb a mountain?'" Mahadevan says. "Some people do it for the challenge, but there is another aspect to it, and that is that you can actually see around you. You can see where you are." But the path straight up the mountain may be too hard. "The difficulty could be technical, or experimental, or it could be mathematical—it doesn't really matter." But then, he continues, you see a little hill, and think, "Maybe I'll climb up the hill. I will still be able to see around me—maybe not as far as from a mountain, but perhaps, once I get up there, I will find a path from that hill to a larger hill, and so on, from which I will be able to see the range, to understand the lay of the land, and know how to approach questions of a similar kind."

So with the paint drop. As it dries, a skin will form. That is the natural consequence of liquid solvent leaving the surface fastest. "Now you have a skin, which is covering a drop, which is sitting on a surface, and you want to remove more liquid from inside. That is like drying a raisin," says Mahadevan. When you remove some of the volume from beneath a fixed amount of surface skin, "the only thing the skin can do is wrinkle."

Paint often wrinkles—but sometimes it cracks. This seems odd, he points out, because in wrinkling, things are pushed together, whereas cracks form when things are pulled apart. What accounts for these antithetical behaviors?

The answer, he explains, depends on whether and how the drop is attached to the surface. "For example, if I have sliced the grape in half and stuck it down on a surface," then it can't shrink easily because it is stuck to the substrate, and it will rip. "On the other hand, if the drying grape is not attached," removing liquid from the inside will cause it to wrinkle as it shrinks.

Changing one little parameter changes the outcome. Using this knowledge, Mahadevan points out, "You could learn to engineer materials cleverly." The roughness imparted by wrinkles might prevent things from getting stuck to a surface, so that it becomes self-cleaning (like a ridged Circulon skillet). Or a lifesaving drug could be hidden in a crack of material engineered so that, whenever it shrinks or swells, the drug is exposed.

But the applications are not Mahadevan's main focus. He is seeking a general understanding of how things are ordered and shaped in space and time, and strives for simple answers. "The simplest answers often are very powerful," he points out, "since they allow one to move from one problem to another, often via analogy." For example, "If you get an idea looking at a particular system on a particular scale," can it be used to explain other things that initially seem very different, but are not? "We have wrinkles on our skin," he points out, "but, on a grander scale, wrinkles on the earth are called mountains. We have made a little bit of progress explaining their shape and size by doing experiments with balloons, which are very, very naively like the earth's crust."

The crust moves, he explains; it floats on a hot mantle of molten iron and silicate rock. Along the mid-Atlantic ridge, the mantle wells up and new crustal material is formed; in other places the crust falls back into the mantle. "If you look at the globe, you have seen perhaps that subduction zones [where two tectonic plates meet and one is forced beneath the other] are never, or very rarely, straight lines." Think of the islands of Japan or the Aleutians off the coast of Alaska. "They are almost always along arcs," he notes. "Why? What sets the size of the arc? And why is the arc cuspate—not one uniform arc, but many little arcs?"

Mahadevan suggests an answer based on very simple ideas. Newly formed hot crust is buoyant, which is why it rises. As it surfaces, it begins to cool and becomes heavier, even as it continues to be pushed up by new molten material beneath. Eventually, however, the newly formed crust's weight causes it to fall back. "That much is known," says Mahadevan. "The question is, does it fall down smoothly, gently, or does it fall down suddenly? If suddenly, does it fall along a straight line or does it fall along an arc? And very, very naively," he says, answering his own question, "it *must* fall along an arc." As the hardened rim of the crust collapses, it is moving toward a smaller diameter, which

*See "Leaves That Lunch," May-June 2005, page 14. The work was done together with his student Jan Skotheim (now a postdoctoral fellow at Rockefeller University) and postdocs Yoel Forterre (now an assistant professor of physics at Marseilles) and Jacques Dumais (now an assistant professor of biology at Harvard).

Illustrations by Serge Bloch

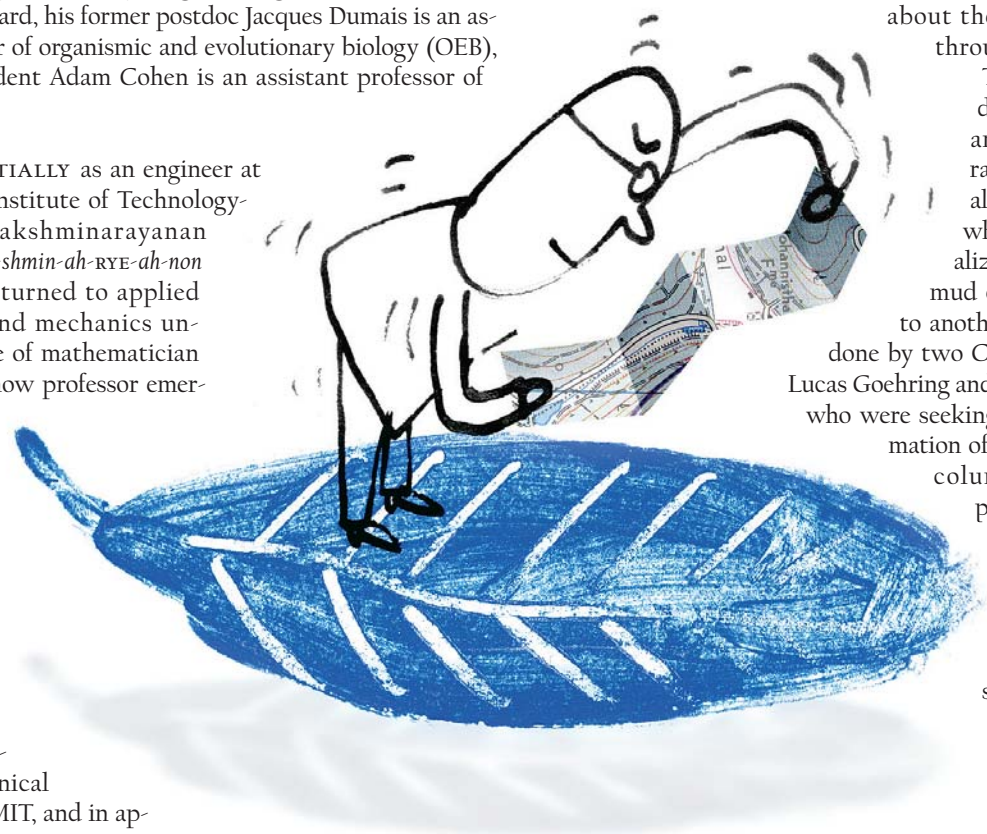
means the perimeter has to shrink. But "the perimeter *can't* shrink very quickly, so instead, what will happen is, it will buckle." He is currently working with postdoctoral fellow Haiyi Liang and geophysicist Rebecca Bendick of the University of Montana to test some of these ideas using real geological data. The work builds on subjects Mahadevan has studied in the past, like wrinkles in human skin—or on the surface of a drop of paint.

The goal of Mahadevan's science is to get at the essence of complex phenomena in the everyday world with explanations that anyone can understand, but that can also be described with full-blown mathematics. "Maha is not only a tremendous applied mathematician, he truly is a kind of Renaissance thinker," says the dean of the School of Engineering and Applied Sciences, Venkatesh Narayanamurti. "Is he an applied mathematician? Is he an engineer? Is he a computational biologist? Or is he an applied physicist? He is all of the above," Narayanamurti adds. "I hadn't realized how much that was so until I got to know him after he joined the faculty. We are very fortunate in the last seven or eight years to have been able to recruit people like him: top-flight theoreticians who are solving important intellectual problems and doing all kinds of applied work as well." As it happens, Mahadevan's students and postdoctoral fellows, past and present, work in a variety of departments and disciplines, including biology, chemistry, engineering, mathematics and physics; at Harvard, his former postdoc Jacques Dumais is an assistant professor of organismic and evolutionary biology (OEB), and former student Adam Cohen is an assistant professor of chemistry.

The goal of Mahadevan's science is to get at the essence of complex phenomena in the everyday world with explanations that anyone can understand...

Trained initially as an engineer at the Indian Institute of Technology-Chennai, Lakshminarayanan Mahadevan (*la-shmin-ah-*RYE*-ah-non ma-ha-*DAY*-vun*) turned to applied mathematics and mechanics under the tutelage of mathematician Joseph Keller (now professor emeritus) at Stanford, where he earned his Ph.D. in 1995; he was then briefly a postdoctoral fellow in physics and math at the University of Chicago. He held professorships in mechanical engineering at MIT, and in applied mathematics and theoretical physics at Cambridge University, before arriving in 2003 at Harvard, where he also has appointments in OEB within the Faculty of Arts and Sciences and in systems biology at the Medical School (HMS). In addition, he is a visiting professor of mathematics at Oxford University, and of biology at the National Center for Biological Sciences in Bangalore.

Although the problems he tackles vary in complexity, none is trivial in Mahadevan's eyes. He does not believe in a hierarchy of problems, or even that their solutions belong to particular disciplines. "A problem is just that: a problem," he says. "Nature does not tell us what kind of a problem it is—a physics problem, a biology problem, an engineering problem, an important problem, an unimportant problem... Nature couldn't care less." For example, he recently helped explain a problem puzzling the laboratory of a colleague, Mallinckrodt professor of physics and of applied physics David A. Weitz: why, in one experiment, a thin film of mud between two solid surfaces was cracking sporadically as it dried. The crack would remain still for a while, Mahadevan says, then "zip through suddenly and stop, pause for a while, then zip through and stop again." Mahadevan helped explain what was going on as the mud dried, using very simple ideas about the way water moves through soft materials.



Then, aware of the deep mathematical analogy between the rate at which materials dry and the rate at which they cool, he realized that his work on mud could be transposed to another experiment being done by two Canadian researchers, Lucas Goehring and Stephen W. Morris, who were seeking to explain the formation of giant, jointed basalt columns found in such places as the Devil's Postpile National Monument in east central California. Often perfectly six- or eight-sided, the columns present in profile the appearance of enormous hitching posts; they were

formed when volcanic rock cracked as it slowly cooled.

Mahadevan, who grew up in India, tells a traditional story about Krishna where mud becomes metaphor. "In Hindu mythology, Krishna is divine," he begins. "However, because there was a prophecy that he would overthrow an evil king, his origins when he was a baby were hidden from almost everybody. So when Krishna was born, his mother surreptitiously sent him away to be brought up by a foster mother who didn't know who he was. As in all mythologies, there were premonitions [of greatness], but growing up with his foster mother, he would go out like all children and play in the mud. One day he started to eat the mud, putting it in his mouth. And his [foster] mother, from afar, said, 'Don't do it.'" Krishna kept eating the mud. "Again [she] said, 'Don't do it,' and yet he continued. So she came up to him, and when she opened his mouth to take out the mud, she looked—and she saw the universe.

"Without ever claiming all the grandeur that the story actually suggests," says Mahadevan, "you just have to look and you will find interesting things everywhere."

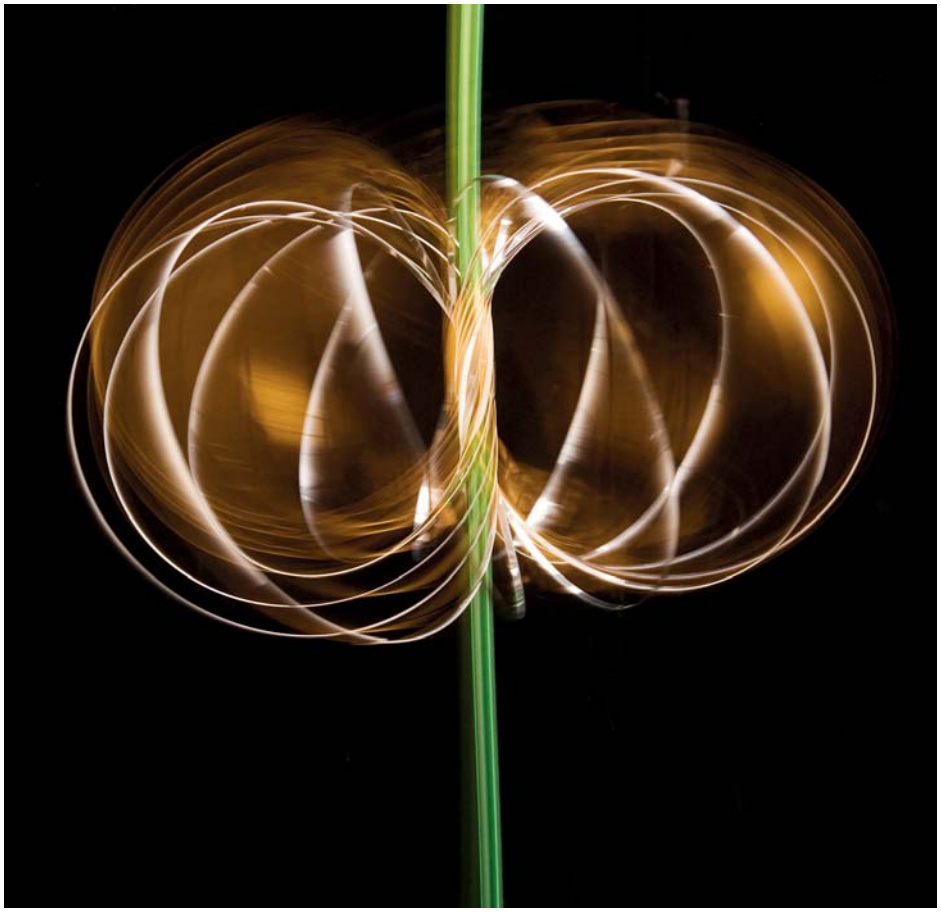
Mahadevan has a particular knack for choosing interesting problems—and for coming up with solutions that are "as simple as possible, but no simpler," says his doctoral student Madhav Mani, echoing Einstein. "When he looks at a problem, he is able to strip away all the junk and say, 'This is the essence of the phenomenon we are looking at.'" It is a gift Mahadevan shares with students, from first-years in his freshman seminar, "Science of Everyday Life," to graduate students in Engineering Sciences 216, "Biological Dynamics," to his half-dozen most advanced postdoctoral fellows. "[Applied mathematicians] are all technically as good as each other," says Mani, "but the ability to see, for example, that there is a competition between two areas of physics leading into one problem," either one of which might offer an answer, and to focus on the one that holds the key to the solution: "this is the kind of thing that you want to learn as a Ph.D. student."

Using an origami model, Mahadevan demonstrates how folds in the leaves of a hornbeam or a beech are coupled, allowing them to easily open and close.

In his office, Mahadevan keeps an origami model of a leaf made of green paper, patterned like the leaves of beech or a hornbeam. "This is a very clever design," he says admiringly. "You can open and close the leaf by playing with just one place." Mahadevan manipulates the model with his fingers. A plant would use water pressure to do the same thing. "The folds in this leaf" he says, "are very different from those in a map, in which each fold is decoupled," meaning that every fold can go either way—which is what makes road maps hard to close. In the leaf, on the other hand, all the folds are coupled to each other, so they open and close in unison. This same pattern, known as Miura-ori (after the Japanese engineer Koryo Miura), appears again and again in nature—in flowers and insect wings, for example, which have nothing in common at the genetic or molecular level—an apparent case of convergent design. Mahadevan thinks he knows why.

Looking at a "serendipitous experiment" associated with the wrinkling of gelatin, he found that this Miura-ori pattern arises naturally as the most efficient solution to a physical problem. When gelatin shrinks in two directions, the pattern develops spontaneously. "The analogue in biology would be that cells are shrinking, or expanding or reproducing, or dying" at a greater rate on a surface layer of a tissue than on an inner layer, forcing the cells to push together. "That is all you need," says Mahadevan. "You don't need to control where this fold or that fold will occur. The rest just follows, following the laws of physics, nothing more complicated than that"—a plausible explanation for why these patterns appear in so many places.

The underlying principle, which involves the differential expansion or contraction of cells, can also produce mechanical effects. "If you wet a pine cone, it will close," Mahadevan points out. "If you dry it, it will open." This occurs when water swells one part of the pine cone more than another, as in a bimetal thermostat where two strips, made of different metals that expand at differ-



One of the "toys" in Mahadevan's office forms a toroidal bubble—a doughnut—as interlocked metal rings spin down around a central tube. He hopes to learn what limits the speed of its descent.

ent rates in response to temperature, have been stuck together. When the metal on one side swells, the thermostat bends away to the opposite side to accommodate the expansion. When the metal contracts, the apparatus swings back the other way. A pine cone with seeds generally stays closed when it is on the tree, but as soon as it falls, it dries and opens, and the seeds start to disperse. "These are solutions to problems in biology, from which we may learn something once in while."

THE OFFICE ALSO INCLUDES a collection of toys and interesting objects that once amused his children on weekends when they accompanied him to work. There is a purple cape, purloined from his daughter, that drapes and folds dramatically; a model of a biological structure that has kinks in it and can rotate; tubes for making mathematical models; and interlocked metal rings that form a toroidal bubble—one shaped like a donut—when they spin around a piece of flexible tubing that loops through the donut's center hole. Frequently, the objects illustrate ideas he has been working on. "This is a crochet made by a mathematician at Cornell, Daina Taimina," he says, holding up an object that resembles a bell with a wavy lower edge, or more fancifully, a flamenco dancer's frilled dress. He uses it to illustrate a fundamental question in geometry, but also to think about the folding of the brain during embryogenesis, when gray matter packs itself into the tight confines of a skull.

Crochet, he explains, is made by knotting thread or yarn. "Suppose I wanted this object to be a flat, circular disk," he says. "Starting at the center, I would increase the number of knots linearly with the radius," to make, in effect a round hot pad. If, instead, as he worked out from the center, he decreased the number of knots at the perimeter, a spherical cap would start to form. But when the number of knots at the perimeter increases exponentially, you begin to get something like Daina Taimina's creation. The exponential growth at the edges leads to excess material that can be accommodated only by having folds. "This is a very deep mathematical result that goes back, in fact, to David Hilbert and Henri Poincaré," Mahadevan explains. He is interested in what happens next. "Geometers and mathematicians will tell you that as the structure grows more and more it will self-intersect, because there is too much material, and the only way to accommodate it all is basically to have it go through itself. Of course, this cannot happen with real material. Instead, the sheet forms complex folds."

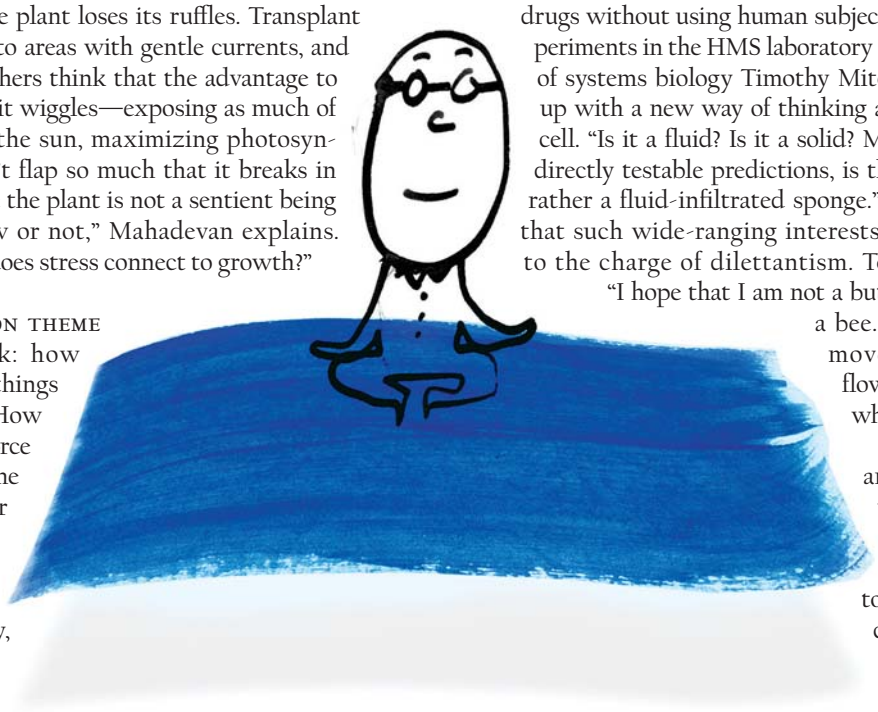
Visit harvard-mag.com/extras to watch Mahadevan create wrinkles, folds, and a flutter.

In the case of the brain, for example, "you have a flat sheet that is growing rapidly" inside an enclosed structure, the skull. "Brain folding is a difficult problem, which a number of research groups are working on," Mahadevan says. Rather than tackle it directly, he has been climbing a smaller hill: he has been studying the growth of seaweed.

> "There is a unity to these ideas. Science is a continuum, and the goal should be to explain the largest number of observations with the smallest number of assumptions."

Kelp, the blades of which can grow as long as 10 meters, lives in shallow ocean waters. Typically, these algal blades are flat in the center and ruffled at the edges. But the amount of ruffling depends on the environment, says Mahadevan, whose interest in the problem was sparked by University of California, Berkeley biologist Mimi Koehl while he was on sabbatical there. If moved

into fast-flowing water, the plant loses its ruffles. Transplant the same algal blade back to areas with gentle currents, and the ruffles regrow. Researchers think that the advantage to the plant is to ensure that it wiggles—exposing as much of its surface as possible to the sun, maximizing photosynthetic activity—but doesn't flap so much that it breaks in strong currents. "Of course the plant is not a sentient being that knows when to grow or not," Mahadevan explains. "The *real* question is, how does stress connect to growth?"



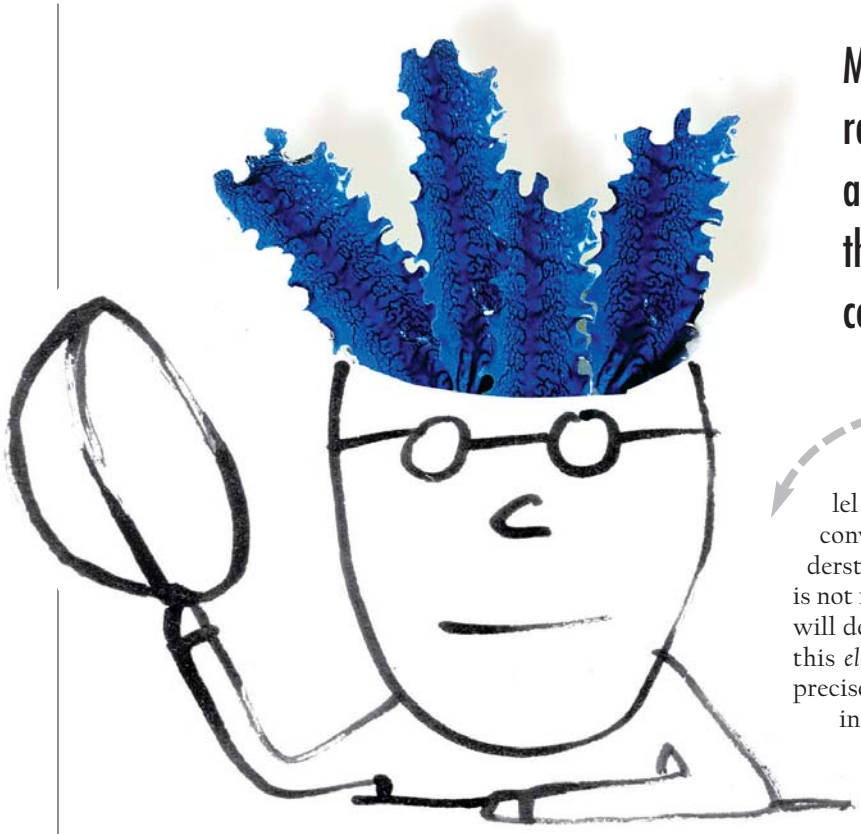
Structure is a common theme in Mahadevan's work: how shape arises and how things change shape and flow. "How does structure essentially force certain things to happen," he asks, "predetermining or very strongly constraining function in physics, chemistry, engineering, mathematics, geometry, biology, and medicine?"

Thus Mahadevan's interest in the way plants move water has led to one collaboration exploring how they grow pollen tubes and other structures using hydrostatic pressure, and another exploring how the design of veins in a plant's leaves work to control evaporation in different climates. Working in his lab with John Higgins, a clinical fellow in pathology from HMS, and with his experimentalist colleague Sangeeta Bhatia, who is at MIT, he is studying the physical basis for sickle cell disease—in which hemoglobin sometimes forms a flexible rod inside the balloon-like red blood cells, causing cells to take on the characteristic sickle shape that can block capillaries—using a small device that mimics symptoms of the disease. The goal is to understand the mechanisms associated with flow blockage, while also developing technologies that might be useful for individualized medical testing and for testing potential drugs without using human subjects. And based on experiments in the HMS laboratory of Sabbagh professor of systems biology Timothy Mitchison, he has come up with a new way of thinking about the inside of a cell. "Is it a fluid? Is it a solid? My theory, which has directly testable predictions, is that it is neither, but rather a fluid-infiltrated sponge." Mahadevan knows that such wide-ranging interests leave him exposed to the charge of dilettantism. To which he replies, "I hope that I am not a butterfly, but more like a bee. A bee pollinates. I move from flower to flower. I hope, once in a while, I am successful."

The kelp is an example of a recurrent theme among Mahadevan's interests: how growth leads to form, and how form changes function in the context—in this case—of having more or less light. He has developed a mathematical model of cellular growth in an algal blade, which shows that the pattern of ruffling arises naturally when the rims of a blade grow faster than the interior. The rims form a series of saddles, similar to the waves in the crochet, in order to accommodate their greater length. "The same thing happens when I take sheets of paper and wet them and dry them and different parts wet and dry differently," Mahadevan says. "Spray water on a paperback in the bathroom and when it dries it is very difficult to keep it shut again.... The point is that there is a unity to these ideas. Science is a continuum, and the goal should be to explain the largest number of observations with the smallest number of assumptions."

Mahadevan moves easily from modeling the way kelp grows to a simple understanding of how it sways in a current, based on his work examining how flags flutter. He holds a thin sheet of paper to his lips, and blows softly. The paper gently rises. Then he blows rapidly, and the sheet begins to flutter wildly. "There are many prob-

The same rules of geometry and physics can govern wrinkling in objects as small as carbon nanotubes and as large as an elephant's trunk. Mahadevan makes the point with a tube of rolled rubber. (A video demonstration may be viewed on line.)



Motivated by watching skates and rays skimming along the bottom of an aquarium, Mahadevan has calculated the conditions under which carpets could be made to fly.

lems where you move from a steady behavior to an oscillation," he observes. In the 1930s, as planes began to fly faster and wings sometime broke off as a result of high-speed vibrations, aeronautics engineers devised ways to design around the problem. Similar wind-driven oscillations famously brought down the Tacoma Narrows Bridge in 1940. Mahadevan and a postdoctoral fellow, Médéric Argentina, now an assistant professor in France, realized the flutter of a flag could be used to unify a whole class of problems in a single conceptual idea: that a fluid such as air or water can actually couple different modes of energy.

"What a flag does," says Mahadevan, "is essentially convert a uniform DC [direct current] flow to AC [alternating current], if you think of it in terms of electrical analogies." The steady flow of the wind is converted into the oscillations of the flag. The simplest way to think of this is to imagine that the flag is rigid. Mahadevan raises his arm to demonstrate, using his elbow as a pivot point. A wind blowing would push his arm first up, then down, as it overshot a position parallel to the direction of the wind. In this way, a flow can be converted to an oscillation, "something that has been understood since the time of Lord Kelvin." But of course a flag is not rigid. "Even in the absence of a fluid, if you hit the flag it will deform and then come back to rest." The combination of this *elastic* response and the fluid-driven response led to "a precise description of how you can push energy from the fluid into the solid and make it vibrate," he says. And of course one can turn the problem around, turning AC movements into DC locomotion. "Think of an eel that [propels itself forward] using waves of undulation that propagate along its body." In a recent paper with his student Zengcai Guo, Mahadevan described how snakes "swim" this way on land, by "pushing off against protuberances." And more whimsically, motivated by watching skates and rays skimming along the bottom of an aquarium, he has calculated, with student Jan Skotheim and Argentina, the conditions under which undulating carpets—actually thin films—could be made to fly.

Mahadevan is a testament to science driven primarily by curiosity. "Nobody questions whether art or music is useful and important and relevant," he says. In the same way, he believes, there ought to be room for science pursued simply because it is part of human culture. As a teacher, he aspires to whet and satisfy the natural scientific curiosity that drives such inquiry. No degree in mathematics is required. "To be able to experience some of the wonder and the mystery," he says, "you just have to probe the immediate environment around you."

A purple cloak demonstrates—dramatically—how fabric drapes and folds.

Jonathan Shaw '89 is managing editor of this magazine. Readers interested in additional information on L. Mahadevan's work may wish to visit his website, www.seas.harvard.edu/softmat.

2008 TRIPS

OCEAN / SEA CRUISES

CANARY ISLANDS & THE ALGARVE ON *LE DIAMANT*
CORNELIS "KASE" KLEIN
APR 23 - MAY 1, 2008

GREECE BY LAND & SEA ON *SV PANORAMA*
ELENI ZACHARIOU
MAY 7 - 17, 2008

THE ANCIENT SHORES OF TURKEY *ON CALLISTO*
AUG 21 - 30, 2008

CIRCUMNAVIGATION OF THE BLACK SEA ON *LE LEVANT*
SEP 3 - 16, 2008

ISLAND LIFE IN ANCIENT GREECE & TURKEY ON *LE DIAMANT*
GRAEME BIRD
SEP 21 - OCT 1, 2008

LIBYA, TUNISIA, & GREECE ON *LE LEVANT*
OCT 9 - 21, 2008

RETRACING THE AENEID THROUGH THE MEDITERRANEAN ON *CORINTHIAN II*
FRANCESCA SCHIRONI
OCT 10 - 21, 2008

AUSTRALIA'S GREAT BARRIER REEF ON *CORAL PRINCESS II*
MARK VAN BAALEN
OCT 15 - 25, 2008

NEW ZEALAND BY LAND & SEA ON *ORION*
DAVID AGUILAR
NOV 9 - 21, 2008

ANTARCTICA, SOUTH GEORGIA, & THE FALKLAND ISLANDS ON *LE DIAMANT*
KAREL LIEM
NOV 15 - DEC 6, 2008

BAY OF BENGAL: KOLKATA TO CHENNAI ON *ISLAND SKY*
SUGATA BOSE
DEC 26 – JAN 6, 2009

ISLAND LIFE IN TAHITI & FRENCH POLYNESIA ON *STAR FLYER*
ANI PATEL & JENNIFER BURTON
JAN 25 - FEB 9, 2009

LAND PROGRAMS

VILLAGE LIFE IN DORDOGNE
TOM & VERENA CONLEY
APR 24 - MAY 2, 2008

CHINA: HIGHLIGHTS OF THE MIDDLE KINGDOM
JUN 8 - 21, 2008

CANADIAN HELI-HIKING & MOUNTAIN RETREAT
JUL 17 - 25, 2008

HIGHLIGHTS OF THE SILK ROAD IN CHINA & CENTRAL ASIA
MERLE & MARSHALL GOLDMAN
SEP 6 - 24, 2008

THE ITALIAN LAKE DISTRICT
SUE WEAVER SCHOPF
SEP 6 - 14, 2008

CHANGING FACES OF JORDAN
OCT 11 - 21, 2008

ULTIMATE SOUTHERN AFRICA
TIM MCCARTHY
OCT 15 - 31, 2008

THE HOLY LAND: VIEWS ON ISRAELI-PALESTINIAN RELATIONS
EVERETT MENDELSOHN
OCT 22 - NOV 1, 20008

SOUTH AMERICAN SPECTACULAR
LOUISE RICHARDSON
NOV 2 - 17, 2008

RIVER CRUISES

PRINCELY DOMAINS: ELBE CRUISE ON *MV KATHARINA*
ALICE DELANA
MAY 5 - 17, 2008

SWISS COLLECTIONS & LANDSCAPES OF THE RHINE ON *RIVER CLOUD*
JUN 3 - 14, 2008

NORMANDY TO PARIS: CULTURAL HERITAGE ON *CEZANNE*
HARVEY COX & NINA TUMARKIN
JUN 3 - 14, 2008

ANCIENT & IMPERIAL RUSSIA ON *VOLGA DREAM*
MARSHALL & MERLE GOLDMAN
JUL 12 - 26, 2008

A VOYAGE THROUGH THE DANUBE'S MUSICAL HERITAGE ON *CASANOVA*
JOHN STEWART
SEP 19 - 29, 2008

RAIL JOURNEYS

SOUTHERN AFRICAN RAIL JOURNEY ON *ROVOS RAIL*
MICHAEL SHINAGEL
APR 30 - MAY 15, 2008

EDINBURGH & THE ROYAL SCOTSMAN: TEES & TOURS
JUN 2 - 10, 2008

TRANS-MONGOLIA BY PRIVATE TRAIN ON *GOLDEN EAGLE*
HARVEY COX & NINA TUMARKIN
JUL 9 - 22, 2008

CELEBRATING PALLADIO: 500 YEARS LATER ON *ORIENT EXPRESS*
SEP 24 - OCT 3, 2008

CITYSCAPES

ART & ARCHITECTURE OF BERLIN & DRESDEN
MONIQUE RINERE
MAY 13 - 18, 2008

REYKJAVIK, ICELAND
PATRICIA CRAIG
JUL 16 - 20, 2008

MEXICO CITY ART & ARCHITECTURE
OCT 15 - 19, 2008

FAMILY ADVENTURES

FAMILY TANZANIA SAFARI
DANIEL LIEBERMAN
JUN 22 - JUL 4, 2008

THE GALÁPAGOS ISLANDS & THE HIGHLANDS OF ECUADOR: A FAMILY ADVENTURE ON GALÁPAGOS EXPLORER II
SCOTT EDWARDS
JUN 29 - JUL 10, 2008

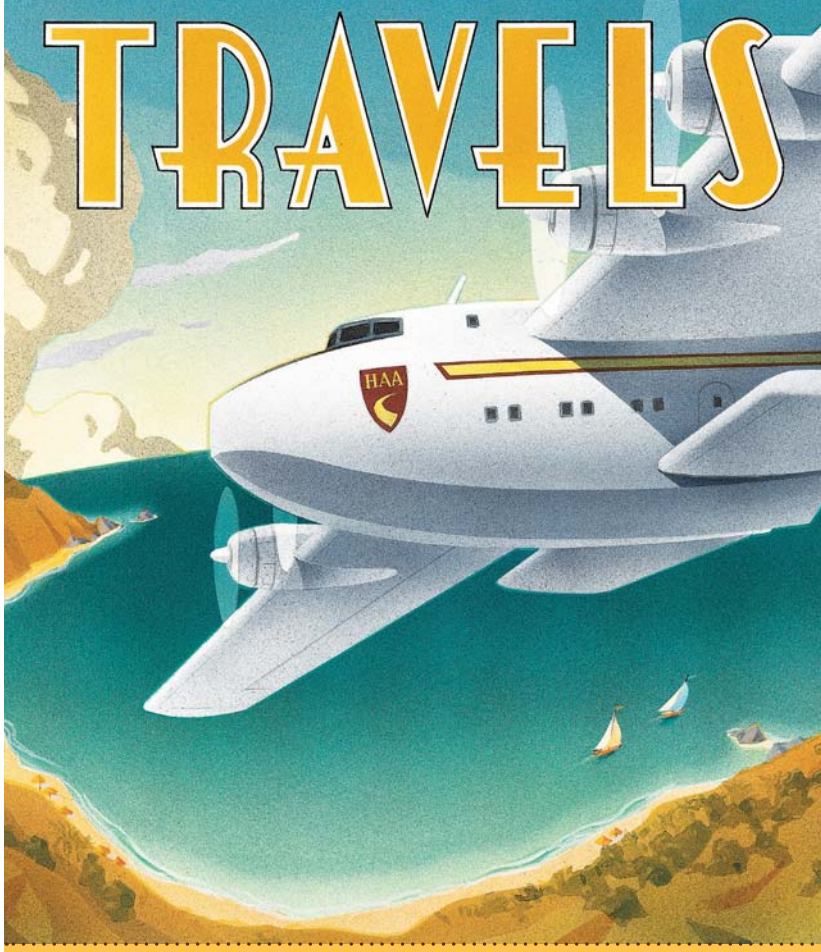
SPORTS / ACTIVITIES

2008 MASTERS TOURNAMENT: A GOLFER'S EXCLUSIVE
APR 12 - 15, 2008

RYDER CUP GOLF TOURNAMENT IN KENTUCKY
SEP 19 - 22, 2008

HARVARD ALUMNI ASSOCIATION

TRAVELS



TRAVELING WITH THE HARVARD ALUMNI ASSOCIATION IMMERSES YOU IN THE INTELLECTUAL, CULTURAL, AND HISTORICAL CONTEXT OF YOUR DESTINATION. PROGRAMS ARE DESIGNED AROUND OUR STUDY LEADERS WHO INCLUDE HARVARD FACULTY, RENOWNED SCHOLARS, AND SPECIALISTS IN THEIR FIELDS. WITH OVER 80 DESTINATIONS ON ALL SEVEN CONTINENTS, HAA IS YOUR PASSPORT TO AN ADVENTURE IN LEARNING.

BOOK YOUR NEXT TRIP

CALL 800.422.1636 OR EMAIL HAATRAVELS@HARVARD.EDU

FOR DETAILED PROGRAM INFORMATION VISIT HTTP://POST.HARVARD.EDU/TRAVEL

JOHN HARVARD'S

JOURNAL

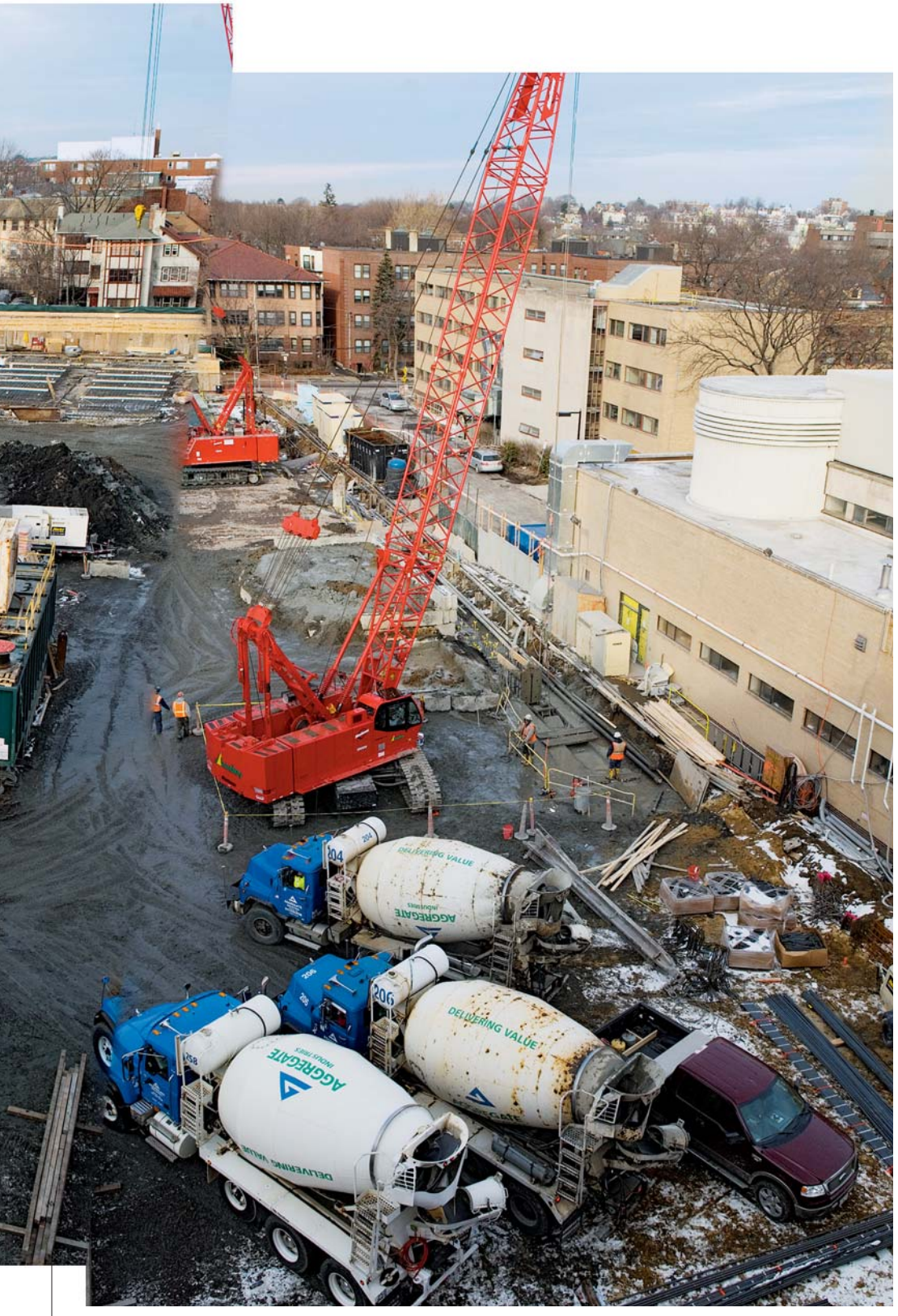
LAW SCHOOL, LOOMING LARGER: Subsurface construction proceeds on Harvard Law School's northwest building, which extends along Massachusetts Avenue (diagonally across the upper left) north of Pound Hall, from which this late-winter photograph was taken. The new complex will accommodate classrooms as well as faculty and research offices.

IN THIS ISSUE

Boosting College Financial Aid

HARVARD'S NEW undergraduate financial-aid policies, affecting even students from high-income families, were announced on December 10—and received national attention, setting off debate on financial aid generally, private institutions' use of their endow-

Photograph by Jim Harrison



ments, and the relative position of other colleges (see "Raising the Ante," page 56). The principal features of the new system are meant to be easy for families to use as they plan for their children's education:

• An income-based standard. Families with incomes from $120,000 to $180,000 are asked to pay 10 percent of their income toward a child's cost of attending Harvard: from $12,000 per year (compared to the current cost of $19,000) to $18,000 per year (versus the current $30,000.) For families with incomes below $120,000, the contribution will decline from 10 percent to zero (already the standard for families at an income level of $60,000 or less). This reduction, totaling one-third to one-half of the current cost to those families now required to contribute, would, Harvard estimates, make the price of a College education for students on financial aid comparable to the cost of an in-state education at leading public universities.

• No loans. In calculating aid packages, Harvard will no longer expect students to take out loans; it will provide increased grants instead. For students from the lowest income cohorts, that means an additional $1,000 per year of scholarship aid.

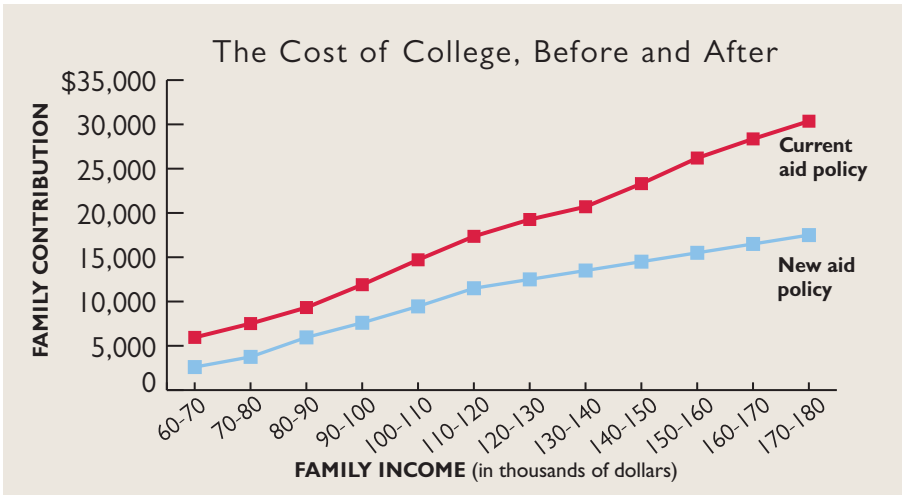
• Eliminate home equity. Harvard will no longer consider home equity in calculating a family's ability to pay; in practice, this will reduce the expected contribution toward the cost of attending Harvard by $4,000 per year.

President Drew Faust, Faculty of Arts and Sciences (FAS) dean Michael D. Smith, and dean of admissions and financial aid William R. Fitzsimmons unveiled the new program, noting that the initiative will take effect for all College students, beginning this fall.

"We want all students who might dream of a Harvard education to know that it is a realistic and affordable option," Faust said. "[W]e are determined to do our part to restore [education's] place as an engine of opportunity, rather than a source of financial stress....[W]e are not tinkering at the margins, we are rebuilding the engine. This is a huge investment for Harvard."

The enhanced aid packages will initially cost about $22 million annually, the University estimated, increasing the grant-aid budget from $98 million this year to nearly $120 million in the 2008-2009 academic year (about 22 percent). During a conference call, Faust said the money would come from presidential and FAS discretionary funds and distributions from the endowment (which totaled $34.9 billion for the University as a whole as of June 30, 2007; FAS accounts total about 45 percent of that sum).

According to Fitzsimmons, 53 percent of undergraduates now receive grant aid; that



cohort typically comes from families with incomes of $180,000 (between the 90th and 95th percentiles for family incomes nationwide) or less. (About 225 students whose families' incomes exceed $180,000 also receive grant aid, reflecting circumstances such as health crises or multiple children in college at once.) The remaining students do not qualify for financial aid—meaning that roughly half of current undergraduates come from the top 5 to 10 percent of families, measured by income. In theory, the proportion of undergraduates on financial aid could rise if the new program encourages additional talented middle-

Raising the Ante

In the wake of Harvard's December announcement, a host of other institutions—Haverford, Penn, Pomona, and Swarthmore among them—said they would replace loans with grant aid. (All such programs are tracked at the Project on Student Debt, http://projectonstudentdebt.org.) But from the Cambridge vantage point, the most interesting news came from Yale, which had also been reviewing its aid policies when Harvard publicized its new program. The Eli decision was double-barreled.

On January 7, Yale president Richard C. Levin announced that his institution would lift its targeted annual distribution from the endowment to a range of 4.5 percent to 6.0 percent of the value of the funds; the nominal payout ratio had been raised to 5 percent in 1995 and to 5.25 percent in 2004. To effect that change, he said, the distribution for the 2008-2009 year would rise 37 percent, to $1.15 billion, from $843 million in the current fiscal year. The huge increase would be used to enhance financial aid; to make Yale's intellectual capital more available to the public (on line and, perhaps, on campus, by expanding the undergraduate student body 13 percent, to 6,000); and to accelerate biomedical research by developing a 136-acre pharmaceutical campus in West Haven purchased last fall.

Some perspective: Yale is less than two-thirds Harvard's size, measured by total enrollments and endowments ($22.5 billion versus $34.9 billion last June 30). During fiscal year 2007, Harvard distributed $1.04 billion from the endowment for operations (a 4.3 percent distribution rate in the University accounting), plus additional sums for one-time "decapitalizations" and for the annual assessment for Allston campus development costs; in sum, Harvard now aims to have an "aggregate spending rate," for all three categories of distributions, that totals 5.0 percent to 5.5 percent of endowment value. In the near term, absent a change in University policy, Harvard's regular endowment distribution for operations might be only slightly greater than Yale's, measured by dollars spent.

On January 14, Levin unveiled Yale's aid package, which in some ways goes beyond Harvard's. It eliminates loans, applies the 10-percent-of-income formula to families with up to $200,000 of income, and expands expense allowances during school vacations for foreign students. It exempts the first $200,000 of family assets, if not all home equity, from aid calculations. In illustrating its package, Yale emphasized significant reductions for families educating more than one undergraduate at a time, and estimated that the average cost of enrolling a child would be reduced by more than half for families with financial need. An on-line calculator will help families estimate the net cost of attendance. Paying for the new program will cost "more than $24 million," increasing the aid budget to "over $80 million annually"—implying a spending increase of perhaps 40 percent. Yale will also limit the increase in its term bill for next year to the expected level of general inflation, 2.2 percent. (Harvard's 2007-2008 term bill increased 4.5 percent.)

While the two universities with the world's heftiest balance sheets battled it out, various educators had somewhat critical perspectives on the escalating aid offers, particularly to upper-income families. *The Chronicle of Higher Education* quoted Robert J. Massa, a vice president at Dickinson College: "Harvard, Yale, and other mega-rich universities…are applying a 'percentage of income' contribution because they can afford to do so—not because it is right." Similar sentiments reported in the *New York Times, Washington Post, Boston Globe,* and elsewhere summed up fears that the few dozen richest institutions are, in effect, moving beyond need-blind aid toward merit scholarships—thus forcing less-endowed competitors to ramp up their own spending even for affluent students, depleting the ability to focus aid on financially needy applicants. Pomona president David W. Oxtoby '72 told the *Times* that if other schools headed in that direction, "[T]hat would be terrible, exactly the wrong outcome." Some public university leaders expressed apprehension that elite private institutions are taking advantage of budget constraints affecting state support for higher education—even as they wanly hoped the new round of aid programs would focus legislators' attention on the need to boost scholarship funding.

Reacting to such concerns, Levin told the *Washington Post,* "If we don't spend our resources for a social good, we are criticized. If we do…we are criticized. We are trying to strike a balance."

income applicants to seek admission.

In the era of the $45,000 bill for a year of college, Fitzsimmons said, "Many parents won't even allow their sons and daughters to apply to private colleges, while others allow their children to attend but experience real pain in paying the share we ask of them." He also cited survey research showing that students from the highest-income groups enjoy "differential access" to the undergraduate experience. Aid recipients are constrained in their ability or willingness to explore unpaid research opportunities or internships, to spend time with friends (as opposed to working or helping their families secure loan funds), to study abroad during the summer, and so on. Fitzsimmons called this finding a "kind of *Upstairs, Downstairs* situation," resulting in a "diminished experience" for half the student body.

There is strong evidence that such effects linger. In "Constrained after College: Student Loans and Early Career Occupational Choices," Jesse Rothstein and Cecilia Elena Rouse of Princeton's Firestone Library found that "[D]ebt causes graduates to choose substantially higher-salary jobs and reduces the probability that students choose low-paid 'public interest' jobs." Their paper, published by the National Bureau of Economic Research last May and based on the decision early this decade by "Anonymous University" to eliminate loans from its financial aid, also found "some evidence that debt affects students' academic decisions during college." In an essay on "Expanding Equal Opportunity" in the Winter 2007 *Harvard Educational Review,* Shirley M. Tilghman, president of Princeton (which fits all traits attributed to "Anon U"), says its proportion of students on financial aid rose by 17 percentage points in a recent class, and representation of low-income and minority students has increased strongly, since it did away with loans in 2001. She also cites accumulating evidence that students are "taking up positions in nonprofit, governmental, or educational fields."

Hence many of the elements of Harvard's new aid policy.

THE CHANGES not only build on prior efforts to bring private education within reach of lower-income families, but also

HARVARD PORTRAIT

David Charbonneau

On camping trips in northern Ontario as a Boy Scout, David Charbonneau, Ph.D. '01, Cabot associate professor of astronomy, remembers looking up and watching the stars. "I'd lie on my back with a little star map," he says, "and try to piece together constellations." The son of a geologist and a psychiatrist, Charbonneau studied physics, math, and astronomy at the University of Toronto, where he also joined a co-op and applied his scientific acumen to brewing homemade stout. While a graduate student at Harvard, he remained active in co-ops by tutoring at one (through Dudley House) and founding another during a year-long stay in Boulder. In Colorado he also made an important discovery at the High Altitude Observatory. Until 1999, astronomers possessed only indirect evidence of planets in other solar systems, but by measuring the change in a star's brightness during an eclipse, Charbonneau proved the existence of the planet causing it (see "Distant Planets," July-August 2000, page 22). That research won him a fellowship to Caltech for postdoctoral study, during which he flew back East on weekends to visit his wife, who was doing her residency at Boston-area hospitals. He joined the Harvard faculty in 2004 and recently received a Packard Fellowship to build eight 16-inch telescopes at the Whipple Observatory on Mount Hopkins in Arizona. His original research turned up only "gas giants"; he will target the new scopes to identify small, rocky planets like our own. "We really are poised," he says, "to understand whether the solar system is commonplace throughout the galaxy, or whether we're unique."

Photograph by Stu Rosner

reflect heated competition among private institutions to liberalize their aid offers.

Harvard's financial-aid initiative started in 2004, when President Lawrence H. Summers announced that families with incomes below $40,000 would no longer need to make any contribution to the costs of educating their children at the College, and such contributions were reduced for families with incomes between $40,000 and $60,000 (see "Class-conscious Financial Aid," May-June 2004, page 62). Yale, Stanford, Penn, and other private institutions began comparable programs, and public schools such as the University of North Carolina promoted their augmented aid programs. Harvard's threshold rose to $60,000 in 2006, with reduced contributions expected for families with incomes from $60,000 to $80,000 (see "Aid Augmented," May-June 2006, page 69).

During 2007, Amherst, Davidson, and Williams announced plans to eliminate loans, emulating Princeton. (Princeton also excluded home equity from aid calculations, as did Stanford, which had earlier reduced the weight of that asset in its aid

Gains for Graduate Students

Harvard's new formula for undergraduate financial aid, unveiled on December 10, overshadowed its consequential changes in support for Ph.D. programs, disclosed on December 7. In a message to faculty colleagues, then-dean of the Graduate School of Arts and Sciences (GSAS) Theda Skocpol diagnosed and outlined solutions for three problems; the details were made available later, in response to queries.

• Stipends. Ph.D. students do not pay tuition; through this academic year, humanities and social-sciences students have been offered stipends for living expenses during their first two years of graduate study, followed by teaching fellowships in the third and fourth years. In these fields, "the stipends we guarantee…have lost ground compared to those proffered by our chief competitors, causing us to lose prospects to MIT, Princeton, Yale, Berkeley, Columbia, Stanford, and so forth," Skocpol wrote. In an interview, she noted that Harvard has been "losing the top candidates to our peer universities and even state schools."

The stipends, adjusted regularly for higher living costs, rose from $17,600 in academic year 2003-2004 to $18,500 two years later and $19,700 this year. For students entering GSAS programs this fall, the sum will be $21,830, an adjustment well above such "incremental" boosts. For antitrust reasons, schools do not share competitive information about their aid, but *Inside Higher Ed* reported on December 12 that Yale's support now ranges from $20,000 for nine months to $28,000 for full-year stipends, depending on disciplines. Skocpol said the new stipend should put Harvard midway among comparable institutions.

• Summer support. In the same fields, Harvard has in the past promised just two summers of living expenses, versus the three to five offered by peers. Students progress most successfully toward completing their dissertations, Skocpol wrote, when they can make optimal use of their summers—prime time for learning languages, conducting field work, or mastering a statistical technique required to pursue research. Effective this fall, financial support will double to four summers. Skocpol said the stipends, meant to cover an additional two months of living expenses, are worth about $4,300 annually. Significantly, the extra financing applies both to entering students and those already enrolled, covering the so-called G3 and G4 years. Again, this puts the University in the mid range of offers.

• Science. In the natural sciences and engineering—including programs in the Faculty of Arts and Sciences (FAS), the School of Engineering and Applied Sciences (SEAS), and the Longwood campus (Harvard Medical School [HMS] and Harvard School of Public Health)—planned growth in laboratory facilities, faculty ranks, and research programs have not been matched by growth in Ph.D. student enrollments. GSAS data found constrictions in federal government and foundation funding contributing to the "crisis."

Financial support for graduate students in the sciences depends not only on departmental endowments and University resources, but also on faculty members' research grants and on federal and foundation training grants. But Harvard's federal grants have begun to decline (see "Getting and Spending," November-December 2007, page 71)—reflecting the level budget of the National Institutes of Health, which is squeezing science support everywhere. Foundation fellowships have diminished. Federal training programs have been held essentially level; even when available, such grants can confine students to existing projects, just when they should explore new fields that most interest them. And in cutting-edge fields—the medical school's systems biology department, say, or regenerative medicine—there are no established endowments to fall back on, and federal research funds may not yet be available.

In response, Skocpol reported that the Harvard University Science and Engineering Committee (see "For Science and Engineering, New Life," March-April 2007, page 65) had agreed to underwrite "Harvard Science Fellowships"—to the tune of $7 million per year now—to more appropriately support graduate students otherwise dependent on training grants; to expand enrollments in new fields; and to match new faculty members in new fields with suitable student pools for their research groups. The funds (derived from FAS, HMS, and other University sources) mean that FAS and SEAS natural-sciences programs will admit 210 to 215 graduate students this fall, up from a five-year average of approximately 190. For interdisciplinary Ph.D. programs based in Longwood, the comparable growth will be to 145 entering students, up from a five-year average of about 130.

Admissions will focus on areas where enrollments have lagged behind faculty growth. The new funding thus represents both an enhanced level of graduate-student support and a jump start for a core University priority: expanding science research and education—particularly across traditional boundaries and at the frontiers of discovery.

awards.) On December 7, just ahead of Harvard, Duke—nearing the conclusion of a $300-million financial-aid campaign—eliminated parental contributions for families with incomes below $60,000; moved to help students with family incomes below $40,000 graduate debt-free; reduced loans for students from families with incomes up to $100,000; and capped loans for families with higher incomes at $5,000 per year. Duke estimated the cost of the initiatives at $12.7 million in the first year, a 17 percent increase over current spending on need-based, merit, and athletic scholarships.

These measures, like Harvard's, reflect several factors. First, the earnings of middle- and even some upper-income families have not kept pace with the costs of private higher education, which typically rise faster than the rate of consumer-price inflation in general. Second, Harvard and other need-blind selective colleges have had some success in expanding applications from lower-income students, and now see the opportunity, using recent endowment gains, to extend aid to most of the population. Third is heightened competition among schools for top students. (By making its aid policy public on December 10, Harvard, which no longer offers early admissions, sent a signal to students awaiting early-action decisions from other institutions, typically mailed in the middle of that month; presumably those accepted would then begin studying financial options.) And fourth, members of Congress, led by Senator Charles Grassley (R-Iowa), have raised questions about endowed universities' and colleges' use of their assets—particularly after several years of strong investment returns—and about continuing increases in tuition, room, and board fees. He has advocated that such institutions, like tax-exempt grant-making foundations, spend 5 percent of their endowments annually—well above the disbursements made by Harvard and most of its peers.

FAS dean Michael Smith emphasized that the aid enhancements are not meant to address only "one segment" of the faculty's students, citing recent increases in graduate-student stipends

Yesterday's News

From the pages of the *Harvard Alumni Bulletin* and *Harvard Magazine*

1923 The committee examining Harvard's admissions process discourages giving preferential treatment to alumni children because "unearned exemptions and favors are apt to be demoralizing to their recipients."

1928 The first reading period at Harvard College has proven successful in bolstering student achievement. The *Bulletin* cites an increase in honor and satisfactory grades and a corresponding decrease in unsatisfactory marks as proof that upperclassmen have the "capacity and interest to work independently."

1948 The University announces that tuition for the College will rise to $525 in the fall, the first increase in 20 years, and the Faculty of Arts and Sciences decides to eliminate the taking of attendance in upperclass courses.

1953 A Senate Judiciary Committee subcommittee holds two days of hearings in Boston to investigate Communist influences in education; three Harvard students and a junior faculty member are summoned to testify.

1968 Following the assassination of Rev. Martin Luther King Jr., the Association of African and Afro-American Students calls on the University to establish an endowed chair for a black professor, hire more black junior faculty members, create courses relevant to black students at Harvard, and admit blacks in proportion to their percentage of the nation's population as a whole.

1988 Harvard undergraduates triumph over students from Columbia and Dartmouth in a dining-hall survey designed to gauge "cultural literacy." Initiated by the editors of the conservative *Dartmouth Review* and administered at the College by the like-minded *Harvard Salient,* the survey features questions from various disciplines, including: "Who wrote *The Prince*?" "What is another name for the aurora borealis?" and "What is the capital of West Germany?" The Harvard respondents average 70 percent correct answers.

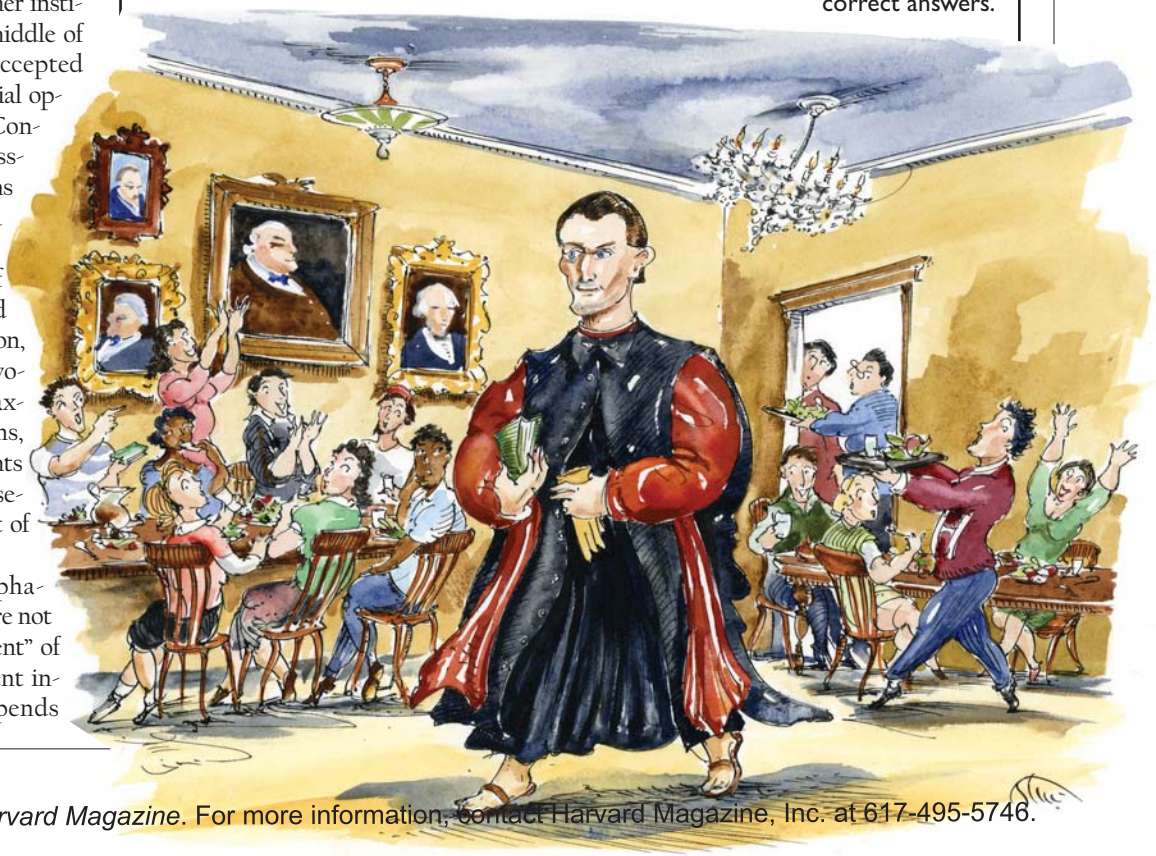


Illustration by Mark Steele

and fellowships (see "Gains for Graduate Students," page 58). President Faust promised more action in the "near future," reflecting the increasing importance of graduate and professional education and the resulting "enormous debt" many students assume.

"What we're trying to do," Faust said, "is reconfigure...what affordable access means," from the time students decide where to apply to college to their years as undergraduates. The size and reach of the new aid program, she stressed, demonstrate that "We're reframing the whole approach."

The Talking Cure

FOR DECADES, insurers and risk-management departments have told doctors that if they make a mistake, the *last* thing they should do is admit it to the patient. But in the new millennium, national medical organizations have begun signing on to a simple but revolutionary idea: doctors should be allowed, and encouraged, to talk openly to patients even when harm occurs in the course of medical care. In 2001, the national accrediting body for hospitals began requiring written policies on disclosing such "adverse events" to patients. This gratifies Lucian L. Leape, an adjunct professor of health policy at Harvard School of Public Health (HSPH) and former pediatric surgeon who has spent nearly two decades trying to bring about a culture change in the way the medical community views mistakes by clinicians.

Leape is one of the authors of "When Things Go Wrong," a 2006 paper that recommends ways for dealing with adverse events. (He prefers that term to "medical errors" because patients may suffer harm from factors beyond a doctor's control—for example, a previously undetected medication allergy—and such episodes can be just as traumatic as incidents in which the doctor was at fault.) Among the suggestions: that doctors talk to patients or their families within 24 hours of an event's occurrence, if possible, and follow up later; that they accept responsibility and express regret; that the communication come from the doctor most involved in the patient's care, not from an administrator; and that the hospital waive the patient's bills and provide reimbursement for other expenses. To help hospitals flesh out their often terse written policies, the paper also suggests words for such difficult doctor-patient conversations: "We failed you." "This shouldn't have happened." "We're going to find out what happened and do everything we can to see to it that it doesn't happen again." The Harvard teaching hospitals endorsed the document unanimously; their malpractice insurer, as well as several of the hospitals, each sent a representative to the working group that wrote the paper.

Lucian L. Leape

Photograph by Stu Rosner

IT IS HARD to overestimate how ingrained the old way of doing things is in doctors' psyches. "This is shameful to say, but in many circumstances, the advice was 'Do not talk to the family at all'—period," says Robert Truog, professor of medical ethics in the department of social medicine at Harvard Medical School (HMS). "You can imagine a physician or a nurse, who is feeling horrible about what's just happened, being told by their attorneys not to have any communication. You can imagine, from the family's side, how horrible it is to have had a relationship with the doctor or nurse, and to suddenly have that completely cut off. And yet that was standard practice until recently."

Last year, Truog, who also directs the Institute for Professionalism and Ethical Practice (IPEP) at Children's Hospital Boston, helped design a program that trains doctors to have conversations of the kind Leape advocates. Employees of Beth Israel Deaconess Medical Center and Brigham and Women's Hospital have gone through the training; Massachusetts General Hospital (MGH) employees will attend this spring. Truog and David Browning, an HMS lecturer on anaesthesia and senior scholar at IPEP, used a coaching model: at Beth Israel, for example, just 10 people were trained, but the nurse on duty as administrative clinical supervisor always knows how to reach them, and can select the one with expertise best suited to each situation. If it's a surgery case, the hospital's vice chair of surgery is one of the coaches; for nursing cases, the group also includes the nurse director of professional practice development.

The curriculum grew out of "Difficult Conversations," a more all-encompassing program on doctor-patient communication that Truog and Browning had devel-

A Century of Commerce

Above, Radcliffe women registering for classes at Baker Library, 1960; right, the first eight women admitted to the full M.B.A. program, 1963; below, 1965 study group

Harvard Business School (HBS) is throwing a year-long centennial celebration. The anniversary itself falls on April 8, the date in 1908 when the Harvard Corporation approved the new entity. On campus that day, alongside birthday hoopla, faculty members and students will join in HBS-style case-method discussions of the school, based on a new case study being prepared by MBA Class of 1949 professor of business administration Richard S. Tedlow as part of a larger history he is writing.

The events culminate in a "Global Business Summit" scheduled for October 12-14 on the campus and at the Boston Convention and Exhibition Center. Keynote speakers include Bill Gates '77, LL.D. '07, chairman of Microsoft Corporation and co-chair of the Bill & Melinda Gates Foundation; Ziegler professor of business administration and Tisch professor of history Niall Ferguson; President Drew Faust; and Eliot University Professor Lawrence H. Summers, Ph.D. '82, LL.D. '07, past president and former U.S. Secretary of the Treasury.

Between the major addresses, there will be dozens of panel discussions and interactive classroom sessions, involving faculty members and alumni from around the world, on topics ranging from agribusiness and energy to asset management, entrepreneurship, and public service. Many of these sessions are based on private conversations and colloquiums that HBS professors have conducted with business leaders in recent months, gathering insights on current practice and theory. Some exercises involve the leaders of other business schools, and are meant to strengthen HBS's management and leadership education. Although public access to much of this work is limited, the centennial website (www. hbs.edu/centennial) has interactive faculty-led discussions on topics of current interest (for example, innovation), and details on the summit schedule and participants.

Decidedly public is the series of exhibitions mounted by Baker Library from its vast historical collections. The current installment, *A "Daring Experiment": Harvard and Business Education for Women, 1937-1970*—a sample of which appears here—is on display through May 16. Internet visitors can tour the materials for this and other shows in the series (www.library.hbs.edu/hc/exhibits/index.html), and, probing deeper, explore digital research links, finding aids to the underlying collections, on-line research materials, and even related bibliographies—a vivid demonstration of the school's educational technology.

In welcoming alumni to participate in the centennial, dean Jay O. Light emphasized that the planning for all the events "is grounded in the work of our faculty, rooted in the spirit of our classroom—whether in person or virtual—and based on our commitment to ideas with power in practice."

oped. Typically, young physicians and nurses learn how to deal with patients and families through trial and error, Truog says. "The damage that can be done there is just as real as the damage that can be done by not being adequately skilled at a procedure."

Fittingly, the program extends simulation, a method used to teach doctors technical skills, to the interpersonal. In practicing a new surgical technique, doctors can operate on a computerized mannequin that evaluates their performance. In practicing conversations, they talk with actors who tell the doctors what they might have done better—and how the conversation felt from the patient's side. After an adverse event, responders have a continuum of possible ways to explain what happened, notes Kenneth Sands, Beth Israel's senior vice president for healthcare quality. "The communication could be 'Your medication gave you a seizure,' or 'You were given the wrong medication; therefore, you had a seizure,' or 'You were given the wrong medication because the resident did not write the order clearly, and that's what gave you a seizure.'"

It's not enough to tell a patient, "There was a miscommunication," Browning echoes; unless the doctor explains what kind of miscommunication, and between which parties, patients and families will feel the doctor is hiding something or underestimating their capacity to understand what's going on. Truog says families who revisit the ICU years later typically don't remember many medical aspects of

Photographs courtesy of Baker Library

the care, but have "vivid memories of what somebody said to them. Those memories could be very positive—exactly the right word when they needed to hear it—or searingly negative, creating anger that never goes away."

Beyond merely tolerating such straightforward conversations, the Harvard hospitals' medical malpractice insurer is funding the training program. Controlled Risk Insurance Company/Risk Management Foundation (CRICO/RMF), the self-insurance vehicle for the University's teaching hospitals, has also produced a documentary, directed by Koplow-Tullis professor of general medicine and primary care Thomas L. Delbanco, that features interviews with victims of medical injuries and their families. Many of the sentiments expressed aren't pleasant—"One doctor told me I had a 50 percent chance of living...and then he walked away," one woman recalls—but the insurer uses it because "sometimes it's hard to hear the voice," says Robert Hanscom, the foundation's vice president for loss prevention and safety. "You can only spend 10 minutes with this patient—gotta move on

Inevitable Mistakes, Avoidable Harm

The culture of medicine has long tried to keep doctors from making mistakes by indoctrinating them to believe that they *shouldn't* make mistakes. "It's the way we're trained as physicians," says Tejal Gandhi, executive director of quality and safety at the Harvard-affiliated Brigham and Women's Hospital. "Unfortunately, a lot of times, people feel like they need to be perfect."

But doctors are human and therefore prone to error, so many in the healthcare industry are urging a culture shift: assume that mistakes will happen and focus on catching them before they harm a patient, by building double- and triple-checks and balances into systems. This way, mistakes become breakdowns in the system, rather than personal failings. "It isn't a case of an individual failing a patient," says Gregg Meyer, senior vice president for quality and safety at Massachusetts General Hospital. "It's a case of the system failing both the patient and the provider."

The old culture of perfection may actually hold hospitals back. Amy C. Edmondson, Novartis professor of leadership and management at Harvard Business School, has shown that the way hospitals handle mistakes, and employees who make them, is integral to improving patient safety (see "Secret Errors Kill," March-April 2001, page 11). Consistent reporting of errors is crucial, but employees won't report mistakes—colleagues' or their own—unless the hospital has cultivated an environment of what Edmondson calls "psychological safety." Nurses and other clinicians whose status is relatively low hesitate to speak up, even if they see a doctor making a mistake that could hurt a patient, if they feel the doctor will respond harshly to criticism or questioning. That dynamic exists in many workplaces, but in an operating room, the consequences can be grave. "We need surgeons to be unbelievably confident," says Edmondson. "But they also need to be confident enough to embrace someone else bringing up something they might have missed, like the fact that the x-ray is on the light box backwards."

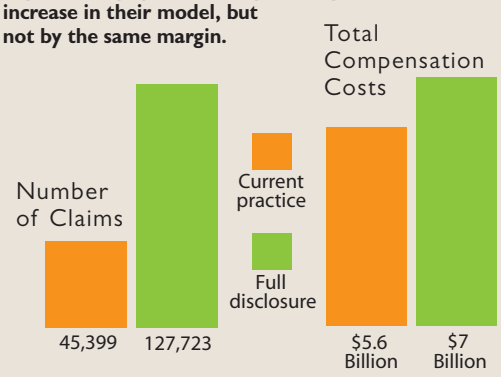
Some Harvard teaching hospitals have tried to create the receptive environment Edmondson describes. Brigham and Women's now responds to each report of a mistake or a near miss, telling the person who filed the report what action was taken so staffers know their comments aren't being ignored. At Beth Israel Deaconess Medical Center, the obstetrics unit reduced adverse events by 25 percent by borrowing practices from another high-stakes environment: the airline industry. The approach, known as "crew resource management," strictly defines rules for communication and requires increased awareness of the distribution of patients within the unit. Before, says Kenneth Sands, the hospital's senior vice president for healthcare quality, one of two obstetricians on duty might be taking a break in the lounge, waiting out a slow delivery, unaware that the other is handling three difficult births simultaneously. Today, Sands says, frequent huddles keep the staff abreast of everyone's workload.

These new approaches to reporting mistakes, and to communication in general, are part of what the industry calls "quality improvement": diagnosing ailments promptly and accurately; making sure patients get the right medication in the right dose; taking precautions to keep patients safe from hospital-acquired infections; and setting up systems that make serious errors—such as wrong-site surgery and mixed-up patient charts—all but impossible. The Institute for Healthcare Improvement (IHI), a Cambridge nonprofit, estimates that 15 million medically induced injuries occur each year, and recently launched a nationwide campaign aimed at preventing five million medical injuries in two years. Hospitals volunteer to participate by implementing changes that include taking steps to prevent adverse drug interactions, bedsores, surgical-site infections, central-line infections, and ventilator-associated pneumonia. "Historically, there have always been byproducts of care that have been considered inevitable," says IHI vice president Joseph McCannon '99. "We want to say today's unpreventable, unavoidable form of harm might be tomorrow's avoidable form of harm."

In January, Beth Israel's board took a step that aligns closely with the IHI initiative: it called for the hospital to eliminate all preventable harm by 2012. Sands says this effort requires evaluating skills and practices that range across everything the hospital does: "Supervision, communication, training, culture—if you go after these, you'll fix several different types of adverse events at once." That decision followed a Massachusetts Hospital Association announcement that member hospitals would no longer charge patients for costs associated with nine types of so-called "never events"—complications such as bedsores, injuries caused by falls, leaving a surgical instrument inside a patient, or giving a patient a transfusion with the wrong blood type.

For hospitals that don't go for the carrot, there's also a stick: Medicare recently announced that it will no longer pay bills for care in the wake of "never events." Says Lucian L. Leape, an adjunct professor of health policy and a leader in the patient-safety movement: "There is clearly a rising acceptance...that there are certain things that shouldn't happen, and therefore patients and insurance companies shouldn't pay for them."

In a recent journal article, Harvard faculty estimated the impact if hospitals nationwide adopted a full-disclosure policy. They projected the number of claims would nearly triple; money spent to compensate patients would also increase in their model, but not by the same margin.



to the next one. Sometimes it's hard to hear the patient say, 'I need someone to talk to about this. This is a terrible outcome for me and my family.'"

Brigham and Women's has instituted a Web-based reporting system for adverse events and near misses. Beth Israel now has mandatory reporting forms for adverse events, and recently added a section for recording details of the subsequent conversation. And MGH has added disclosure to the topics covered during the internal discussion that routinely follows each adverse event. Gregg Meyer, MGH's senior vice president for quality and safety, says giving disclosure such official status tells employees, "Not only is disclosure something that's permitted, it's something we expect."

Some proponents of open disclosure believe it will save money: if people find out what happened up front, the argument goes, they are less likely to sue. In one instance, five years after the University of Michigan hospital system adopted an open-disclosure policy, in 2001, the number of malpractice claims filed against the hospital system annually had declined more than 50 percent, and litigation costs decreased accordingly. But whether those results will hold true elsewhere is unclear. In a controversial paper published in *Health Affairs* last year, professors from HMS and HSPH, led by David Studdert, adjunct professor of law and public health, modeled what would happen if hospitals nationwide began practicing full disclosure. Even assuming the average amount paid out after a medical injury fell by 40 percent, they projected that the total spent on compensating patients would rise by about a quarter, from $5.6 billion to $7 billion a year, because the number of claims filed would nearly triple as more patients found out that they had been harmed.

That study's conclusions sparked a firestorm, but the people implementing the new policies at Harvard's teaching hospitals say questions of cost are beside the point. "This may save us money—I don't know. It's hard to say," says Hanscom. "We did it because we recognized that we really had to support the physicians in their ability to do the right thing in their care of patients. We'll see how the money plays out."

As a self-insurance vehicle for teaching hospitals, rather than a commercial insurer, CRICO/RMF is uniquely situated to carry out such an idealistic reform. And the hospitals' teaching status means they, too, are uniquely situated to try something untested. "You have a lot of turnover among trainees, and so you can quickly inculcate a new philosophy," says Ken Sands of Beth Israel. HMS itself has incorporated adverse-event disclosure into its curriculum: first-year students view Delbanco's documentary, and Leape's papers on error prevention and disclosure are required reading for third-year students.

Leape and others are pushing for even more complete integration. After all, frank conversations aren't just good for patients, they're good for doctors, too: hospitals, including Brigham and Women's, are creating peer-support programs to help staff members cope with stressful experiences. Leape has first-hand knowledge of adverse events' psychic toll. Thirty years ago, when he was a practicing surgeon, an 18-month-old child died while in his care. She had a bleeding ulcer, and Leape says he waited too long to operate. He apologized to the child's parents, but the incident left "an indelible impression." When something like that happens, he says, "you remember it forever."

Doctoral Director

Allan M. Brandt became dean of the Graduate School of Arts and Sciences (GSAS), within the Faculty of Arts and Sciences (FAS), on January 1. A historian of science, Brandt holds a joint appointment as Kass professor of the history of medicine at Harvard Medical School (HMS). The appointment was announced on December 12 (see www.news.harvard.edu/gazette/2007/12.13/99-gsas.html).

Brandt will succeed Theda Skocpol, Thomas professor of government and sociology, who became dean in 2005 but announced her intention to step down last spring. She made her final report to the faculty at an FAS meeting on December 11; in it she highlighted forthcoming increases in financial aid for doctoral students in the social sciences and humanities, and new funds that will allow more graduate students in the sciences and engineering to be admitted across the University. (For details, see "Gains for Graduate Students," page 58, on the financial initiatives, and "Focusing on the Ph.D.," page 64, on Skocpol's tenure.)

Brandt chaired the history of science department during the 2000-2001 through 2005-2006 academic years. That administrative experience, his dual appointments in FAS and HMS, and the nature of his academic work should serve him well in his new responsibilities. As Skocpol noted, the GSAS deanship is neither organizationally powerful nor equipped with the financial resources available to the deans of Harvard's separate faculties. But it affords access to exciting research, faculty members, and graduate students across the University, because GSAS is the steward of all of Harvard's Ph.D. programs, many crossing disciplinary and even school boundaries (see www.gsas.harvard.edu/programs_of_study/programs_of_study.php for a complete list).

Of immediate relevance, during the fall term, Brandt (although on leave) began participating in the Graduate Policy Committee, which Skocpol established to review GSAS programs, resources, and directions. In that capacity, he worked directly with deans and faculty members in FAS, HMS, and the School of Engineering and Applied Sciences, and with GSAS administrative staff.

A Brandeis graduate who earned a Ph.D. in American history from Columbia in 1983, Brandt taught at Harvard from 1982 to 1990, and then returned in 1992. He has offered a popular undergraduate

Core course, Historical Study A-34, "Medicine and Society in America," and writes on the social and ethical aspects of health, disease, and medical practice, focusing on twentieth-century America. *No Magic Bullet* explores venereal disease. *The Cigarette Century: The Rise, Fall, and Deadly Persistence of the Product That Defined America*, examines the tobacco industry (see "The Fall of the House of Ashes?" July-August 1996, page 19, on the research then in progress). It won the Albert J. Beveridge Prize of the American Historical Association and the Arthur Viseltear Prize of the American Public Health Association. On his website for the book, Brandt wrote, "We now confront a worldwide pandemic of tobacco-related diseases as cigarette use has spread....It is my hope that *The Cigarette Century* provides a strong foundation for a critical discussion of new strategies to

Focusing on the Ph.D.

During her tenure as dean of the Graduate School of Arts and Sciences (GSAS), from mid 2005 through last December, Theda Skocpol says, "I got a Ph.D. in what it means to be a university administrator in two and a half years." Recognizing that the graduate-student experience can be far more diverse, isolated, and protracted than the undergraduate experience, Skocpol, who is Thomas professor of government and sociology, focused attention on graduate education as a whole in an effort to better ensure those students' successful preparation for their future role as scholars.

• Time to degree. Early in her deanship, Skocpol recalled during a December conversation, she sought data on each of the separate Ph.D. programs—in particular, on how long it took students to complete classwork, their general examinations, and the dissertation. Such data had rarely been gathered, and even less frequently shared—despite national statistics indicating that fewer than half of humanities students complete the doctorate within 10 years. (The time to degree is typically longest in the humanities, where students may have to master multiple languages, and shortest in the sciences; social sciences fall in between.)


Theda Skocpol

As of 2003-2004, according to the data, 8.5 percent of Harvard humanities and social-sciences Ph.D. candidates were beyond their eighth year of graduate study—suggesting problems in completing their programs that put at risk their own careers and faculty members' investment in these advisees (plus hundreds of thousands of dollars of Harvard support). Skocpol talks about students getting "lost." Departmental performance—when members of an entering cohort took their generals, for example—varied widely.

In response, GSAS took corrective action. Funding was secured for dissertation fellowships: a year of writing uninterrupted by teaching, provided students have completed chapters in hand by their sixth year (or sooner) and use the funds in their seventh (so the money isn't an incentive to further delay). Nearly all applications for such fellowships were funded by the 2006-2007 academic year; only one-third had been funded two years earlier. (For other financial-aid news, see "Gains for Graduate Students," page 58.)

Skocpol added a stick to that carrot: for each five students enrolled in a doctoral program beyond the eighth year, departments would lose an admission slot the next year. The policy was put in place in late 2005, to take effect 18 months later. Sixteen of 24 humanities and social-sciences departments were then at risk of losing 33 slots in total. A year later, 14 departments still faced losing 23 slots.

But in the end, only two departments lost a slot apiece, as faculty members and students found ways to work together to accelerate graduation. Harvard conferred 71 humanities doctorates in 2005, 82 in 2006, and 99 in 2007. In social sciences, the numbers were 95, 98, and 110 in the same years. By her final report to the Faculty of Arts and Sciences (FAS), Skocpol noted that the share of students still working on their degrees past the eighth year had declined to about 4.7 percent.

• Teacher training. Skocpol led an FAS task force that recommended multiple incentives to improve pedagogy—from more rigorous evaluation of teaching during tenure reviews to equal assessments of classroom work and research in professors' salary reviews (see "Toward Top-Tier Teaching," March-April 2007, page 63). Many of the measures await action, but GSAS has implemented those pertaining to teaching fellows. A program now promotes full English competency, during the first graduate year, for students whose native language is not English. Graduate assistants should now have better training, more regular relationships with faculty course heads, and "dossiers" documenting their teaching when they go on the academic job market.

• Setting policy. Skocpol created the Graduate Policy Committee (GPC) to advise the GSAS dean on policies and financial resources, and to review each doctoral program (as is routinely done for undergraduate concentrations). The committee stimulates faculty involvement from all the schools participating in Ph.D. programs; informally, its members have become peer advisers on best practices from across the University. Under the GPC's aegis, the joint Ph.D. in science, technology, and management has been overhauled; FAS is about to approve a program in film and visual studies; and doctoral students, like undergraduates, now can pursue "secondary fields"—increasingly important as disciplines evolve.

In all, said Skocpol, despite fears that faculty colleagues could not cooperate or commit to innovations in graduate education, "That's not what I found."

Photograph by Justin Ide/Harvard News Office

Brevia

Endowment Manager Earnings

Harvard Management Company's (HMC) annual disclosure of the salary, bonus, and benefit payments to its president and five most highly paid portfolio managers, released on December 20, just before the University's year-end break, revealed that compensation for the fiscal year ended last June tracked closely with the levels established in the prior year—well below the sums disbursed earlier in the decade. (Ironically, **William A. Strauss** '69, M.P.P.-J.D. '73, founder of the Capitol Steps comedy group, who was an outspoken critic of HMC's pay system, had died of cancer two days earlier.) **Mohamed El-Erian**, president and chief executive officer, who announced his resignation in September and returned to Pacific Investment Management Company effective December 7, earned $6.5 million. The top-earning money manager, **Andrew Wiltshire**, managing director for natural resources, was paid $6.0 million, leading the group for the second consecutive year. He was followed by colleagues who earned between $2.1 million and $3.4 million. These paychecks reflected a year when HMC achieved a 23 percent return on endowment investments, and a 5.8 percentage-point margin of performance over market returns (the fourth highest in modern HMC history). During the 2003-2005 period, the top-performing managers, who oversaw enormous fixed-income portfolios, earned as much as $35 million in a year. When they left to set up an independent firm, El-Erian reorganized HMC, creating smaller portfolios.

FROM HOGWARTS TO HARVARD. J.K. Rowling, author of the wildly popular *Harry Potter* novels, will be the principal speaker at the afternoon exercises during Commencement, on June 5. President Drew Faust made the announcement on January 17, citing Rowling's unparalleled role in inspiring young people "to experience the excitement and the sheer joy of reading."

Senior Spokesman

Vice president for government, community, and public affairs **Alan J. Stone**, who agreed to President Drew Faust's request that he continue serving during the current academic year as she formed her new administration, has confirmed his plan to step down at the end of June. Faust has formed an advisory committee for the search for a successor; members include the deans of the Kennedy School of Government and the Graduate School of Education, three vice presidents, and two senior administrators involved in campus development in Allston, a major focus for the University's community-relations efforts.

ROSE LINCOLN/HARVARD NEWS OFFICE

Alan J. Stone

A Basis for Bioengineering

Venkatesh Narayanamurti, dean of the School of Engineering and Applied Sciences (SEAS), and **Jeffrey S. Flier**, dean of Harvard Medical School (HMS), have charged a six-member faculty committee with exploring whether the University can mount a broad bioengineering initiative, including both research and educational components. The idea, one of several that surfaced during earlier planning for interdisciplinary science (including programs in stem-cell research, computing, and microbial science—see "The Undiscovered Planet," November-December 2007, page 44), will now be vetted on a fast track, with staff support from the provost's office and the Harvard University Science and Engineering Committee, the body that coordinates and helps fund such ventures. The co-chairs are professor of systems biology **Pamela A. Silver** (HMS) and McKay professor of materials science **Joanna Aizenberg** (SEAS; she also holds professorial appointments in chemistry and chemical biology, and at the Radcliffe Institute). A draft report is due on March 31, with the final version expected by June 30.

STEPHANIE MITCHELL/HARVARD NEWS OFFICE

Pamela A. Silver

Nota Bene

Leveraging leadership. The Kennedy School of Government's **Center for Public Leadership** (www.ksg.harvard.edu/leadership) has received a $20-million bequest from the estate of the late **Alan L. Gleitsman**, a television executive. The funds will endow Gleitsman's existing award program for international and citizen activists, and academic investments in student fellowships, visiting scholars, research, and curriculum development.

Applications avalanche. Selective colleges reported strong gains in applications for admission. Harvard received 27,278 applications, up 19 percent from the previous record of 22,955 received last year. Yale, Chicago, and Northwestern reported nearly comparable gains, and Dartmouth, Cornell, Duke, Princeton, and others have recorded strong growth

Photograph courtesy of J.K. Rowling

MOVING TO A MAY COMMENCEMENT. **On January 15, as undergraduates labored through first-semester exams, Harvard announced its new calendar, to begin in the 2009-2010 academic year. Fall term will open early in September, and conclude with exams just before Christmas; there will be a three-week optional "winter session," for schools to use as they deem fit. Spring classes will begin in the final week of January and conclude with Commencement as early as May 24 (2012) or as late as May 30 (2013); the first such Commencement, in 2010, falls on May 27. See www.news.harvard.edu/gazette/2008/02.07/-99calendar.html for complete calendars.**

as well. A larger high-school cohort, more aggressive recruiting, increased applications from international students and from lower-income families attracted by new financial-aid programs, and the sheer competitiveness of admissions (prompting the filling out of more applications) have all apparently contributed to the surge.

Outreach officers. Within the University's community-affairs staff, **Kevin Casey**, who has led federal and state relations, has been promoted to associate vice president; **Mary Power,** who has been responsible for work with Cambridge, has been appointed chief of community relations and executive director of community initiatives (suggesting that Harvard may move toward more extensive partnership and community-benefits programs, involving education, affordable housing, and so on); and **Kevin McCluskey** '76, M.P.A. '86, chief liaison with Boston and the Allston neighborhood, has been promoted to senior director of community relations, Boston.

On other campuses. **Boston College** has submitted a master plan for Boston Redevelopment Authority review, the first step in a 10-year plan for $800 million of construction and renovation, much of it on a 65-acre parcel it recently purchased adjacent to its existing campus. The same authority must review Harvard's Allston campus master plan. **Columbia** has won New York City Council approval to rezone 35 acres in Harlem, on half of which the university plans a 25-year, $7-billion expansion to accommodate science-research facilities, its business school and other schools, housing, and a site for a university-affiliated public secondary school for math and science students. **Duke** has received $40 million from the Duke Endowment, the foundation that is the university's principal benefactor, to endow 10 new assistant and 10 new associate professorships, and to match funds for 12 new full professorships, all aiming to make innovative contributions to undergraduate education. **Stanford** has inaugurated a $4.5-million Faculty Development Initiative to appoint junior faculty members in the humanities and social sciences who specialize in the study of race and ethnicity.

Miscellany. **Ray Williams** has been appointed the Harvard University Art Museums' first director of education, signaling an enhanced outreach effort to students and the public at large; he has held comparable roles at the Rhode Island School of Design Museum, the Peabody Essex Museum, and the Smithsonian's Freer and Sackler Galleries....The **Harvard Gay & Lesbian Caucus** has begun a $1.5-million campaign to endow the F.O. Matthiessen visiting professorship of gender and sexuality, meant to fund one-term teaching appointments (http://hglc.org/matthiessen.html); **Mitchell Adams** '66, M.B.A. '69, a member of the Board of Overseers, co-chairs the fundraising effort....The Carnegie Foundation for the Advancement of Teaching has named **Anthony S. Bryk**, Ed.D. '77, president, effective this August; he has been on Stanford's faculty since 2004, after previous service at the University of Chicago, where he was long involved in efforts to strengthen the city's schools....Gray professor of systematic botany **Donald H. Pfister** has been appointed dean of Harvard Summer School; he succeeds Robert Lue, professor of the practice of molecular and cellular biology, in the half-time position. Pfister, past Master of Kirkland House, is curator of the Farlow Library and Herbarium....Harvard Law School's Lambda student organization and Legal Services Center have established a new **Gay, Lesbian, Bisexual and Transgender Law Clinic**, providing pro bono and low-fee services to same-sex partners and families....Spangler Family professor of business administration **Debora L. Spar,** Ph.D. '90, has been named president of Barnard College, effective July 1....Jazz saxophonist **Joshua Redman** '91, who performed at President Drew Faust's installation concert last October, will receive the Harvard Arts Medal on May 1 during the annual Arts First celebration....The papers of the late **Stephen Jay Gould,** Agassiz professor of zoology, have been bequeathed to Stanford University.

COURTESY OF RAY WILLIAMS/HARVARD ART MUSEUM

Ray Williams

COURTESY OF JEFFRY PIKE/HARVARD DIVISION OF CONTINUING EDUCATION

Donald H. Pfister

Illustration by Mark Steele


Allan M. Brandt

avert a potential global health disaster."

As a scholar, Brandt has been involved in graduate training at the master's and doctoral level within both FAS and HMS; the latter's Ph.D. programs are offered through FAS's departments of anthropology and history of science. In 2005, he was appointed director of a new social-sciences track in the joint M.D.-Ph.D. program, combining work in anthropology, health policy, government, or psychology with clinical medicine (www.hms.harvard.edu/md_phd/program/sstrack.htm). In earlier FAS discussions concerning revision of the undergraduate curriculum, Brandt urged broad perspectives on how faculties from other Harvard schools might be further involved in education in the College, and advocated a holistic assessment of students' coursework, extracurricular activities, and study abroad. He has also served as the director of the Collection of Historical Scientific Instruments (see "Telltale Apparatus," March-April 2006, page 42).

In the official announcement, FAS dean Michael D. Smith noted, "Allan is an exceptional scholar and teacher who will bring to the position a deep understanding of the complex issues facing the graduate school.... [H]is service on committees, experience as a department chair, and his service as the director of the social-sciences track of the M.D.-Ph.D. program give him a unique background on which to draw when looking broadly at our graduate programs....With creative energy, enthusiasm, and a collaborative spirit, Allan will continue to move us forward in the areas of teaching, training, and funding for graduate students...."

THE UNDERGRADUATE

Off Harvard Time

by SAMUEL BJORK '09

Many Harvard undergraduates give personal happiness and reflective decision-making short shrift in the race for academic accolades and pre-professional success: focusing on the seminar papers and section preparations, the problem sets and practice tests, the paperwork of fellowship applications, even the intensity of high-powered extracurricular commitments. At least, as the four semesters between my first ill-fated math set freshman year and the caffeine-fueled completion of my final sophomore essay flew by, that was the case for me.

Unsure of what I wanted to do with the second half of my undergraduate career, and still a bit startled by the first, I took time off for a bit of service and self-reflection, seeking an antidote to Harvard time in the languor of African time. Since September, I've made my home in Gaborone, the capital of Botswana, a dusty, sunny, and rather quiet country of bleating goats, braying donkeys, and the second-highest prevalence of HIV in the world. I've come, appropriately enough, to work on a public-health project aimed at assisting primary- and secondary-school teachers in the fight against the HIV and AIDS epidemic in their classrooms.

At least, that was the plan. In reality, the first few months in-country found my stomach too often in my mouth for self-reflection, and whatever "service" I hoped to render seemed an exercise in futility: my poor command of the local language severely handicapped me; the grossly overworked government officials involved with the project had limited time and resources to offer; and what few results I did get left much to be desired. My enthusiasm for my work waned. I raided libraries to justify my growing cynicism and found, through an unfair fixation on the critical parts of otherwise nuanced books, enough validation to have me washing my hands of global do-gooding for life.

I should have taken a bus instead. "When does this leave?" I impatiently asked the driver the first time I did, leaning over the tightly bound and blinking chicken with which I shared my seat. "When it is full," he replied with a leisurely smile. Some minutes later, a respectable-looking man sat down opposite the chicken, looked with amusement at my fingers drumming on the seat-back, and pointedly closed his eyes, falling into the endemic African trance-like state of endless patience. Two hours later, the bus was full, and my own impatience had turned to embarrassment. I realized that I had never really left Cambridge, never really left the world of deadlines and timetables, of problem sets to be solved and turned in on time. I had a lot to learn, and Widener couldn't help me.

I soon found other ways to be a student. Not long after the bus incident, I traveled with a team of community workers to villages outside Gaborone to test at-risk inhabitants for HIV infection. We drove past sun-burnt fields, worked by stooping women with babies strapped to their backs; past the spreading acacia trees where their husbands gulped cheap *chibuku* by the liter. Some trips to village health centers brought empty rooms and disheartening facilities; at other times, with a bullhorn declaring our presence and purpose for all to hear, our car was surrounded by eager subjects. Back in Gaborone, Western doctors working on the hospital wards introduced me to the maddening unpredictability—the needless deaths, the spectacular recoveries—of Third World medicine. For every excuse to doubt the future of this embattled country, I learned there was a reason to hope.

I had also hoped to teach. Gradually, the team of medical officers and social

Photograph by Stephanie Mitchell/Harvard News Office

workers with whom I worked found its way to some schools. Our "workshops"—two-day marathons of lectures, questions ("Is it true that if I shower after..."), and discussion sessions—had been devised, long before I arrived, as a response to the growing number of school-age children with HIV in Botswana. If we have covered far fewer schools since my arrival than I anticipated, we have, at least, been welcomed with far greater enthusiasm than I could have dreamed.

Frequent lulls in this work have allowed me to continue my education outside Botswana. My wanderings have taken me through Swaziland, a beautiful but ailing country with the highest prevalence of HIV in the world, to the poverty of Mozambique; across Botswana's riparian border with Zambia, where the endless line of truckers waiting to cross the Zambezi River forms, in the words of a doctor with whom I was traveling, the epicenter of the HIV epidemic in Africa; and through the rice fields of Malawi to Tanzania. Everywhere people in need, and everywhere, for better or worse, volunteers lined up to help them: Peace Corps types with their hand-rolled cigarettes and scraggly beards; Dutch relief workers on holiday; students, like myself, swapping job descriptions and mounting frustrations on terraced escarpments overlooking Lake Malawi; jaded one-time do-gooders who click cheap bottles of beer and toast leaving "Africa to Africans." The experience has been invaluable, the conversations enlightening, the endless kilometers of bus travel immensely liberating.

Somewhere along the way—and for the first time in 14 years—I watched the Southern Hemisphere spring give way to summer without the startling rush of formal schooling. It's odd, then, that my education has never been so intense.

Samuel Bjork at the hospital where he works, in Gaborone, Botswana

The benefits of taking time away from school should come as no surprise. Students have long had the option of taking a "gap year" between high school and college, and the Office of Undergraduate Admissions has promoted it in their letter of admission for more than 30 years.

Even as an increased number of study-abroad opportunities has created options for a more structured break, or at least change, from Cambridge, Harvard College's dean of admissions and financial aid, William R. Fitzsimmons, says that there can be great benefit in taking unstructured time off as well: "Such an experience can lead a student in a very different direction from a personal, academic or vocational perspective."

After a semester studying abroad in Tanzania, Travis Kavulla '06 found himself as unwilling to return to campus as he was unable to remain in Africa. "I'd always wanted to do a community governance project," he e-mails, "and I'd been involved in school politics in my town, Great Falls, Montana, when I was in high school." So Kavulla used the freedom of time off to engage in some "unremunerated volunteer work" aimed at reversing a local school closure. It was, he says, a commitment undemanding enough to allow him to strengthen his family ties and appreciate some of the most rewarding aspects of unstructured life. "I spent most of my time catching up on fiction, and improving my pool game and alcohol tolerance," he reports. "Time well spent, if you ask me."

The decision to leave school is not easy. My two years at Harvard passed by so rapidly in part because I love the College so much: the classes, the students, the quiet study nooks in the libraries. Schooling, for better or worse, has defined much of my life to date—so much so that at times I have hoped never to leave this familiar world. Fitzsimmons, in fact, cautions that students "often find it very hard [to take time off] during college because they become so involved with roommates, friends, academic work, and classes."

For others, however, this all-consuming and sometimes crippling involvement with the daily workings of Harvard is reason enough to step away. After transferring from the University of Pennsylvania to Harvard following her freshman year, Elise Wang '07 found a different sort of campus than she had expected. "Maybe I never found the right group of people or the right classes," she e-mails, "but sophomore year was very difficult. Everyone seemed to care [about] and be doing something, [but] it just seemed like everyone was president of their two-person club, rather than forming any sort of movement...I began to feel like this sort of attitude was all that was available if one wanted to become involved in an effort to change things, and it was getting depressing."

In need of another change, Wang traveled to Taiwan, a country whose language she knew and where distant relatives lived, but which she had left as an infant. It was, she says, "a balance between striking out on my own and still feeling like I had somewhere to go for a meal when I was just too tired to go haggle at the mar-

Photograph courtesy of Samuel Bjork

ket." At first, she studied Chinese, taught English, and, like Kavulla, "enjoyed having the time to read all those books I'd always meant to read." From Taiwan, she set off for Beijing University, where she supplemented her Mandarin studies with courses on immigration and Chinese history in an academic setting unlike anything she had seen at Harvard or Penn.

After further travels throughout China, Wang worked for Senator Barack Obama in his Chicago office, a job perhaps most valuable for allowing her to concentrate on her growing interest in immigration issues. "In a way," she says, "a year away from doing 'productive' work was really what threw me into focus, so to speak. At the end of it, I was ready to begin again, not only with energy, but also with the knowledge that this wasn't the only thing out there—that, contrary to popular belief, a world does exist on the other side of the Charles and past Porter, not just in a theoretical future way."

After two years of living in Boston, I'm not entirely sure that I've actually been past Porter Square; I'm even less sure that any of the lessons I've learned while away will throw anything into focus for me back at Harvard. I am, after all, still in the midst of things, having written this on a dirty street corner in Dar es Salaam, to be sent overseas—the chaos of overland travel in Africa permitting—from my home in Gaborone.

I do know, however, that my newfound commitment to the worlds of public health and international aid is only one part of my time abroad. In some probably selfish sense, what I've done in my time off has mattered less than the simple fact that I did it away from Harvard. My work, although supported by a generous Harvard-specific fellowship, was not arranged by an established work- or study-abroad program or through any of Harvard's international channels. It arose instead from a few simple e-mails to outside organizations I admired. This probably resulted in a more chaotic project than a formal Harvard program might have provided, but I'm not convinced that is all bad. In fact, it has allowed me to step away not just from the routines of Cambridge, but from the academic cocoon in which I've been ensconced for two years. I have been able to define my public-health experience for myself, in part by ignoring time altogether, in part by responding in my own way to the difficulties of the developing world. I still don't know what I'll do when I return to campus, but for the first time in years, I'm comfortable with that.

My African adventures do occasionally

150 Years of Glee

During its first international tour, in 1921, the Harvard Glee Club inspired French composers Francis Poulenc and Darius Milhaud to write new pieces for the group. Milhaud set Psalm 121. Poulenc penned a drinking song. So began a tradition that continues this April 11, when the club premieres opera and choral composer Dominic Argento's *Apollo in Cambridge* at a gala 150th-anniversary concert in Sanders Theatre (see www.harvardgleeclub.org).


Harvard Glee Club

The debut caps an eight-year project. In 2000, Bernard E. Kreger '59, secretary of the Harvard Glee Club Foundation, donated $25,000 (which was matched by the foundation) to commission a new piece of men's choral music annually, culminating in a major work for the sesquicentennial. He formed a five-man committee and began considering likely sources. He even remembers a vacation spent driving all over Maui, "listening to a stack of CDs to see if I could whittle it down to a couple that I thought were really worthy."

The committee ran its selections by director of choral activities Jameson N. Marvin, the group's conductor, and began commissioning composers, including Charles Fussell, a professor at Boston University, and Sir John Tavener, who composed music for Princess Diana's funeral. "We probably do more twentieth-century music than any genre," explains Marvin. The commissions help because "in general there's not a lot of great male chorus music out there." Kreger and current Glee Clubbers agree that their goal is not only to support the group, but also to push the boundaries of men's choral music with every piece.

Of the new works, club president Quentin Sedlacek '08 says, "Some are now performed by choirs throughout the country." The professional men's group Cantus recorded Sedlacek's favorite, "Ave Dulcissima Maria" by Morton Lauridsen, a winner of the National Medal of the Arts. Peter Lifland '10, who "came to Harvard for the Glee Club," enjoys "Credo," by Paul Moravec, but says some audiences—put off by its dissonant cluster chords—don't. He admits that the new pieces can be difficult, sometimes requiring months of rehearsal.

Nothing has been more difficult than *Apollo in Cambridge,* a setting of works by Harvard-affiliated poets James Russell Lowell, Oliver Wendell Holmes, and Henry Wadsworth Longfellow that Marvin introduced in rehearsal more than a year ago. Argento's 15-minute piece contains three sections, each with its own shifting time signatures, syncopated rhythms, and flurries of sharps, naturals, and flats. But the challenges and intricacies, say the singers, don't mean the piece isn't fun to listen to. "It sounds really luscious," agrees Kreger, who serves as an accompanist for the group. "[Argento's] not an 'out-there' modern composer making odd noises." Sedlacek sees the new music connecting the group's present with its storied past. "This anniversary," he says, "will really highlight that continuity."

Photograph by Stanley Rowin

strike me as somewhat ridiculous. My knee-jerk cynicism regarding public-health work may have given way to a wary faith in its utility, but I harbor no delusions of the impact I'll make in just six months. I've had my doubts even about the transformative power of travel. I find myself wondering—as often at work as on empty buses, waiting for them to fill with more than poultry—if the independence, the suspension of time, the break from the pressures and decisions of schooling that I have found in Botswana might just as easily have been found amid the comforts of the West.

But whether there's more to my wanderings than a few good stories and a partially successful project is beside the point. What matters is that I've finally learned one of the more difficult lessons a Cantabrigian can: there is more to my education than Harvard.

The work Berta Greenwald Ledecky Undergraduate Fellow Samuel Bjork '09 is doing in Botswana is supported in part by a Carl and Lily Pforzheimer Foundation Public Service Fellowship.

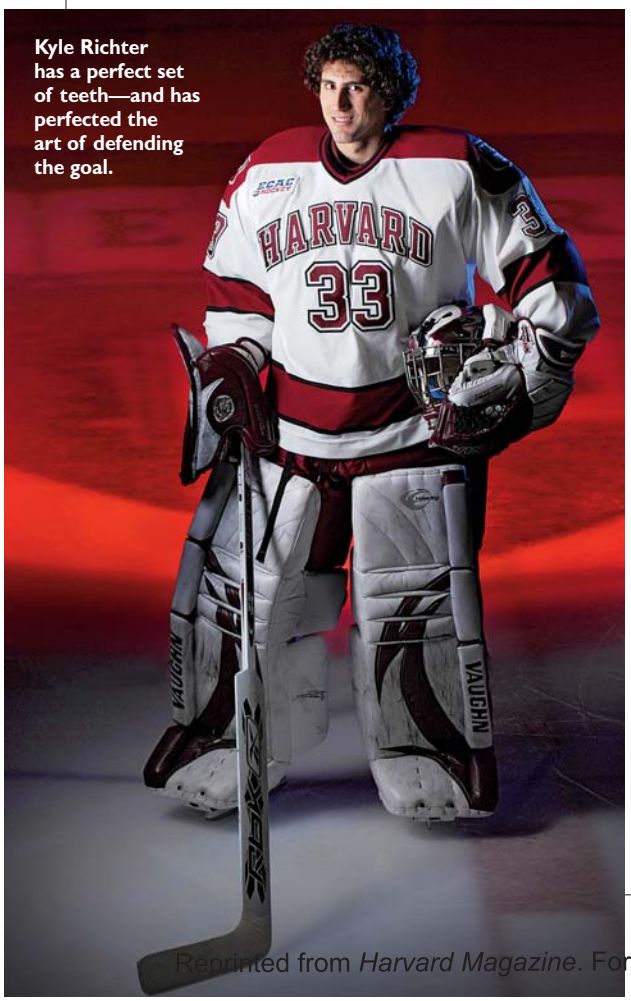
SPORTS

Stick, Helmet, and Butterfly

Protecting against the puck

Hockey parents, they say, don't like their kids to become goalies because goaltenders wear so much costly protective equipment. But those special helmets do save money on dental bills. Unlike many icemen, Crimson goalie Kyle Richter '10 has a perfect set of teeth.

This season, Richter has had ample reason to smile. Although individual statistics change with every game, Richter ranked second in the country in goals-against average (at 1.46 per game) and led the nation with a .951 save percentage after the Crimson's first 11 contests. He had shut out Rensselaer, Union, and Dartmouth. Harvard ranked thirteenth nationally, with a 6-3-2 record, at that point, and the performance in goal of the six-foot, one-inch, 188-pound Richter was an important factor. "I like the extent of responsibility, being the one guy there to stop a goal," he says. "As a goalie, your mistakes get counted on the scoreboard."



Kyle Richter has a perfect set of teeth—and has perfected the art of defending the goal.

Photograph by Fred Field

But stopping opponents from scoring has become more difficult in recent years. Both the National Hockey League (NHL) and the NCAA have changed their rules to promote the offense by broadening the definition of what constitutes infractions such as hooking or interference by defenders. This means more penalties called, hence more power plays and more opportunities for goals. At the same time, technology has improved hockey sticks: today's more flexible graphite/composite sticks put more power into a shot than the older wooden sticks, while the wider variety of curves in the new sticks' blades lets skaters cradle the puck and lift their shots, if they choose, toward the upper reaches of the net.

Goaltending has also progressed. Modern goalies like Richter employ the "butterfly" style—dropping down onto the ice with flared legs, knees drawn in tightly, using flexibility in the hips—to make saves. Coaches feel the method allows a goalie to get more body between puck and goal than the older "stand-up" technique. (Richter, who grew up in Calgary, is a fan of the Calgary Flames of the NHL, but also admires the butterfly moves of goaltender Roberto Luongo of the Vancouver Canucks.)

Line changes give the skating players relief from their exertions every couple of minutes, but as a goalie, "You are on the ice the entire time," says Richter. "There's no time to relax. You're always on your feet, and when the puck is in the zone, you are constantly in the crouch position. It's physically draining, and equally draining mentally." Hyper-alertness is essential, not only because of the speed of play and the velocity of shots, but to stay on top of oddities like a "flutter puck"—a shot that might spin or tumble end-over-end through the air, perhaps unexpectedly changing direction when it hits the ice.

Despite these demands, or perhaps because of them, Richter, who first skated at

Crimson Queens of the Rink

Clockwise from left: sophomore netminder Christina Kessler; senior defender, tri-captain, and Olympic bronze medalist Caitlin Cahow; junior forward and Olympic gold medalist Sarah Vaillancourt

The women's hockey team ended January with a perfect 14-0 record in the ECAC, and a 17-1-0 record overall, earning them the top ranking in the nation. The icewomen have consistently frosted their opponents with devasting offensive flurries and a defense that has allowed just 0.83 goals per game. Harvard's sole loss came against the UNH Wildcats, alma mater of veteran Crimson head coach Katey Stone, on December 14. At their next game, in early January, the icewomen knocked off Cornell, and then—in quick succession—Colgate, Boston College, St. Lawrence, and Clarkson before a two-week, exam-period layoff. Back on the ice January 27, the Crimson dispelled any speculation that their hot touch might have gone cold with a decisive 4-0 shellacking of tenth-ranked Dartmouth.

In the net, goalminder Christina Kessler '10 has proved she's a keeper. Sidelined by injury for much of last season, the sophomore standout has garnered a .957 save percentage in the 17 games she has played this winter, including shutout wins against Yale, Brown, Clarkson, Boston College, and Dartmouth, among others. The Dartmouth shutout, her eighth of the season, set a new Harvard record, and solidifed her standing among the best goalies in the country.

On the other side of the blue line, the Crimson has plentiful scoring power in Sarah Vaillancourt '09, a member of the gold-medal-winning Canadian women's team at the 2006 Olympics in Torino. Vaillancourt led the team in scoring with 11 goals. Close behind her in the count, with 10 pucks in the net—and watching Vaillancourt's back—is tri-captain Caitlin Cahow '08 on defense; another 2006 Olympian, she skated for the bronze-winning U.S. team. At press time, Cahow was third nationally in power play goals (with 8) and second in goals scored among defenders (with 1.06 per game). Against Boston College on January 8, the senior scored her first collegiate hat trick in a 7-0 blowout. With just eight conference games left, the Crimson looked likely to lock up home-ice advantage for the ECAC tournament that caps the regular season, and seemed poised for play on the national stage.

age three, has loved being in goal since he started playing there at eight. After high school in Calgary, he played for two years for the Brooks Bandits of the Alberta Hockey League, a "Tier II" Junior "A" league in Canada. Richter laughs about the hockey world's consensus that you need to be a little crazy to play goal. "A lot of goalies are 'different,'" he admits. "My coach in the juniors told me that I was one of the most normal goalies around."

Nonetheless, he does things on the ice abnormally well—such as picking up the trajectory of a puck when players skating in front of the goal screen his view. "Finding the puck when there's traffic in front is half the battle," he says. "To control a rebound on the ice when you can barely see it in the first place is a real challenge."

Saves, whether with stick or body, inevitably create many rebounds, and hence more chances for the attacking team to shoot, often from close range. Richter pays serious attention to rebound management. "You want to make rebounds go to the right spot," he explains. "That means keeping the puck away from the center of the ice." Ideally, a goalie will deflect a shot to his own teammate, starting a transition to offense. If the other team *does* get the puck, the goaltender tries to make sure that happens in a less dangerous area, such as the corners of the rink or behind the net.

Breakaways present special challenges as well as opportunities for the goaltender's most spectacular feats. "You want to skate out of the net and attack the [oncoming] player," Richter says. "Then you move back as he comes forward, so if he makes a 'deke' [decoy, a feint], you can use your momentum to go with him. By staying in front of him you cut down his angle if he shoots. Guys are getting pretty crafty with fakes. As a goalie, you want *him* to make the first move, to commit himself. The bottom line is patience. Reaction and patience."

Of course, the goalie has plenty of help from his teammates. (Though the crowd usually cannot hear, players do plenty of talking while play is in progress.) Richter's position gives him a panoramic view of the ice that allows him to help teammates by letting them know, for example, what is developing behind them. True, in the final analysis, he's the last line of defense, but, as he points out, "I didn't pick this position because it was easy."

—CRAIG LAMBERT

Photographs by David Silverman/dspics.com

ALUMNI

Wartime Legalities

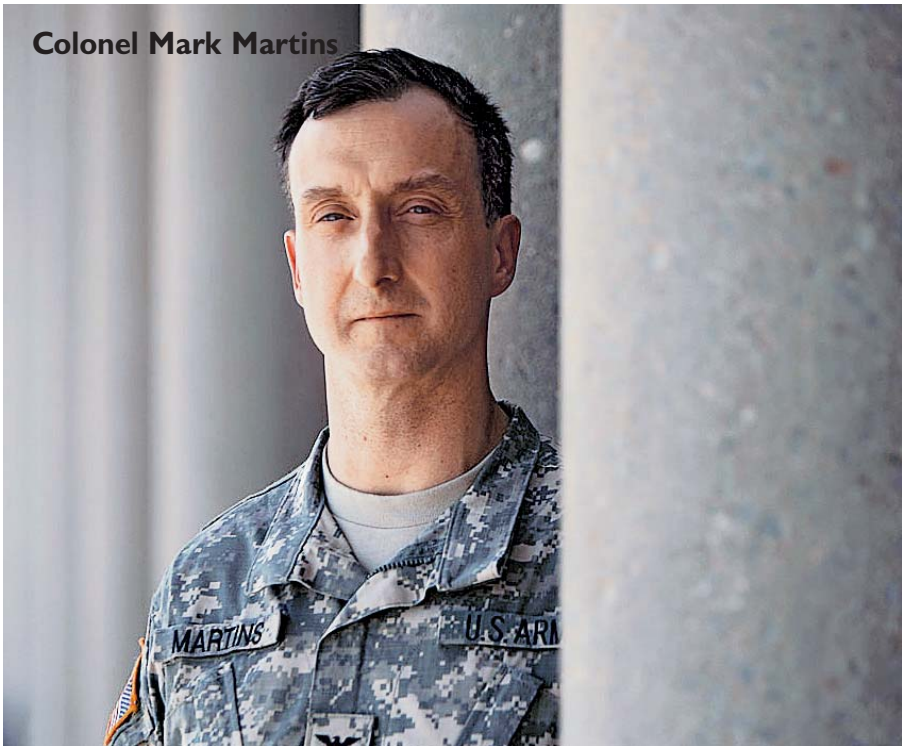
A top military lawyer aims to avoid "victor's justice" in Iraq.

by WILLY STERN

At 6 A.M. in western Baghdad, the thermometer has already punched through 100 degrees across the barren lands around Camp Victory. As Colonel Mark Martins, J.D. '90, takes off for his thrice-weekly 5.7-mile run, he pushes to keep up with his boss and longtime friend David Petraeus, commanding general of the 168,000 coalition troops stationed in Iraq. They cruise quickly past an armored Humvee, soon pounding out a better than six-minute-mile pace along the scorched pavement that's been laid down across the desert floor. Later, they adjourn to the faux-marble anteroom of one of Saddam Hussein's former hunting cottages where each churns out 100 push-ups, with ramrod-straight backs, in under 90 seconds.

The two men have known each other since 1992, when Petraeus was a battalion commander and Martins a newly minted military trial lawyer, both in the 101st Airborne Division. They still share a penchant, as scholar-athletes, for pushing "the pedal to the floor in everything we do," says Martins, who was valedictorian of West Point's class of 1983, earned first-class honors as a Rhodes Scholar at Oxford in 1985, and graduated magna cum laude from Harvard Law School.

These days, Martins is Petraeus's legal adviser. As the staff judge advocate for the multinational force in Iraq since May 2006, he also supervises 670 lawyers and paralegal staffers—essentially a substantial law firm—in a war zone. He works seven days a week, traveling throughout Iraq in Blackhawk helicopters, C-130 transport planes, or armored vehicles, and is lucky to get six hours of sleep at night. Like all soldiers in Baghdad, he is under constant threat from indirect fire and wears a Kevlar helmet and heavy armored vest when leaving the relative safety of military bases; four legal staffers whom he knew have been killed. His closest brush with death to date came last year, when a 122-millimeter Katyusha rocket flew through the air and exploded on a wall next to him. Martins, who was lucky enough to be in the shadow of the blast, was fine, save for some ringing in his ears.



Colonel Mark Martins

His legal activities range widely: international and administrative law, command advice on rules of engagement and use of federal appropriations, foreign claims (by individuals against the U.S. military), criminal work, legal assistance for troops, and support for Iraqi investigative and judicial systems.

One day's work, for example, saw Martins inspecting an Iraqi detention center with his Iraqi counterparts, traveling to meet a local judge and prosecutor to hear about their training and support needs, and attending a bar association meeting to discuss the establishment of offices, administrative support, and security for local defense counsel representing crime suspects. Later, he worked to assemble experts to secure and catalog recovered Iraqi property records, and followed up with a brainstorming session with western and Iraqi businessmen on how the country's public contracting procedures could be made less vulnerable to corruption. Late in the day, he helped guide junior judge advocates in the U.S. military who had checked in with him on coalition legal cases. By the time paperwork, phone calls, and e-mails were completed it was around 10:30 P.M.

The mission is daunting: to encourage the rule of law in a war-torn country. Now that the "surge" has lowered levels of violence, the top priority for Martins is, in fact, education. He wants to help the chief judge of Iraq and his key ministers establish an advanced training course for criminal investigators. "Weaning Iraqi investigators and courts from their reliance on confessions is a worthy goal," he says. His constant refrain to his Iraqi counterparts is "Focus on fingerprints, ballistics, and other forensic data"—the best way, he asserts, to avoid human bias and to lower incentives to mistreat suspects.

Photograph by Daniel Berehulak/Getty Images


Martins (at right) with his commanding officer, General David Petraeus

SSG LORIE JEWELL

Most of the roughly 5,000 trials conducted by the Central Criminal Court of Iraq in Baghdad in 2007 still didn't involve modern evidence-collection techniques, but the proportion of those relying on some form of forensic data is on the rise. "Iraqi judges by and large understand these concepts," he reports, "but the system has to be built up to get more proper evidence from the streets, where crime is occurring, and into the courtroom."

Iraq's secular legal system—as opposed to shari'a and tribal courts, which function locally without government sanction—is based principally on the continental European model. Under Iraqi law, for example, a magistrate with broad powers conducts a criminal investigation before referring the case to a panel of three trial judges. According to Martins, who interacts with hundreds of magistrates and judges across the country, Iraq's legal professionals, at long last, have potential to cross sectarian lines and focus on the law.

Still, the possibility of corruption and intimidation is always present. "Iraq's preexisting secular courts weren't so much corrupted by Saddam as they were displaced by special and revolutionary courts," he notes. "Today, if the Iraqi judges and their families feel secure, many judges will enforce the law regardless of sect, tribe, or other improper influence." Martins notes, however, that "these judges are human, too, and if they feel exposed, their decisions may well reflect the intimidation."

In most major criminal prosecutions, explains Martins, proceedings are conducted in a secure complex in Baghdad where judges and their families live all the time, along with witnesses who require protection there. One case he has found particularly encouraging is the pending landmark prosecution of two Shiite government officials arrested in 2007—Hakim al-Zamili, the former deputy ministry of health, and Hamid al-Shammari, the former head of that ministry's security service—both accused in the killing and kidnapping of hundreds of Sunnis. It is expected to be the first case to subject high-ranking Shiites to judicial trial for alleged sectarian crimes.

Not surprisingly, Martins is reluctant to broadcast his views of Iraq's future. "You won't get a simplistic prediction from me," he warns. "The rule of law does not yet prevail here, and economic activity still must really accelerate to have an impact on common Iraqis. This will need to be a long effort in order to be successful. In the areas I'm most familiar with, I have seen the Iraqis achieve modest successes, taking small steps. But such incremental progress is important, and I tend to think it will be the methodical, unsensational steps that ultimately will bring lasting security." As examples, he points to a recent Iraqi court case in which one attorney introduced expert testimony (about the remote detonation of an improvised explosive device) that quickly helped to identify a guilty defendant and exonerate two others. In another case, an Iraqi lawyer successfully persuaded the Iraqi Bar Association to advocate for much-needed changes in the country's rules of criminal procedure.

MARTINS DEVOTED his National War College thesis to another recent hot-button topic: Should terrorists be tried in military tribunals or in U.S. federal court? He's not allowed to comment on matters that he's directly involved in, but he notes that terror offenses, because they necessarily involve violence committed to advance a political objective, pose great challenges for any court, military or civilian.

When a "war on terror" has been declared, he notes, there is a great risk of being caught in a nasty cycle of "victor's justice"—which is no justice at all. The only way out of this cycle is "to try defendants according to the facts and the law, to acquit where guilt cannot be proven beyond a reasonable

A Special Notice Regarding Commencement Exercises

Thursday, June 5, 2008

Morning Exercises

To accommodate the increasing number of those wishing to attend Harvard's Commencement Exercises, the following guidelines are proposed to facilitate admission into Tercentenary Theatre on Commencement Morning:

•Degree candidates will receive a limited number of tickets to Commencement. Parents and guests of degree candidates must have tickets, which they will be required to show at the gates in order to enter Tercentenary Theatre. Seating capacity is limited, however there is standing room on the Widener steps and at the rear and sides of the Theatre for viewing the exercises.

Note: A ticket allows admission into the Theatre, but does not guarantee a seat. The sale of Commencement tickets is prohibited.

•Alumni/ae attending their major reunions (25th, 35th, 50th) will receive tickets at their reunions. Alumni/ae in classes beyond the 50th may obtain tickets from the Classes and Reunions Office, 124 Mount Auburn Street, sixth floor, Cambridge.

•For alumni/ae from non-major reunion years and their spouses, there is televised viewing of the Morning Exercises in the Science Center, and at designated locations in most of the undergraduate Houses and professional schools. These locations provide ample seating, and tickets are not required.

•A very limited supply of tickets will be made available to all other alumni/ae on a first-come, first-served basis through the Harvard Alumni Association, 124 Mount Auburn Street, sixth floor, Cambridge 02138.

Afternoon Exercises

The Harvard Alumni Association's Annual Meeting convenes in Tercentenary Theatre on Commencement afternoon. All alumni and alumnae, faculty, students, parents, and guests are invited to attend and hear President Drew Faust and the Commencement Speaker, J.K. Rowling, deliver their addresses. Tickets for the afternoon ceremony will be available through the Harvard Alumni Association, 124 Mount Auburn Street, sixth floor, Cambridge 02138.

~Jacqueline A. O'Neill, University Marshal

doubt, and to make a full record so that all can judge both the judgment and the process, and even re-evaluate both as new information comes to light over time." Legitimacy, he adds, "cannot be taken for granted by any court. In this light, we do not yet have an adequate terror court. Making a terror case in U.S. federal court promotes fairness and legitimacy on one level, but risks exposure of counterterror secrets and harm to trial participants while posing other serious risks to the legal system—such as expansion of conspiracy doctrines—and to society."

Is there a better solution? Martins believes "military commissions can eventually pass constitutional muster [as legitimate courts] and have potential to develop into prudent and effective counterterror institutions." He's well aware that such commissions remain subject to reasonable concerns about independence and fairness. "The only thing I am sure of," he adds, "is that a terror court consistent with our values will be one in which, to paraphrase Justice Jackson at Nuremberg, 'Power pays tribute to Reason.'"

MARTINS DEFERS when asked what role, if any, he had in shaping Petraeus's counter-insurgency strategy. The general's thinking, he says, "is highly individual, sophisticated, and pragmatic. Sometimes he says things that seem to echo points I've emphasized, but I can't really know if I've accelerated his arrival at something I regard as an insight, or if he reached the insight on his own."

Petraeus, he says, is "very, very tough and disciplined but also aware of the power of ideas and emotion in human endeavors, particularly war. He's also completely secure intellectually, an attribute that I believe makes him open to advice and information from every source."

The same could be said of Martins himself. At West Point, he excelled both in the classroom and at sports. After graduating and completing U.S. Army Ranger training, the Rhodes took him to England to study politics, philosophy, and economics. "Oxford compelled me to stand in the shoes of those who disagreed with my most basic assumptions and to seek to understand and even master their arguments before surmounting them," he recalls. "That process, if undertaken honestly, changes you, so that when you get around to the surmounting part, you've grown. This is valuable, and not only for soldiers." Once back in the United States, he served for two years as an infantry platoon leader with the 82d Airborne Division at Fort Bragg before attending law school.

Drawn to the law by his study at Oxford of H.L.A. Hart, an influential, twentieth-century British legal scholar, and his own observations on the role of dissent in military organizations, Martins says his favorite Harvard professors were the late Frankfurter professor of law Abram Chayes, Story professor of law Daniel Meltzer, and Walmsley University Professor Frank Michelman. "Those," he says, "were three tremendous years of sampling widely from course and lecture offerings across the law school and University, of late-night discussions at Gannett House and elsewhere on the major issues of the day," and "of weekend dashes with Kate [his wife, an army helicopter pilot, whom he met at West Point] to our favorite spots in Maine, Vermont, and New Hampshire." He also ran four marathons, including Boston's.

Martins has since dedicated his professional life to the military—despite the modest pay, inherent dangers, and long absences from family. He is painfully aware that when his son and daughter graduate from high school, he will have been absent for four years of their childhoods. But the soldier's life has its advantages, he says, and he has no plans to leave it anytime soon: "The life is very familiar." He grew up in a close-knit family in the Bronx, with a father who was also a career officer, a physician who rose to become chief of the army's neurosurgery service.

Back in Iraq, following his workout with Petraeus, Martins heads for breakfast in his sweaty running gear. Leaning up against the wall in the hunting-lodge kitchen, he talks about his days at West Point and Harvard. West Point, he says, "wasn't a place that cultivated appearances of effortless superiority. At Harvard, sweating and repeated tries were certainly nothing to be ashamed of, but neither were they [activities] sought for themselves. A smarter approach was just smarter, regardless of how it was conceived.

"Iraq is the toughest challenge I have encountered from both perspectives," he adds. "We'll continue to need persistence here, but we'll also continue to need smart approaches that take account of new developments. And even then, there will be no guarantees of victory in the conventional military sense." ▽

Willy Stern, M.P.A. '91, was embedded last year as a journalist in Iraq with the Army's First Cavalry Division out of Fort Hood, Texas.

Vote Now

THIS SPRING, alumni will choose five new Harvard Overseers and six new elected directors for the Harvard Alumni Association (HAA) board.

Ballots should arrive in the mail by April 15 and must be received back in Cambridge by noon on May 30 to be counted. The results will be announced at the HAA's annual meeting on June 5, on the afternoon of Commencement day. All Harvard degree holders, except Corporation members and officers of instruction and governance, are entitled to vote for Overseer candidates. The election for HAA directors is open to all alumni.

The Candidates, listed here in alphabetical order, are:

For Overseer (six-year term, five to be elected):

Lynn Chang '75, Newton, Massachusetts. Concert violinist; violin professor.

Anne Fadiman '74, Whately, Massachusetts. Author; Francis writer-in-residence, Yale.

Paul Finnegan '75, M.B.A. '82, Chicago. Co-CEO, Madison Dearborn Partners, Inc.

Robert Freedman '62, Philadelphia. Partner, Dechert LLP. (Nominated by petition.)

Eve Higginbotham, M.D. '79, Atlanta. Dean and senior vice president for academic affairs, Morehouse School of Medicine; surgery professor.

Michael Holland '66, New York City. Chairman, Holland and Company LLC.

Anand Mahindra '77, M.B.A. '81. Mumbai, India. Vice chairman and managing director, Mahindra and Mahindra Limited.

Regina Montoya, J.D. '79 Dallas. CEO, New America Alliance.

Return to Harvard Day

On April 16, all College alumni and their spouses/partners and high-school-age offspring can visit the College, attend classes, and meet faculty members. The HAA sends brochures promoting the event to alumni in New England, New York, New Jersey, and Pennsylvania. If you do not receive a brochure and want to attend, contact the HAA at 124 Mount Auburn Street, sixth floor, Cambridge 02138; 617-495-2555; or send your request by e-mail to alexandra_monti@harvard.edu.

David Oxtoby '72, Claremont, California. President and professor of chemistry, Pomona College.

For Elected Director (three-year term, six to be elected):

Joseph Bae '94, Hong Kong. Member and managing partner, KKR Asia.

Rodney Hardy '60, Minneapolis. Vice president/owner, Sienna Corporation.

Carolyn Hughes '54, Oceanside, New York. Retired; former project manager, Empire Blue Cross Blue Shield.

Kevin Jennings '85, New York City. Founder and executive director, Gay, Lesbian and Straight Education Network (GLSEN).

Robert Kraft '76, Los Angeles. President, Fox Music.

Elizabeth Reilly '91, Boston. Attorney, WilmerHale.

Alejandro Santo Domingo '99, New York City. Managing director, Quadrant Capital Advisors Inc.

Rosa Wu '03, San Francisco. Associate product manager, Google.

Andrea Zopp '78, J.D. '81, Chicago. Senior vice president and chief human resources officer, Exelon Corporation.

GSAS Alumni Day

On April 5, Graduate School of Arts and Sciences alumni and their guests are invited to a day-long celebration featuring afternoon symposiums on a variety of topics, and a keynote address, "Common Wealth: Economics for a Crowded Planet," by economist Jeffrey Sachs '76, Ph.D. '81, chair and director of the Earth Institute at Columbia University (and 2007 GSAS Centennial Medalist). For details, or to register, contact the Harvard Graduate School Alumni Association at 617-495-5591 or visit www.gsas.harvard.edu.

HAA Clubs Committee Awards

The HAA clubs committee Awards honor individuals who provide exemplary service to a Harvard club or shared interest group (SIG), as well as clubs and SIGs that have organized exceptional programming. They were presented to the 2008 recipients (listed below) at the HAA Board of Directors and Alumni Leadership Conference dinner on February 1.

Modesta Garcia, Ed.M. '79, of Daly City, California. Garcia has been president of both the Harvard Club of Silicon Valley and the Harvard Club of San Francisco. At the latter, she broke new ground by initiating club awards for human-rights leadership, cofounding a Latino Committee, and co-chairing a college mentorship program. (She was also the first person of color, and only the third woman, to serve as club president.) As a professor and counselor in the department of career and life planning at the College of San Mateo, she has also been instrumental in helping students achieve their highest educational aspirations.

Mia Riverton '99, of Venice, California. In 1999, Riverton cofounded Harvardwood, a SIG focused on the arts, media, and entertainment that now has about 800 members. An actress, Riverton has also spearheaded educational events such as Harvardwood 101 (a career-exploration program for undergraduates) and a summer-internship program, along with networking opportunities, seminar series, programs for writers, career-counseling partnerships, and an annual holiday gala.

The Harvard Club of Chicago, the oldest continually operating Harvard club in existence, celebrated its 150th anniversary in 2007. The year-long series of events—including publication of a book outlining its history and longstanding relationship with the University (see "Harvard in Chicago," at right)—was capped off on November 9 with a day of symposiums and a dinner with University president Drew Faust. Meanwhile, the club continues to contribute to the social good through its Adopt-a-School Program (established in 1989) with Walter Payton College Preparatory High School, through which more than 200 Harvard volunteers—"Harvols"—play various roles.

Harvard Club of Serbia, chartered in 2003 as the Harvard Club of Serbia and Montenegro, formally changed its name to the Harvard Club of Serbia in 2006. Last year, this small club sponsored its largest-ever event: a month-long exhibit on the 125-year history of Serbian-U.S. relations that appeared at the National Library of Serbia in Belgrade (see www.harvard-serbia.org. The club is anchored by its mission: to bring alumni in Serbia together with other European alumni and Harvard clubs through intellectual and social events, and to keep alumni aware of University affairs.

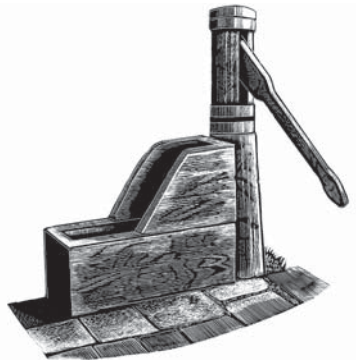
The Harvard Club of Boston Turns 100

The harvard club of Boston, founded "to give effective expression to the Harvard spirit," kicked off its centennial celebration with a rousing New Year's Day brunch. A year-long roster of other activities is planned, including a March 12 dinner with University president Drew Faust, who will give a keynote address following a short annual meeting. To learn more about future events, or to attend the reception and dinner, contact the club at 617-536-1260 or visit www.harvardclub.com.

Harvard in Chicago

As part of its sesquicentennial celebration, the Harvard Club of Chicago has published *150 Years of the Harvard Club of Chicago: 1857-2007,* a handsome history that includes more than 110 photographs. The 198-page book was edited by club director Walter Keats '67; he and fellow members spent months on research in the club's own archive, besides locating hundreds of articles in the *Chicago Tribune* archives and much more material from the *Crimson,* the University Archives, and other Harvard and Chicago sources. Volume are available for $40 each from the club: by mail (P.O. Box 350, Kenilworth, Illinois 60043); phone (847-256-1211); fax (847-256-5601); or e-mail (harvardclub@aol.com).

Tough Turkeys



"Your wooden arm you hold outstretched to shake with passers-by."

TURKEYS are menacing innocent students at the Business School. "Large female wild turkey...trots after male Business School student around several buildings, finally stopping when the student runs into the Baker Library for cover," reports the *Harvard Recycling Update*, a monthly e-mail bulletin on refuse and campus wildlife sightings.

Harbus, the school's student newspaper, is much energized by the turkeys, of whom there are at least two. Why are the turkeys here? Writes an editor, "It is doubtful that, like many of us, the turkeys are here to find rich husbands, international-style squash courts, or decent sushi," adding darkly, "Here they are only safe until someone works out the NPV [net present value] of the purchase of a good stout ax and some gravy."

Maybe, but the turkeys are good at intimidation. "Apparently, much like labor unions, they will back off if you act aggressively," *Harbus* counsels, "but...that is not as easy as it sounds. These birds fight back...."

"Parables of the Wild Turkey" appear in successive issues of the paper as the gobblers take up residence in students' imaginations, too. In one parable, the turkey sneaks into the dean's residence and then flees five minutes into one of his uninterrupted dinner-table disquisitions. "Moral of the story: Nobody can stand an uninspiring monologue." In another, the turkey downs an M.B.A. candidate on the lawn and pecks his forehead so relentlessly that the man misses a job interview. Moral: "The wild turkey can save you from a wretched life as a McKinsey consultant."

Hunters had exterminated wild turkeys in Massachusetts by 1851, according to an advisory in the *Boston Globe*, but today, thanks to governmental intervention, the Commonwealth harbors an estimated 20,000 of the peripatetic fowls.

REMEMBRANCES: One of the more agreeable behaviors of the Faculty of Arts and Sciences is the delivery of "Memorial Minutes" at faculty meetings. These are tributes to deceased colleagues written by committees of their friends and "spread upon the minutes" of the faculty for eternity. They often include material not found in the usual obituary. We are told, for instance, that one of the greatest legacies of the late statistician Charles Frederick Mosteller, LL.D. '91—who brought his learning to bear in a zillion disciplines—"is his impact on others through collaboration, and he famously accumulated a host of co-authors across many fields." A poem read on his seventieth birthday begins: "On a high and secret mountain on a South Pacific isle/Lived a hermit in a mud house in a most reclusive style/ He had not clothes nor money, neither dishes nor a bed./ And he had never even written one short monograph with Fred."

Of the late economist John Kenneth Galbraith, LL.D. '88, his colleagues noted that, "Unlike most Harvard professors, he used personal stationery headed simply 'John Kenneth Galbraith, Cambridge, Massachusetts'; the post office knew where to find him."

NICETY: For ages, the Harvard Glee Club has burst into the anthem that begins "*Domine, salvum fac Praesidem Nostrum...*" whenever the president of the University appears on a state occasion. The words mean "O Lord, make safe our president," and their 1853 setting by composer Charles Gounod constitutes Harvard's equivalent of "Hail to the Chief."

Glee Club members perceived, of course, that the words would require declensional adjustment because of the gender of the new incumbent. Thus, at a gala in Chicago last fall to celebrate the 150th anniversary of that city's Harvard Club (the oldest of the clubs), when President Drew Gilpin Faust entered the hall, the words rang out, "*Domine, salvam fac Praesidem Nostram....*" "She recognized the change, laughed, and turned around to smile at us," says Glee Club manager Kelby James Russell '09. "It seemed rather remarkable that anyone noticed the change at all."

—PRIMUS V

PAUL TESSIER/ISTOCKPHOTO

LETTERS

(continued from page 10)

mouth, and Swarthmore for nearly 25 years, I've had the opportunity to read many student essays about college life. I consider "Applying Yourself" to be one of the most insightful statements yet about the personal academic journey at such highly selective schools. I believe that Goodwin's essay should be circulated to high-school and college-age students across the country, and I plan to do my part by sharing the essay (with her gracious permission) with students here at Swarthmore.

Jim Larimore
Dean of students, Swarthmore College
Swarthmore, Pa.

RACE AND GENETICS

Your story on "Lucky Jim" Watson ("Chairmain of the Bored," a book review, January-February, page 24) could at best be considered ill-timed. Apparently Watson admires the University of Chicago as a place that produced graduates "capable of critical thought and morally compelled to use those critical capacities—damn the consequences," and where he "learned the need to be forthright and call crap crap." Well, speaking of crap, what about Watson's views on race and genetics? Shouldn't you have been forthright about that?

Jeffrey F. Hamburger
Francke professor of German art and culture
Cambridge

Editor's note: Steven Shapin's review was written before James D. Watson's widely publicized, and criticized, comments on race, made during his book tour. Shapin and the magazine's staff discussed making note of the controversy, but decided that his original text was sufficient as a critical review of the memoir—and of its author.

CARBONIFEROUS INSECTS

In his fascinating article on Robert Wood's robotic fly ("Tinker, Tailor, Robot, Fly," January-February, page 8), Dan Morrell asks, "Why did all the four-winged arthropod flyers of the Late Carboniferous Period evolve to have two wings?" Well, they didn't. Four-winged insects, descendants of Late Carboniferous ancestors, still dominate the insect world; think of beetles and butterflies. Only a single major order of insects, the flies Wood's robots emulate, have reduced their wings to two. Flies appear many millions of years after the Late Carboniferous; there is not a single Carboniferous or Permian flying-insect fossil with only two wings.

I suspect Morrell is confused about wing numbers and the numbers of wing pairs. So really Morrell's question should be: "Why did all the six-winged arthropod fliers of the Late Carboniferous Period evolve to have two pairs of wings?" And just as interestingly, why did one large group later evolve to have a single pair?

William Shear, Ph.D. '71
Hampden-Sydney College
Hampden-Sydney, Va.

TISSUE AT ISSUE?

You quote Dean Harry R. Lewis as saying the Harvard College Toilet Paper Commission of 1998 "met weekly all fall to consider this important issue" (Yesterday's News, January-February, page 58). I suspect what he really said was, "met...to consider this important *tissue*."

Peggy Troupin, Ph.D. '74
New York City

TOWARD A LIBERAL REALIST FOREIGN POLICY

(continued from page 38)

try in the international system to produce global public or common goods. In the nineteenth century, Britain defined its national interest broadly to include promoting freedom of the seas, an open international economy, and a stable European balance of power. Such common goods helped Britain, but benefited other countries as well. They also contributed to Britain's legitimacy and soft power. In the early twenty-first century, the United States should similarly promote an open global economy and commons (seas, space, Internet), mediate international disputes before they escalate, and develop international rules and institutions. Because globalization will spread technical capabilities, and information technology will allow broader participation in global communications, American economic and cultural preponderance will become less dominant than at the start of this century. That is all the more reason to build institutions that make the world safe for diversity.

Your Vision and Smart Power

The united states needs to rediscover how to be a "smart power." That was the conclusion of a bipartisan commission that I recently co-chaired with Richard Armitage, the former deputy secretary of state in the Bush administration. A group of Republican and Democratic members of Congress, former ambassadors, retired military officers, and heads of nonprofit organizations was convened by the Center for Strategic and International Studies in Washington. We concluded that the effects of the September 11 terrorist attacks have thrown America off course.

Since the shock of 9/11, the United States has been exporting fear and anger, rather than our more traditional values of hope and optimism. Abu Ghraib and Guantánamo have become more powerful global icons of America than the Statue of Liberty. Terrorism is a real threat and likely to be with us for decades, but over-responding to the provocations of extremists does us more damage than the terrorists ever could. Success in the struggle against terrorism means finding a new central premise for American foreign policy to replace the current theme of a "war on terror." A commitment to providing for the global good can provide that premise.

The United States can become a smart power by once again investing in global public goods—providing services and policies that people and governments in all quarters of the world want but cannot attain in the absence of leadership by the largest country. That means support for international institutions, aligning our country with international development, promoting public health, increasing interactions of our civil society with others, maintaining an open international economy, and dealing seriously with climate change. By complementing American military and economic might with greater investments in soft power and a broader vision, you can rebuild the framework that we will need to tackle the tough problems ahead.

Joseph S. Nye Jr. is former dean of the Kennedy School of Government and currently University Distinguished Service Professor and Sultan of Oman professor of international relations. His latest book is The Powers to Lead, *just published by Oxford University Press.*

TRAILS OF TEARS, AND HOPE

(continued from page 43)

recalls. "Zoroastrians weren't allowed to ride horses or wear colorful clothes, and were exorbitantly taxed and legally discriminated against. I knew about all of this, but I never personalized it. I thought people in other countries suffered more."

Abadian's father, Bahman Abadian, earned his economics doctorate in India, where Gandhi's example influenced him deeply. He came to Harvard in 1963 as a Mason Fellow in international development and, after joining the World Bank, moved his family to Washington, D.C. "As the daughter of a World Bank economist, I traveled widely and did not think it unusual to have dinner-table conversations on the benefits of rural electrification in the Philippines, or World Bank president Robert McNamara's stance on eliminating poverty," she writes in her forthcoming book. Abadian attended the acclaimed Walt Whitman High School in Bethesda, Maryland. "It was a true world community in Washington," she says. "I never saw boundaries."

Yet along with this cosmopolitan upbringing, Abadian also had deep ties to rural Iran. Accompanying her father on a development project, she met tribal peoples there, who once gave her a lamb. "I loved the freedom that these nomadic peoples represented," she says, "as well as their generosity, even though they had very little." She also returned several times, as a child, to her mother's village of Ahrestan, near Yazd in central Iran. There she fetched water from a cistern, ate fresh fruit from orchards, slept on the roof under thick quilts, and rose at 4:30 A.M. with her older cousin to take the goats and sheep out to graze. Instead of televisions and radios, there were card games and fortunetellers.

For a long time, Abadian prepared to follow in her father's footsteps and work in international development. She earned her bachelor's degree at Swarthmore in sociology, anthropology, and economics. She took courses in Farsi, trained as an emergency medical technician, and was interested in medicine, but "having traveled to India and other places, I had seen that village doctors would cure a child of typhoid and the child would go home and get typhoid again. The real problems were systemic issues—public health."

The late David Maybury-Lewis, then Henderson professor of anthropology, recruited her to Harvard for an experimental one-year master's program in the anthropology of social change and development. She earned her A.M. in 1987, writing a thesis on the link between the status of women in Bangladesh and their reproductive behavior. Soon thereafter, the KSG accepted her into its doctoral program in political economy and government.

She also earned an M.P.A., traveling in 1986 to Bangladesh to analyze income-generating activities for the poorest of the world's poor: Bangladeshi women. One day Abadian followed such a woman through her daily rounds. The woman had just sold some handcrafts she had made and consequently had money in her pocket when she ran into her husband, who was sitting under a tree, gambling. The husband spoke roughly to his wife, grabbed her sari, took the money from her, and resumed gambling. "It hit me," Abadian recalls, "that it's not enough for these women just to be able to make money." Such experiences caused her to wonder about the real obstacles to economic development. She began to ask if the deepest barriers to moving forward might be not on the physical plane, but rooted instead in the human mind and emotions.

Then, with the birth of her first child in 1988, Abadian, who had always traveled extensively, was suddenly grounded. "It was a great gift to be at home," she says, "because instead of traveling outwardly, I started to explore the inner landscape." Over the years, she learned to meditate and began to participate in shamanic retreats; spiritual teachers introduced her to "power animals," drumming, and indigenous practices, such as the use of sweat lodges. "Many of these teachings resonated with Zoroastrian traditions," she says. "It was like going home."

Eventually she began traveling again, to native communities throughout the American West and Canada, funding her own doctoral research. On the tribal reserves, Abadian tried to absorb as much as she could about indigenous and alternative forms of healing. "Most of them, I've tried on myself," she says. "I've also extensively explored Western therapies and healing modalities." These experiences suggested to Abadian that there are ways to treat "soul wounds" like those collective trauma inflicts.

"WHEN PEOPLE ENGAGE in genuine healing," Abadian says, "they become more accountable, and in touch with reality. Healing generates compassion and tenderness. To heal collective trauma, you must heal the individual; healthy individuals give birth to healthy institutions and cultures. It's circular, of course, and ideally you intervene at both macro and micro levels at once."

"Zoroastrians were exorbitantly taxed and legally discriminated against. I knew about all of this, but I never personalized it."

Several facilitators with Harvard ties have been applying these principles to help heal traumatized individuals and their relationships. Father Leonel Narvaez, M.T.S. '01, for example, a Colombian Roman Catholic priest, has been creating "Schools of Forgiveness and Reconciliation" in Colombian cities and villages to reduce domestic violence and pacify civil strife among warring militias. He applies an eclectically derived model that involves creating a safe environment, sharing one's traumatic narrative with others, and "re-socializing" the traumatized person away from a victimized/vengeful narrative toward "a crazy thing, which is mercy and compassion," Narvaez says. "It is irrational. But against the irrationalities of violence, we propose the irrationality of reconciliation." Former PICAR deputy director Donna Hicks has used a different approach that she calls "reconciling with dignity" to help victims and perpetrators of the conflict in Northern Ireland reconcile after years of violence, as part of a 2006 BBC television series she made with South African archbishop Desmond Tutu, LL.D. '79. Hicks is writing a book, "The Power of Dignity," about this healing work.

Tamar Miller, M.P.A. '93, a clinical social worker trained to work with traumatized individuals and families, says,

"Abadian offers a new lens by insisting that we go beyond the individuals to the collective, particularly in dealing with intractable conflicts." As the former executive director of the KSG's Institute for Social and Economic Policy in the Middle East and founder of PeaceBeat, whose motto is "Some good news, some of the time," she is working to reshape the polarized public conversations among Muslims, Jews, and Christians, primarily in the Middle East. Miller is on the board of the Alliance for Middle East Peace, a growing coalition of 50 citizen-diplomacy organizations in Israel and the Palestinian territories. "People-to-people peace building offers the opportunity for relationships that engender hope in a despairing region," she says. "Hope is a fundamental requirement of healing collective trauma.

"At the end of each political, sociological, or economic analysis [of the Israeli/Palestinian conflict], inevitably there's a sentence that reads, 'And both peoples are traumatized,'" Miller continues. "There is never a second sentence after that. No one knows what collective trauma really means, what it does to groups and nations, or how to intervene to heal it. Sousan offers a crucial part of that road map."

In 2003, Miller and the Institute for Middle East Peace and Development, a New York-based nonprofit, organized an interfaith summit that convened a group of Christian, Muslim, and Jewish leaders and theologians from Egypt, Jordan, Saudi Arabia, and the United States to reflect on the challenges of religious leadership. The KSG's Center for Public Leadership hosted the gathering, which included some of the highest-level clerics in Egypt and Jordan. Abadian told the group about the Native American experience of colonization and trauma, distinguishing between individual and collective traumas. "Everyone seemed to identify with [that] experience of oppression and trauma," says Miller. "Sousan was so compassionate and clear; people understood—but more important, *felt*—that the pain and violence in the Middle East are not a deficiency in themselves, their nations, or their religions, but in part a universal human response to collective trauma." Abadian recalls, "In the middle of the talk, one Muslim theologian banged on the table and said, 'We must heal our children! We must heal our children!'"

But collective healing involves much more than healing individuals and relationships, Abadian says. She also advocates a selective revival of traditions and cultural elements, and the generation of new ones. "Cultural renewal isn't about bringing back wholesale everything from the past," she cautions. "Some practices may have to be adjusted, or jettisoned altogether. In the context of native peoples, some Pacific Coast tribes practiced slavery and polygamy, for example. And communities may adopt cultural elements from outside that they find meaningful. Communities that didn't traditionally practice sweat lodges and sun dances have adopted them." Furthermore, new or revived life-affirming ceremonies can take the place of dysfunctional coping mechanisms like drinking binges. Traditional dances, drumming and singing circles, quilting groups, and even weaving porcupine-quill baskets may occupy the social space formerly held by drug use or violence.

Cultural revival can spur controversy. When the Eastern Pacific gray whale went off the endangered-species list in 1994, young people of the Makah tribe in

Trauma and Social Injustice

"There's actually been no institutional relationship between personal healing and social justice," says professor of psychiatry Richard Mollica, M.D., director of the Harvard Program on Refugee Trauma (HPRT) at Massachusetts General Hospital. "For example, look at the experiences of witnesses in the Bosnian tribunal at The Hague: it's very clear that many did not experience social justice as therapeutic." South Africa's Truth and Reconciliation Commission set several goals, including apology, punishment, compensation, and reconciliation, but its chair, Archbishop Desmond Tutu, LL.D. '79, clearly stated that the commission would not be able to heal most victims of the atrocities of apartheid.

Mollica has spent more than 30 years helping victims of many kinds of trauma around the world. His recent book, *Healing Invisible Wounds: Paths to Hope and Recovery in a Violent World*, argues that people have an inherent ability to heal themselves and focuses on the relationship between personal healing and the healing of collective wounds—which may or may not include the legal and institutional remedies that are aspects of social justice. Mollica and his colleagues at HPRT have developed a global training for post-conflict recovery, and set up an on-line global dialogue on the prevention of all forms of human violence (see their blog: healinginvisiblewounds.typepad.com).

No society has a good definition of social healing, Mollica says, and ironically, social *justice*—prosecuting perpetrators of crimes against humanity, for example—"can actually make the individual and/or the situation worse for the survivors of violent crimes. Look at the aftermath of acquittals in The Hague—people felt betrayed, and felt that their ongoing social and economic crises were not addressed. Many survivors felt the courts were primarily politically motivated." Furthermore, "A lot of people were destroyed or psychologically damaged by giving or hearing testimony at the international tribunal," he says. "It is traumatic in itself for a South African mother to learn via testimony that her son was barbecued by police agents." Yet vivid testimony of this kind strengthens the prosecutors' case, Mollica says. "The more vivid it is, the more injured the victim is, the more it helps the prosecutors."

Though he believes that social justice can contribute to the healing process, Mollica points out that "there is such a thing as a toxic trauma story. Telling the brutal facts that generate high emotions can be very negative and anti-therapeutic. A trauma story needs to be associated with survival and healing—then it becomes a teaching story, as in the lives of Gandhi, Martin Luther King, and ordinary survivors as well. Societies need to collect and share these stories. We're not doing a good job of this internationally, or with the people of New Orleans or Iraq, or soldiers returning from the Iraq War. We don't have good personal data from Native Americans on their personal reactions to the ethnic cleansings they experienced. Stories like this can help both social healing and personal healing."

Neah Bay, Washington, at the extreme northwestern tip of the continental United States, began preparing to resume the Makah's 3,500-year-old practice of whaling. Under the tribe's 1855 treaty with the U.S. government, the Makah ceded extensive tribal lands but "retained the right of access to natural resources, including whales," says Janine Bowechop, executive director of the Makah Cultural and Research Center. "The whale-hunting clause didn't exist in any other Indian treaty." During the mid 1990s, the International Whaling Commission and U.S. courts approved the Makah's right to hunt whales, despite legal attempts from animal-rights organizations to stop the hunt. Another case is now in progress.

In 1999, with extensive live television coverage, several young Makah men paddled a sacred canoe (with a powerboat in support) into the Pacific Ocean and harpooned a whale, finishing it off with a rifle shot. They had prepared for the whale hunt with an extended period of fasting, prayer, and ritual bathing, and had to remain alcohol- and drug-free during their two-year training, according to Edward E. Claplanhoo, a former Makah tribal council chair. "A whale hunter who carries the spirit of animate beings can usher the spirit of the whale into the next world in the right way," says Makah tribal council member Micah McCarty, who trained for the 1999 hunt but returned to college before it occurred. The whale hunt seemed to stimulate interest in Makah traditions, he says: "Afterwards, younger kids wanted to know more about our culture and to participate in it." Claplanhoo thinks that "one whale a year would be enough. If we could get young people interested in their culture, the alcohol would go out the window."

Claplanhoo chairs the board of the Seattle-based United Indians of All Tribes Foundation (www.unitedindians.org), which works broadly to serve cultural, educational, and community development needs of indigenous peoples. Its chief executive officer, Phil Lane Jr., a member of the Chickasaw and Yankton Sioux nations, says that there are four primary ways of dealing with oppression: assimilation ("taking on the form of the oppressor"); resignation ("giving up—alcoholism, apathy, drug use"); violent conflict ("adversarial politics"); and co-creating together ("working with the dominant culture to create a new future while keeping tribal values and traditions alive"). Lane advocates this "fourth way" of working together as the best choice for empowering indigenous peoples throughout the world. "We each need to understand that we are a sovereignty," he says, "ancient, imperishable, and everlasting."

That fourth way is guiding the process of cultural healing at the Pojoaque Pueblo, located about 12 miles north of Santa Fe, New Mexico. The 385 Pojoaque tribal members live where their ancestors have resided for a millennium. But by the early twentieth century, most of the tribe had left the pueblo and non-Indians were taking the land; the pueblo nearly vanished. Since the early 1990s, however, new income from gaming and a tribal cultural revival have begun to help the Pojoaques rebound.

George Rivera, who was elected governor of Pojoaque in 2004 (after serving as lieutenant governor for 13 years), isn't a typical political leader: he's an accomplished, active sculptor whose works decorate the tribe's government building. As a young man, he spent years studying art in Europe, noticing how those cultures carefully preserved their heritage and used it to attract travelers from around the globe. The Pojoaques' own construction firm built the Poeh Cultural Center (*poeh* means "pathway" in Tewa, the local native language). "We knew we couldn't build something of steel, glass, and cinder blocks with hard edges," Rivera explains. "We wanted it to have the touch and feel of native architecture, so that when native students came here to study, they would feel at home." The complex includes classrooms, studios, and workshops in addition to a museum that houses artworks collected from eight nearby Tewa-speaking pueblos.

Meanwhile, gaming has brought revenue to the pueblo. This year, the tribe expects to open its $300-million Buffalo Thunder Resort, in partnership with Hilton. Extensive exhibit space for pueblo art, and such features as a custom-woven carpet that depicts weavings by Pojoaque artists, drove up the budget by $20 million, but, as Rivera explains, "It's not only about gaming, it's about experiencing the pueblo culture."

Other indigenous communities in the United States, and even one in Brazil, have looked to the Pojoaque as a model of how to preserve and revive native culture while navigating a modern economy. "One thing that works for us is taking out the individual agenda," Rivera says. "We view money not just as something to put in your pocket and spend, but as a tool to make positive changes in your way of life and to have impact in the community in a way that works for generations to come. If it were just about getting wealth for yourself alone, it wouldn't work."

Places like the Poeh Center help make cultural renewal permanent, says Abadian, because they institutionalize healthy life ways, weaving them into daily routines. The social "intervention" gives way to a changed society. "There used to be a wise man in the tribe," she says. "Perhaps he disappeared as a result of trauma. But you can recreate that role—call it a mediator, if you like. You want the role to become part of everyday culture.

"There are a lot of wonderful experiments in healing taking place, but also there's a great deal of resistance to the notion of healing trauma," she continues, while warning against the pitfall of replacing "the stereotype of the 'drunken Indian' with a new stereotype of the 'traumatized Indian.'"

Abadian sees exciting possibilities. "We're living in an incredible era," she says. "Future generations may look back on this as the time when the great healing began. Humankind has never done this before. Many communities have become laboratories for conscious evolution." ∇

"We each need to understand that we are a sovereignty, ancient, imperishable, and everlasting."

Craig A. Lambert '69, Ph.D. '78, is deputy editor of this magazine.

History Bronzed

French medals of the Great War

Harvard people with medals they aren't sure what to do with have often given them to the University. Many of these impressions of history have fetched up in the Harvard College Library, specifically in Houghton, which is otherwise a repository for rare books and manuscripts. Leslie A. Morris, curator of modern books and manuscripts, keeps and shows students an accumulation of about 850 medals. Many of them were struck in the United States, but the gathering is cosmopolitan. The French medals on this page recall the role of that nation in the War to End All Wars.

The piece at top, by the artist Jules-Prosper Legastelois, commemorates an early success, the Battle of the Marne (1914), with the spirit of France soaring over the troops on the reverse. The one at bottom, by Charles Pillet, honors the multitude who died in the tragic defense of Verdun. The large medal at right, from 1918 and also by Pillet, depicts General John J. "Black Jack" Pershing, who led the American Expeditionary Force. The medal second from the top appears to be an edition of one that was handmade for special presentation by the American Volunteer Motor-Ambulance Corps to its founder, Richard Norton, A.B. 1892, the son of Professor Charles Eliot Norton. The nesting storks are on a medal of Alsace; the small piece below it, from Tarbes, salutes the wounded of 1914; and the small medal at right is for the École Clemenceau, a school for orphans.

Alan M. Stahl, the curator of numismatics at Princeton's Firestone Library, who is an expert on medals, calls these French examples "typical of the work of the time—a classicizing Beaux-Arts allegorical romanticism more appropriate for fin-de-siècle society celebrations than for World War I." He prefers German medals of the period, which are "much more modern in style."

Speaking of German memorabilia, a news piece in this magazine in 1920 noted that the French government had presented Harvard with a large collection of artifacts from the recent war—guns, bayonets, cavalry swords, gas masks, a flame thrower—on condition that the French material be "well separated from the German trophies in the exhibition room." One wonders about the present whereabouts of that flame thrower.

Photographs by Jim Harrison

Ready for the real world?

Is your son or daughter ready for the real world?
Ready to get a job, compete, and succeed?

In just one month next summer, the Tuck Business Bridge Program® helps connect juniors and seniors to meaningful careers—all while developing personal strengths that will last a lifetime.

We deliver practical management skills—complemented by team valuation projects, résumé sessions, career panels, and interviews—to give students an advantage in recruiting and in everything they pursue. Courses are taught by the same top-ranked faculty who have made Tuck's MBA program a world leader.

Tuck Business Bridge Program

603-646-0273 • tuck.biz.bridge@dartmouth.edu
www.tuck.dartmouth.edu/bridge

Alfredo Häberli, Industrial Designer.
Creating smart simplicity with passion.

The new Patravi TravelTec GMT a chronograph in stainless steel featuring multiple time zone functions using a new single push-button mechanism is a perfect example of Carl F. Bucherer's unique philosophy. As an independent family business in Lucerne since 1919, our passion for perfection and love of detail have never changed.

www.carl-f-bucherer.com and www.patravi-traveltec-gmt.com
info@cfbnorthamerica.com 800 395 4306

CARL F. BUCHERER

FOR PEOPLE WHO DO NOT GO WITH THE TIMES.