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SPECIAL INSERT
MAKING HISTORY IN THE ARTS & SCIENCES
Now that we are more than halfway through the Making History campaign, we might ask: Is it indeed making a difference? In my daily life on campus, I can see the campaign’s strong impact on the School of Arts and Sciences, both in our ability to assemble a community of the very best faculty and students and in the way those people do research, teach and learn.

I see the impact literally in the physical spaces that have been transformed by gifts we’ve received.

Witness, for example, the renovation of the newly opened Music Building, which nearly doubled the space of the old facility, adding practice rooms, better-equipped rehearsal spaces and new technology for teaching. Whenever I enter the building, I see the campaign’s impact in the delight the music faculty and students find in this lovely space.

Other gifts led to a dramatic refurbishing of our undergraduate chemistry labs. The transformation of the space into bright, clean and safe teaching laboratories was coupled with a renovation of the curriculum, as the chemistry faculty rethought how to make the undergraduate lab experience come alive.

In partnership with the School of Engineering and Applied Science, we are moving ahead with construction plans for the innovative Krishna P. Singh Center for Nanotechnology, a spectacular structure that will provide our scientists with tools for making startling discoveries and promising inventions in the emerging field of nanoscale research.

I can also see the campaign’s influence through the impact of the 199 new scholarships created for students in the College. Some of the brilliant and diverse students in my freshman seminar last fall were there only because we could offer them a scholarship. And campaign gifts to support graduate students have allowed us to raise stipends and provide summer support so that we can attract the best students from around the world to train at Penn to be the scholars and scientists of the future.

The 21 new endowed chairs established through the campaign are absolutely essential in sustaining the strength of the SAS faculty. All of them will be used to reward or retain our most productive and effective faculty members or to recruit new faculty in the areas of highest need. For example, with the offer of a Christopher H. Browne Distinguished Professorship, we were able to attract Carolyn Abbate, who ranks among the world’s foremost musicologists, away from Harvard.

Even as we celebrate success, we are still hard at work on the unfinished business of the campaign. Chief among our challenges is undergraduate financial aid. Nothing is more important to the future of the School, both in opening our doors to the most outstanding students and in assuring our own financial stability, than achieving our goal of $150 million for undergraduate financial aid.

Funding for our Neural and Behavioral Sciences Building is also high on the campaign’s to-do list. This facility is the cornerstone of the School’s commitment to strengthening an already strong life-sciences program. It will house laboratories, classrooms and collaborative spaces that foster the cross-disciplinary work so essential to research in biology, psychology and other disciplines that explore the nexus of genes, brains and behaviors.

The Making History campaign has already been an exciting journey. It has allowed us to focus on the future of the School of Arts and Sciences. It has increased the engagement of volunteers and brought people together to talk about what’s really important to SAS. In my travels, I have seen the campaign’s impact in the passion of people who really care about the School and want to understand and support our priorities and our goals.

With this continued enthusiasm and engagement, I know that together we will meet the remaining challenges.
Two members of the class of 2010 received Gates Cambridge Scholarships last spring. Donielle Johnson and Jill Portnoy were awarded the full cost of tuition for graduate study at the University of Cambridge by the Bill & Melinda Gates Foundation. Approximately 100 Gates Scholars are selected each year based on academic achievement, demonstrated leadership and dedication to improving the lives of others. Currently there are 911 Gates Scholars and alumni from 90 countries. Johnson majored in psychology with a minor in the biological basis of behavior. She intends to continue with her study of childhood autism at Cambridge in the fall. Portnoy, a double major in criminology and Hispanic studies, plans to pursue a graduate degree in criminological research. Amanda Marzullo, L’08, G’08, an advocate for indigent defendants in Texas, also was named a 2010 Gates Scholar.

—PN

2010 Levin Family Dean’s Forum

Last spring’s Levin Family Dean’s Forum featured influential philosopher Martha Nussbaum, the Ernst Freund Distinguished Service Professor of Law and Ethics at the University of Chicago. Nussbaum is the author of several award-winning publications, including *Cultivating Humanity: A Classical Defense of Reform in Liberal Education* and *Sex and Social Justice*. Her most recent book, *From Disgust to Humanity: Sexual Orientation and Constitutional Law*, investigates how the notion of disgust has driven both civil legislation and public opinion supporting discrimination against gay and lesbian citizens. In her talk at the Annenberg Center’s Zellerbach Theatre, Nussbaum identified the religious and public arguments condemning same-sex marriage and argued against their validity in influencing legislation on the issue.

—PR

New Gates Scholars

Donielle Johnson (left) and Jill Portnoy

Two members of the class of 2010 received Gates Cambridge Scholarships last spring. Donielle Johnson and Jill Portnoy were awarded the full cost of tuition for graduate study at the University of Cambridge by the Bill & Melinda Gates Foundation. Approximately 100 Gates Scholars are selected each year based on academic achievement, demonstrated leadership and dedication to improving the lives of others. Currently there are 911 Gates Scholars and alumni from 90 countries. Johnson majored in psychology with a minor in the biological basis of behavior. She intends to continue with her study of childhood autism at Cambridge in the fall. Portnoy, a double major in criminology and Hispanic studies, plans to pursue a graduate degree in criminological research. Amanda Marzullo, L’08, G’08, an advocate for indigent defendants in Texas, also was named a 2010 Gates Scholar.

—PN
“We are presenting a system that will recycle neglected, tax-delinquent properties to benefit the regional economy,” explained Evan Smith, a grad student in the Fels Institute of Government who is also a law student at Temple University. He wore a dark suit, a white shirt and a red tie. His shoes were polished, but there was a nervous catch to his voice. It was the final round of the Fels Public Policy Challenge. With four teammates, Smith was presenting a land-bank plan that would promote neighborhood development to a panel of six distinguished, battle-hardened public-policy experts.

One panelist, Judge Marjorie Rendell, CW’69, from the U.S. Court of Appeals, fixed him with her best show-me stare. Another scowled over reading glasses, arms folded into an I-dare-you-to-impress-me pose. Smith’s team, Land Philadelphia, apparently did impress the judges, winning first place last March against four teams that presented their own policy proposals.

The Fels Public Policy Challenge is a competition that immerses students into all phases of a “civic campaign,” a political-action model for moving a policy idea to a policy reality. “It’s exactly what Fels brings to the table in terms of figuring out the realistic politics—what it really takes to get policy done,” says second-year Fels student Jack Higgins, who did most of the heavy lifting to get the Challenge off the ground. Notes Fels Executive Director David Thornburgh, “It’s the research, the execution, the implementation, the organizing and the persistence that separate realities from good ideas.”

The competition began six months earlier when more than 100 graduate and undergraduate applicants from eight Penn schools (and two from Bryn Mawr College) responded to a call for students interested in working with a team on a policy proposal that they were passionate about. Fels organizers chose 50 students from the pool and sorted them into multi-disciplinary teams that would put together plans to accomplish a wide range of objectives: to increase college enrollment and graduation rates in Pennsylvania, to improve senior-citizen access to social services and healthy food, to reduce recidivism with prison-education programs, to attract solar-panel makers to Philadelphia and much more. The teams attended workshops to coach them on all the research, analysis, organization, lobbying and cheerleading that goes into a successful civic campaign. Another workshop introduced them to the politics and players in the Philadelphia region. At a Round Robin, the 10 teams presented their plans to a jury of policy veterans from the local political scene. The judges listened, offered advice, poked holes and posed tough questions, and then scored the groups, which left half of them to advance to the final five.

“Through the Round Robin and campaign-planning process, we discovered that we really lacked focus and needed a crystal clear idea to communicate to the politicians whose support we needed,” says Matt Rader of team Land Philadelphia. The group made a strategic shift, tying their original idea for a land bank to the problem of tax-delinquent properties. “By targeting this narrower issue,” adds teammate Katie Milgrim, “we were able to create a strategy that would reduce the cycle of decline in neighborhoods, increase city revenues and improve the value of neighboring properties.”

“Politicians don’t vote on ideas,” Thornburgh points out. “I think part of the reason Land Philadelphia was the winning team was that they took their broad idea and kept funneling it into a very specific, actionable, votable proposal. There’s not only no way around this way of doing politics, but this is actually the system we’ve created, and we should embrace that and exercise our rights. This is at the core of what we teach at Fels every day—crafting strategic alliances to develop practical approaches to complex situations. We look forward to continuing and expanding on the success of the first year of the Public Policy Challenge for many years to come.”

—PN
“People are not just bodies,” declares health and societies major Sheyla Medina. “Patients are more than their disease. When we think about health and well-being, we cannot forget that a person’s values and spiritual beliefs are also very important.”

That sensitivity to the cultural and personal dimensions of health led Medina from a Native American literature course on Penn’s campus to a research project at Cass Lake Indian Health Services Hospital on the Leech Lake Ojibwe Reservation in Minnesota. “I wanted to learn about other worldviews,” she says, “other cultures that are often overlooked.”

With Timothy Powell, research project director at the Penn Museum and director of the Digital Partnerships with Indian Communities Website, Medina traveled to the reservation. Her plan was to video record interviews with tribal leaders and hospital officials for a case study of traditional medicine. “I wanted to learn not only about the perspectives that members of the Cass Lake Hospital had, but I wanted to learn about myself and how I could see through their eyes,” she says.

Medina first met with Larry Aitken, the reservation’s tribal historian, who is also Professor of American Indian Studies at Itasca Community College and founder of the Leech Lake Tribal College. “If you work with us,” he counseled, “bizindan (listen).”

Medina spent considerable time observing Aitken and his family, and listening to their stories. “This is the unspoken part of collaborative research,” she points out. “It builds the framework on which research with the community can flourish.” The approach is called community-based participatory research. Her aim was to understand what traditional medicine means for the Ojibwe...
and to work out with them the practical applications of any findings.

Powell, who had been working with the Ojibwe for a decade, was surprised by how responsive they were. “You don’t see native people talking that openly the first time they meet someone,” he remarks. “They recognized in Sheyla a deep-seated respect—she came asking for their help, not telling them how she’s going to help them.”

Medina recorded video interviews with Aitken as well as Norine Smith, CEO of Cass Lake Hospital, and Debra Meness, a physician and the hospital’s clinical director. Both women are Ojibwe. “It was great talking with these powerful, confident women,” Medina reports. “They shared stories about their lives and their contributions to the movement for health-care reform among Native Americans.”

Meness combines osteopathic and traditional medicine in her practice. Smith has worked in health-care administration for years. Earlier in her career, she had brought Jimmy Jackson, a distinguished Ojibwe medicine man, into an Indian Health Service program in Minneapolis. Every day there was a long line of people seeking his help and guidance. Currently, both women are working to integrate traditional medicine into the Western-style biomedical services offered by the hospital at Cass Lake.

The final product of Medina’s research project, “Traditional Medicine,” is a montage of descriptive text and interview videos posted on the Digital Partnerships with Indian Communities Website, a digital exhibition space for student research conducted in consultation with Indian communities. Her exhibit outlines Ojibwe cosmology and explores how this outlook informs the practice of healing. The video excerpts featuring Aitken, Smith and Meness literally give the Ojibwe a voice in the research, which also preserves the tribe’s oral tradition.

In part, Medina probes how the sustained grief of “historical trauma” affects reservation health. “This historical trauma,” Meness explains, “creates diseases like diabetes and cancer and alcoholism.” She says it’s a “soul wounding” that stems from conquest and forceful assimilation and gets passed down from generation to generation. The ongoing disruption of the tribe’s way of life unbalances the well-being of individuals and community alike.

“The healing of these losses demands a bridge between the patient, the community and sacred Ojibwe customs,” Medina comments. In the Ojibwe belief system, community extends beyond space and time into realms where ancestors dwell. Meness will often treat those who come to her by drawing on biomedical expertise as well as spiritual knowledge, calling on ancestral forces to restore imbalances within the patient and the community. “Spirituality is deeply rooted in the respect of ancestral history and cannot be disassociated from the healing that Dr. Meness channels,” says Medina. “She talks about transcending time in traditional medicine, about restoring balance in the patient’s body and within the community. We acknowledge the authority of these traditional practices because the patient and the healer know that they’re important.”

Aitken, Smith and Meness were impressed with the interview videos Medina produced and expect to use them in developing a cultural-competence curriculum, possibly in partnership with the Leech Lake Tribal College. The program would help doctors, nurses and health-care workers at the reservation hospital become more attuned to the culture of the Ojibwe whom they serve. “Most of the medical professionals are not native,” Medina observes, “so we’re trying to bridge that by increasing awareness of Ojibwe traditions and spirituality.”

“The stories themselves are medicine.”

In her project, Medina has helped to throw a bridge across the chasms that divide scholarship from practical application, Western from traditional medicine, the Cass Lake Hospital staff from their patients and scholars on Penn’s campus from native peoples living on the reservation. “The stories themselves are medicine,” Medina stresses. “To hear them, to experience them—even if only digitally—that’s something that cannot be encapsulated in a paper.”

Powell senses a new openness and trust in Ojibwe leaders that just might be a bridge reconnecting peoples estranged by the traumas of violence and misunderstanding. Its foundations rest on the simple expedient of listening, which informs Medina’s community-based participatory research. “Students like Sheyla are so polite and so humble and so respectful,” he says. “Native people like Larry Aitken and Dr. Meness feel that the historical moment has come when they can tell their stories in order to heal historical wounds.”

Visit the Digital Partnerships with Indian Communities website at www.sas.upenn.edu/dpic/.

—PN
Even for medical researchers, a lot of information can sometimes be too much of a good thing. “As in so many aspects of life, biomedical research is increasingly dominated by data,” observes David Roos, the E. Otis Kendall Professor of Biology, “more and more, larger- and larger- scale datasets.” The average person looking for everyday sorts of information has online resources like Google and Wikipedia to narrow things down. But what about the microbiologist trying to create a vaccine against a new variety of tropical disease?

Now, thanks to Roos and his collaborators at Penn and the University of Georgia, scientists from all over the world can turn to the Eukaryotic Pathogen Genome Database Resource, a sophisticated bioinformatics resource accessed through the Internet. The database (EuPathDB for short) is the result of an investment of more than $20 million from the National Institutes of Health, the Bill & Melinda Gates Foundation, the Burroughs Welcome Fund and others. The team of genomics scientists responsible for this resource was recently awarded an additional five-year, $14.6 million NIH contract to expand and extend their database activities.

Genomic data on a disease organism is of crucial importance to scientists. The expression of various genes of the organism at different times in its development can provide vital clues to how it causes disease and how it might be stopped. But the fully sequenced genome of even a single strain of a pathogen is a vast amount of information, much of which may be irrelevant to a researcher who’s concerned only with, for example, the interactions of the pathogen with a certain drug.

Because it’s not merely an encyclopedia or catalog but a full-fledged database, EuPathDB allows scientists to query the genomic data according to their particular needs. Roos explains, “I might want to, say, find plant-like genes in malaria parasites that are turned on at a particular time, and somebody else might want to find genes involved in sugar metabolism in tuberculosis bacteria that are expressed only in the lungs of infected patients.” EuPathDB is based on the idea that, as Roos puts it, “The same tools could be used by people who might want to ask completely different questions.”

Roos and his research team began developing the database in 1995 to support their study of the parasites that cause toxoplasmosis, but they soon realized the concept could be expanded to encompass information on other pathogens. That led to a pilot project to integrate genomic datasets for malaria parasites, which was later expanded to create several other bioinformatics data-resource centers. Last year, Penn won the contract for EuPathDB, which Roos directs. “We proposed expanding this still further to support all eukaryotic pathogens, that is, all single-celled nucleated organisms including organisms as diverse as the parasites that cause malaria, toxoplasmosis, sleeping sickness and so on.”

Open to all researchers, the database receives at least 7,000 hits a month from over 100 countries worldwide. Currently, EuPathDB contains data for almost 30 different organisms, with more being added. “It’s to everyone’s benefit to have all of this information available,” Roos states. That total accessibility will allow EuPathDB to fulfill its promise as an important tool in the fight against the world’s infectious diseases.

—Mark Wolverton
Economics of Peer Pressure

With teen pregnancy up for the first time in a decade and the Obama administration eliminating federal funding for abstinence-only sex-education programs, intense debates abound over how to delay and reduce teen sexual activity. Economics doctoral student Seth Richards is bringing a new perspective to how teen peers influence sexual activity with research that defines these social interactions in terms of supply and demand.

Richards identifies demand as the decision to search for a sexual partner as influenced by peer norms—or the fraction of a student’s same-sex, same-grade peers who are sexually active. Supply is the availability of opposite-sex partners—or opposite-sex members in a student’s school who are seeking to become sexually active. Using the economics framework of search and matching, Richards has developed a model that can quantify the distinct impacts supply and demand have on teen sexual activity.

Using this model, he analyzed data on teen sexual activity from the National Longitudinal Study of Adolescent Health, which provides a nationally representative sample of U.S. high school students from the mid-1990s. He found that peer norms have a large effect on the timing of sexual initiation for both male and female students but that the effect is 50 percent greater for boys than for girls. Richards also discovered that increases and decreases in partner availability respectively increase and decrease the rate of sexual initiation for boys. However, availability does not significantly impact the sexual initiation rate for girls.

“One conclusion,” Richards says, “is that boys seem to be more susceptible to these social mechanisms, whether it’s the norms among their same-gender peers or the availability of partners. To the extent that people are thinking about interventions that work through social mechanisms, they should consider specifically how they’re targeting boys.”

Disciplines like psychology and sociology are best equipped to delve into how and why social interactions work the way they do, but Richards believes that the tools of economics are particularly good at isolating and measuring the impact of specific factors on social issues. “The clarity that comes from trying to have a formal model for the behavior you’re studying forces you to be clear about the factors you think are involved,” he says. “It also encourages you to limit the number of factors you’re examining. Because you want to articulate mathematically how they work, you have to become very clear about what they do.”

Richards, who will join the Heinz College at Carnegie Mellon University as an assistant professor this fall, is currently examining the impact of social norms on teen contraceptive use. His future research plans include studying network influences on medical decision making among both patients and doctors.

— PR
Penn’s Laboratory for Research on the Structure of Matter (LRSM) has launched a one-of-a-kind research alliance with leading scientists in the field of soft condensed matter. Called COMPASS (Complex Assemblies of Soft Matter), the partnership will bring together the resources of LRSM with the international chemical producer Rhodia and the French National Center for Scientific Research.

“The COMPASS collaboration initiates a symbiotic relationship among some of the very best soft-materials people worldwide in academia, industry and government,” says Arjun Yodh, the James M. Skinner Professor of Science and LRSM director. Soft condensed matter is a science that draws on chemistry, biology, physics and nanotechnology to study materials like colloids, polymers, foams and gels, which exhibit properties that lie between hard solids and traditional liquids. The COMPASS network will bring together up to 20 world-class scientists with complementary expertise for understanding, manipulating and creating new soft materials. “At the LRSM,” Yodh continues, “faculty will be presented with new opportunities to connect our fundamental, cutting-edge research to problems of commercial and global importance.” He also expects that students and postdocs will benefit from this unique association of researchers.

Initial projects will explore renewable and sustainable ingredients for consumer products in home and personal-care markets. COMPASS scientists will also work on sustainable technologies for lubricants, novel printable-electronics solutions, materials for water retention in agriculture and more.

“Our research collaborations have always benefited from a multidisciplinary approach,” says Yodh. “I am not aware of any similar programs among universities, the commercial sector and government. We are creating a new research paradigm that others may follow.”

—PN

**COMPASS Points to New Directions**

**Make Your Own Kind of Music**

Faculty and alumni composers from the Department of Music were singled out for a number of prestigious awards last spring. James Primosch, G’80, the Robert Weiss Professor of Music, was honored for outstanding artistic achievement with an Academy Award in Music from the American Academy of Arts and Letters. Composer Pierre Jalbert, G’92, Gr’93, a graduate of Penn’s composition program who teaches at Rice University, also received an Academy Award. Alumna Jennifer Higdon, G’92, Gr’94, one of America’s most frequently performed composers, was recognized for distinguished musical composition with a Pulitzer Prize and a Grammy. The Pulitzer was awarded for “Violin Concerto” and the Grammy for “Percussion Concerto.” Legendary composer and Penn music professor emeritus George Crumb was a Grammy finalist along with Higdon for the best classical contemporary composition.

Pulitzers and Grammys and other prizes are nothing new for the music department. “I don’t think it signals any kind of high-water mark,” observes Primosch. “It’s more part of an ongoing tradition of excellence here.” His most recent composition, “Songs for Adam,” was performed last fall by the Chicago Symphony Orchestra.

A leading 20th-century composer, George Rochberg became department chair in the 1960s. He recruited faculty and shaped a program that formed a generation of composers. “When Rochberg got the modern Penn music department going, he hired wisely when he hired future Pulitzer winners George Crumb and Richard Wernick to join him on the composition faculty,” says Primosch. “We had these three extraordinarily strong composers, and they attracted strong students.” As a Penn grad student himself, Primosch studied composition under Crumb. Jalbert and Higdon also learned from Crumb and were among Primosch’s first students when he moved onto the faculty.

“The long, distinguished history of composition at Penn is studded with successes like those enjoyed this year by Jalbert, Higdon and Primosch,” notes department chair Jeffrey Kallberg. “We’ve seen so many gifted young artists take the training they receive from our faculty and excel in the wider world. And our faculty repeatedly finds new ways to craft deeply moving works of music that compellingly speak to contemporary aesthetic issues.”

—PN
Twenty years ago, when researchers in what is now the Positive Psychology Center created a course to help school children bounce back from adversity, they weren’t envisioning a military audience. But since 2009, the U.S. Army has sent soldiers here each month to learn how to cope with the mental challenges of armed conflict—and how to share these coping skills with others.

This resilience training program is a cornerstone of the Army’s new Comprehensive Soldier Fitness initiative to help soldiers and their families weather the financial, emotional and psychological stresses of repeated deployment. It uses principles of cognitive-behavioral therapy, which involves challenging one’s inaccurate thinking, to help participants make better decisions, communicate more effectively and deal with difficult situations.

The training is modeled on the Penn Resiliency Project, a ground-breaking intervention for middle schoolers susceptible to depression spearheaded by psychology research associates Karen Reivich, C’88, G’92, Gr’96, and Jane Gillham, G’90, Gr’94, and funded by $10 million in grants from the National Institute of Mental Health since 1990. Working from the then-revolutionary premise that psychology could prevent disorders rather than merely treat them, they developed a resilience course that taught students to identify inaccurate thoughts, dispute negative beliefs and solve problems. They found participants experienced significantly less depression and anxiety and fewer conduct problems. Subsequent studies have shown the effects to be long-lasting.

Army Chief of Staff General George W. Casey Jr. has called CSF “one of the most important programs the Army has introduced in a long time.” The initiative stems from a 2008 meeting during which Casey asked center director Martin Seligman, the Zellerbach Family Professor of Psychology, how the Army could help the growing number of soldiers struggling with depression, substance abuse, marital difficulties, posttraumatic stress disorder and suicide. “I thought that was the tail wagging the dog,” says Seligman, the principal investigator for the NIMH grants. He instead encouraged the general to help soldiers become psychologically stronger before they could develop these conditions, comparing it to sending troops into a malaria-ridden area. “You wouldn’t wait for them to get malaria and then treat them,” he says. “You’d clear the swamps, provide mosquito-netting.”

The soldiers, many initially skeptical, have found the training useful. Seligman says one participant told him, “If I had known this stuff three years ago I would not be divorced right now.”

Lead trainer Reivich worked with the Army for months to tailor the training for soldiers and their families and calls it the most gratifying teaching she’s done. “Although this program is for soldiers,” she says, “the bottom line is that what we teach … are life skills that should help anyone cope with stress, have strong relationships and maintain their resilience throughout difficult times.”

Approximately 1,000 have received the training. With the center’s help, the Army opened a master resilience training school at Fort Jackson, S.C., in April and aims to have a resilience trainer in every battalion by the end of 2010 and eventually to train its entire force of 1.1 million.

—Tracey Quinlan Dougherty
The summer of 2009 brought unanticipated turmoil to Iran. For weeks, women and men took to the streets to challenge the June 12 elections, giving rise to the most significant uprising in the country since 1979. They unleashed a “Twitter” revolution and showed the world that turbans and veils can mask savvy rebels capable of outsmarting even the most cunning censors in the Islamic Republic.

The protestors heard calls for solidarity from unexpected quarters. Joan Baez recorded a Persian version of “We Shall Overcome,” and Jon Bon Jovi and Richie Sambora partnered with Iranian singer Andy to record a Persian-English rendition of the classic tune “Stand by Me.”

Now that the initial protests have ended, ordinary Iranians have hardly put their disenchantment behind them. How can they? Journalists disappear without just cause. Others are detained and taken to the notorious Evin prison for questioning and torture.

What role, if any, should the United States play? History can offer some signposts. To make sense of contemporary Iranian politics, American policy-makers must recognize that three themes have animated modern Iranian history: freedom, frontiers and foreign intervention.

FIGHT FOR FREEDOM

In 1906, Iran inaugurated its first parliament. Unfortunately, this first experiment with democracy came to a halt in 1911, when a Russian invasion rang the death knell for constitutional rule.

During the next round of parliamentary politics, Muhammad Musaddiq, the popularly elected (1951) prime minister, led a campaign to nationalize Iranian oil. His status swelled to heroic proportions, and Time magazine grudgingly named this “strange old wizard who lives in a mountainous land” its Man of the Year.

Then came the coup of 1953. The CIA ousted Musaddiq, propped up the Shah’s puppet regime and turned a blind eye to human rights abuses. Within days, all had changed. Musaddiq was placed under house arrest, while the Shah organized his CIA-trained secret police, the SAVAK, and paid lip service to the parliament.

In 1964, Ayatollah Ruhollah Khomeini, a little-known religious figure, delivered an incendiary speech from his pulpit, casting the Persian parliament for granting diplomatic immunity to the United States. His sermon struck a chord with critics of the regime. In response, the Shah silenced Khomeini by sending him to Iraq.
where he hoped the cleric would remain immured behind the gilded exteriors of the Shi'i shrines.

In 1979, Iranians spoke out against the impact of Western imperialism, directing their anger largely against the United States. But many soon felt betrayed by the Islamic Revolution as they watched their civil liberties slip away. Again, the public failed to put in place a government accountable to the people. Despite this history of authoritarianism, Iranians have not renounced their pursuit of freedom. Nor should they.

**FRONTIER SECURITY**

Democracy in Iran is impossible without some measure of frontier security. Home to various ethnic groups, Iran has confronted many separatist movements in its modern history. The instability of frontier life creates real security threats. This point was most recently demonstrated in the Iran-Iraq War of 1980-1988, an internecine conflict that cost many lives and changed little. A nuclear Pakistan to the east has also heightened instability in the borderlands. Pakistan's nuclear test site in 1998 was the Baluchistan desert where separatist movements brought the region under the scrutiny of Iran's central government.

That the U.S. military has virtually surrounded Iran poses a formidable threat that cannot be underestimated. Whatever Iranians may think about President Ahmadinejad, the public overwhelmingly supports his push for nuclear energy. For many, it is a national right. This is not to suggest that Iranians support the acquisition of nuclear energy so that Iran can launch nuclear war against its neighbors. On the contrary, most are weary of war, but Iranians do not wish to feel technologically impotent, especially when nearby countries such as Russia, India, Pakistan and Israel all have nuclear weapons.

Although Iran has tried to stabilize relations with neighbors, it cannot eliminate disturbances that have come to characterize frontier life. The presence of American troops along Iran's borders complicates that puzzle. Rumors of an impending Israeli (or U.S.-Israeli) attack may seem far-fetched to some, but they make others edgy.

**COSTS OF FOREIGN INTERVENTION**

Americans may find it surprising to learn that they were a source of inspiration for Iranians at the turn of the last century. Before President Barack Obama, another American statesman had already won Persian hearts. In 1905, a year before Iran's tumultuous constitutional revolution, a Persian newspaper serialized a biography of George Washington. Described as a brave "nationalist" who had strived for his country's freedom, Washington became a political paragon for Iranian constitutionalists.

Back then, as today, many Americans sympathized with the political struggles of ordinary Iranians. In fact, the American hired at that time to become Iran's treasurer general, Morgan Shuster, wrote a book, aptly titled *The Strangling of Persia*, about the harms of foreign intervention in Iranian affairs. Almost a century has passed since Shuster's mission. What can be gleaned from this troubled history?

While orchestrating regime change—even if desirable—would be problematic in the long term, American diplomats can instead support the Green Movement and Iran's opposition leaders, given that many are regime insiders themselves. Despite their ideological differences, Khamenei, Rafsanjani, Khatami and Mousavi are all sons of the revolution. They can prove effective allies in putting pressure on President Ahmadinejad to meet the demands of the Iranian people.

Faced with economic stagnation, security threats and wide-scale domestic unrest, the government has its hands full. Ahmadinejad's position remains weak even after the arrest of key dissident intellectuals. What's worse, he needs the acquiescence of the senior politicians, some of whom have worked hard to oust him from office.

The best way for the United States to express solidarity with the Iranian people is through an embrace of Persian democracy. As Shuster recognized more than a century earlier, “The Persian people gave to the world an exhibition of temperance, of moderation, of stern self-restraint the like of which probably no other civilized country could show under similar trying circumstances.” Shuster's words could not hold more true today.

_Firoozeh Kashani-Sabet is an associate professor of history and director of the Middle East Center. She is completing a book entitled The Making of the "Great Satan": A History of U.S.-Iranian Relations._
To the agriculturally uninitiated undergraduates in biology professor Scott Poethig’s DNA, Diet and Disease course, a sunny spring day at Penn’s Marshak Dairy seemed, at first, as idyllic as an English pastoral painting. But then the plastic booties appeared. As the students slipped them on in preparation for their tour, one tentatively queried, “Are we going to be walking in squishy stuff?”

“Maybe,” answered dairy coordinator Darren Remsburg with a semi-straight face. This was, after all, a working farm in addition to being a research facility, and Poethig’s class was going to see what that really meant. That afternoon, they watched an enormous cow heaving in labor, learned to identify the breed of a wobbly-kneed calf and marveled at the high-tech automation of the afternoon milking.

According to the syllabus, the aim of DNA, Diet and Disease is to “present major themes in biology by examining the nature of food and the ways in which humans modify, and have been modified by, the organisms we eat.” It’s the brainchild of Poethig, who devised it to teach what he calls “stealth biology” to nonscience majors and also to serve as a gateway course for freshmen into numerous areas of inquiry. “If there’s an interdisciplinary topic, it’s food,” he says. “My goal is to use food as a way of broadening students’ perspectives on the intricate interactions that are involved in providing us nutrition.”

Poethig covers topics ranging from the chemistry, structure and physiology of plants to the genetics of domesticated organisms to farm ecology and the place of agriculture in the global economy. The dairy tour was part of a lesson on the evolution, breeding and utilization of livestock. This and other field trips, along with in-class demonstrations that include making cheese to explore the chemistry of milk and hands-on lab experiments, augment Poethig’s lectures by rendering food production less opaque.

“It’s often like smoke and mirrors—the techniques by which our food is produced,” he says. “When you see what’s actually happening, it’s completely amazing.”

Nathaniel Foulds, C’10, especially enjoyed an experiment in which students tested food they brought in for genetically modified ingredients. “It was pretty advanced lab work,” he explains, “and since the majority of the soy and corn grown in the U.S. is genetically modified, the experiment was really relevant to our everyday lives.”

Students also pursue semester-long projects. Last spring’s included planting a vegetable garden, teaching local high school kids about using nitro-
gen-fixation to produce environmentally friendly fertilizer and researching topics ranging from international food aid to hydroponics and food supplements. Some of the projects are extending beyond the course. The group working on the vegetable garden will be harvesting crops throughout the summer. And junior Debbie Schub’s project of working with Penn’s food provider to source foods more locally will culminate in this fall’s New Student Orientation barbecue.

Poethig acknowledges that food has become a hot—and highly politicized—topic. Some of his students read Michael Pollan’s bestseller *The Omnivore’s Dilemma* as their freshman reading project and cited the book as an influence in their decision to take the class. But he explains that the goal of the class is not to promulgate a particular view on the topic but rather to give students a full sense of its complexity so they can make up their own minds. It’s a lesson Schub has taken to heart.

“We learned about the science of genetic modification,” she says, “and I now understand that the end result of genetic modification can essentially be identical to that of natural selection—an adjustment in the DNA sequence of the plant. Given the choice, I’d still pick Mother Nature over human intervention, but I’m starting to see things in less of a black-and-white way.”

Penn’s Marshak Dairy has about 180 milking cows that produce 1,500 gallons of milk each day.
Naming What Ails Us

MEDICAL HISTORIAN DIAGNOSES THE SOCIAL CONSTRUCTION OF CANCER

BY PETER NICHOLS
PHOTOGRAPHY BY LISA GODFREY

What’s in a name?

If you were to ask medical historian Robert Aronowitz that question, he’d likely tell you, “Everything.” When it comes to getting a diagnosis for a disease like cancer, he says, a whole train of connotations and assumptions and fears comes roaring down the track at you. Much of its freight of meaning had already been loaded and set in motion by centuries of healers and sufferers facing the malady. The social context shaped by that past, he contends, frames our present outlook on cancer and how we try to prevent or cure it.

It seems an odd way for a doctor to talk about sickness. Aronowitz had been a practicing internist and clinical teacher for 10 years at Cooper Medical Center in Camden (N.J.) before coming to the Department of History and Sociology of Science a decade ago. We typically think of cancer as a biomolecular affliction—errant cells and malignant tumors—with a natural history that doctors summon up to explain the pathology and formulate a prognosis. And there are boxcars of data that the stricken can draw on to make informed decisions about treatment.

What’s in a name? Aronowitz might also respond, “Nothing.” Names and categories help us organize and make sense of the world. “They’re useful fictions,” he notes, even if they sometimes name a condition that can kill you. What we call “cancer” is as much the outcome of the “social construction of disease”—changing diagnostic and screening practices, norms for labeling it and prevention messages—as it is a biological object that’s “out there” waiting to be diagnosed. It’s part natural process and part unnatural accretion of meaning built up in our social memory and institutions by past experiences, understandings and choices. The word “cancer” is just an empty train whose semantic cargo gets loaded aboard as it journeys through time.
“Everything” and “nothing” are perhaps terms too crude to capture Aronowitz’s thinking about health and illness. “Disease concepts are contingent upon, not reducible to, social factors,” he specifies. He’s fond of toning down statements with qualifications like, “it doesn’t capture all the complexity but … .” To his mind, it’s as much the uncertainty as the knowledge that should inform how we think about disease and ambiguous stage.” Doctors and scientists don’t really know which, if any, of the so-called “pre-cancers” will develop into metastatic disease, he says, but the word still bears the heavy baggage of fear and fatality that has long burdened it. Today, when a pre-malignant condition is diagnosed, aggressive surgery and chemotherapy often treat the risk of future disease—or maybe they are remedies aimed at fear. “We keep applying the word ‘cancer’ to a lot of things that may not be destined to harm us,” he remarks. “So it might be helpful if the word wasn’t in people’s heads when they have to make decisions about what to do when diagnosed.”

Before he went to Yale medical school, Aronowitz “got seduced by linguistics” and did several years of graduate study at Berkeley. As a medical student, rather than acceding to the usual biomedical strictures, he was preoccupied with the complex ways new diseases get negotiated. “It was my background in linguistics that allowed me to go through medical training with an eye toward how we name and classify things, and to question the assumptions people make,” he says. The received beliefs that doctors hold to—in order to practice medicine—would catch and unsettle Aronowitz and start him down some track of reflection that ended up as an essay or a book. “To be honest,” he comments, “it almost always began with something in my medical training or practice that annoyed me—something that seemed just not right.”

He calls it his “Clark-Kent/Superman life”: doctor in a white lab coat by day; tweedy medical historian by night. It’s an imperfect metaphor—he can’t say whether healer or scholar is the superhero—but it suggests how each persona is whispered to from behind by an expert or skeptic secret identity. “It’s much more interesting and challenging to think about how something hard and real like cancer is framed by social forces,” he says. “Cancer is so self-evidently a biological process that a
lot of people shy away from applying a social-historical approach. It's a third rail, and they're afraid to get burned by doctors who 'really know' what's going on. That's the area I flourish in."

The first book he authored was Making Sense of Illness: Science, Society and Disease, a collection of essays and case studies about how we recognize a new disease, label it and drop the name into some familiar category of medical knowledge. He was still a practicing clinician and a night-shift medical historian when he penned it. "On the wards," he wrote, "I was enthusiastic about finally taking care of patients, but I sometimes felt alienated by the medical culture of which I was rapidly becoming a member."

By the time he wrote his next book, Aronowitz had flipped identities from physician to full-time scholar. Unnatural History: Breast Cancer and American Society looks at the historical momentum that had built up over 200 years of mostly private suffering and medical care, which now structures our very public experience and fear of increased breast cancer risk.

Starting in the 1930s and 40s, more and more cancer was turning up. But the headline-grabbing statistic that reports one in eight American women will be diagnosed with breast cancer, he cautions, is not a simple indicator of more and worse disease. Reliable figures for breast cancer have been kept since the 1930s. When adjusted for aging, the breast-cancer mortality rate remained constant from then until 1990, when it declined.

Aronowitz is a numbers guy, and those statistics bothered him. "How could we have this incredible increase in the number of people labeled with breast cancer without an impact on mortality?" he wondered. It could be that medical progress—early detection and better treatment—added a counterbalance to increased disease, yielding a "mortality standoff," he reasoned. "A more economical explanation is that we have detected a large amount of disease not destined to seriously harm or kill and, until quite recently, have not made significant progress in treating cancer."

Unnatural History casts breast cancer as a contentious and unstable entity, subject to changing values, beliefs, interests and practices. The book tells the story of change in the lived experience of and ideas about cancer: the rise of aggressive surgery and the backlash against disfiguring radical mastectomies, the development of ever more sensitive detection devices and the emergence of early screening, and today's highly fraught collective obsession with risk. So deep is "cancer fear" that many more women are seeking surgery for various states of cancer risk, he argues. Some are having their healthy breast removed along with the malignant one (a 150 percent increase over seven years) even though there are few data on the survival benefit of such aggressive approaches.

Aronowitz and other medical experts maintain that widespread use of screening mammography has yielded a dramatic increase in the number of cancers found, although there's significant "semantic slippage" in a term like "pre-cancer," which categorizes as "cancer" aberrant cells whose future malignancy is uncertain. Together with awareness campaigns trumpeting a pestilence of "women at risk" and calling for constant surveillance and aggressive treatment, these social forces all stoke the fires of cancer fear, a runaway train whose bell clammers for even more surveillance and more aggressive treatments for all stages of disease.

The rails on which the train is running were laid down in the past. "So many of our present dilemmas have their origins in past choices and commitments," he states. "It's the overall momentum of our historical experience that we're living with—technology we've developed, public messages we've decided to put out and labels we've given to things."

According to Aronowitz, changing direction is not a simple matter of doing more studies and parsing more data. Last fall, the United States Preventive Services Task Force recommended that women begin regular breast cancer screening at age 50 rather than 40, a stark breach of the received wisdom of early detection. The task force did not deliver new advice but a second medical opinion. In 1977, the National Institutes of Health became concerned that young women were getting too much radiation. With little evidence that screening younger women saved lives, the NIH called for them to wait until 50 or older before starting regular mammography screenings.

In "Addicted to Mammograms," a New York Times op-ed piece, Aronowitz observed, "You need to screen 1,900 women in their 40s for ten years in order to prevent one death from breast cancer, and in the process

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The story of immigration in America is a complicated one. Nostalgic, sepia-tinted images of a welcoming Ellis Island symbolize an era long past. Today, concerns about security and the economy are asserted by the wire-and-steel wall along the United States-Mexico border, a stark emblem of immigration in the 21st century.

For migrants themselves, immigration is likewise a complicated story. However great the opportunity, migrating can impose a formidable cost, including separation from loved ones, isolation from expanded networks of friends and relatives and the loss of a cultural context.

Emilio Parrado has spent more than 10 years exploring migration’s disruptive effects. Parrado, a professor of sociology who came to Penn in 2008 from Duke University, has focused on Hispanic immigrants residing near Durham, N.C.—a group that is primarily Mexican and largely undocumented. A demographer by trade, Parrado’s statistics tell a nuanced story of what happens when people leave their homelands.

Between 1990 and 2000, close to eight million Latin American migrants entered the United States, nearly doubling the number of foreign-born Hispanics in the country. Mexico alone provided more than half of the new arrivals. In North Carolina, Parrado says, “The Latino population exploded in the 1990s.” The majority of these immigrants are men, mainly young single men and married men who leave their wives behind.

This large influx of recent migrants, according to Parrado, presented an exceptional opportunity to observe the ways immigration affected them.
As migrants adapt to their new home over time, identifying and isolating the immediate impact becomes more difficult. Among the impacts associated with immigration are behavior changes with health consequences, including alcohol use, depression and risky sexual behavior.

In 2006, Hispanics represented only 15 percent of the U.S. population but 19 percent of all people with AIDS. Hispanics contracted HIV through heterosexual transmission at twice the rate of non-Hispanic whites. In North Carolina, Hispanics accounted for 59 percent of HIV infections among foreign-born residents from 1998 to 2007. For other sexually transmitted infections, the numbers are even more dramatic: Hispanics in the United States were diagnosed with 10 times as many new syphilis cases as non-Hispanic whites.

To understand the behaviors in migrant communities that might account for these disturbing numbers, the first step is the hardest: gaining sufficient access to ask questions. As Parrado notes, “Low-skilled immigrants who come to the U.S. are very difficult to study. It’s difficult to reach them. They have recently arrived; they don’t speak English; they are undocumented for the most part—it’s like they live in shadows.” In situations like this, standard survey methods have little to offer.

To overcome these obstacles, Parrado and his colleagues built an inside team—a group of 14 Hispanic men and women who were active with organizations in the immigrant community. All migrants themselves, members of this group were involved in all aspects of the research, from developing the questionnaire to locating buildings where migrants lived and conducting the surveys. Their involvement was critical in getting information. Parrado acknowledges that “everything from their local knowledge to their style of dress made respondents more likely to open up.”

The approach was productive. Parrado and his colleagues were able to obtain detailed information about many aspects of migrants’ lives in the United States, including behaviors like the use of a commercial sex worker (CSW). (“Commercial sex worker” is the more neutral term for “prostitute” preferred by researchers and health workers.) It turns out that using CSWs is common among migrants and takes various forms: visits to brothels, encounters with workers who make visits to apartments where migrants live and encounters with streetwalking CSWs. Each of these situations is associated with its own degree of HIV risk. Encounters with apartment-visiting CSWs, a category less widely documented prior to Parrado’s work, involves less risk than with “streetwalkers,” who are more likely to be intravenous drug users and to engage in unprotected sex.

Parrado noted a number of factors that seem to promote CSW use. The skewed gender composition of the migrant community is an important one. Fewer women means that men’s opportunities to form stable relationships are limited. Isolated neighborhoods, communities with a higher proportion of recent migrants and neighborhoods that are run down all are related to higher CSW use. Parrado also noted a CSW lifecycle of sorts, where use increases during the first years after migration, peaks at around four years and then declines slowly as migrant men form more social bonds and attachments.

In addition to surveying migrants in Durham, Parrado conducted surveys in eight “sending communities”—the Mexican towns of origin for many of the migrants in the Durham area. The data from these surveys provide a baseline for understanding how migrants would likely have lived and behaved had they never left home. In this way, the researchers were able to hone in on how immigration affects sexual behavior.

With respect to commercial sex, Parrado and his colleagues found that use is dramatically more prevalent among Mexicans in the United States than among their peers in Mexico. Only five percent of single men visited a CSW in Mexico during the previous year, compared to 55 percent of single men and 44 percent of married men living away from their wives in the United States. Based on these results, Parrado was able to conclude that “risky sexual practices are not behaviors they bring
However great the opportunity, migrating can impose a formidable cost.

From Mexico.” Instead, he maintains, the risky behaviors result from the breakdown of processes responsible for social organization and control. It’s the different social context. In place of communities with extended families and established social norms, you have, as Parrado characterizes it, “young men living by themselves in an apartment without supervision, without contacts with relatives or female members of the family.”

The findings on sexual behavior, Parrado says, have implications for public policy. The fact that men can’t bring their wives when they migrate, or cross the border

Immigrant Girl Interrupted

Migrating to the United States presents an opportunity for women to rewrite the roles that define them in their traditional communities at home. That, at least, is one theoretical construct for predicting how immigration may change the lives of women who cross the border. The reality, it turns out, is not so simple.

Sociologist Emilio Parrado, along with his colleague Chenoa Flippen, sought to understand attitudes and behaviors among migrant Mexican women in stable relationships in Durham by comparing them to their counterparts in Mexico. What they found was that in relationships with men, according to Parrado, “the conditions that women face in the U.S. do not automatically translate to an empowered position.” Instead, migration may either mitigate or reinforce gender inequality, depending on a range of variables including job opportunities and the degree of social isolation. In many cases Mexican women in the United States become even more traditional and dependent upon their husbands than peers in Mexico.

Recognizing the disruption of immigration is key to understanding the variability of its impact on gender roles. Parrado and Flippen note that “migration is inherently disruptive of social bonds and networks, and … tends to increase the dependence of husbands and wives on one another. Precarious legal status, unfamiliar work conditions and lack of social support can undermine women’s well-being and power in their relationships.” In managing the pressures associated with social class and undocumented status in the United States, the researchers speculate that “women may tolerate household inequalities perceived as unnecessary or unjustified in Mexico.”

—LT
In March 2009, at a White House conference on health care, President Barack Obama claimed, “Since Teddy Roosevelt first called for reform nearly a century ago, we have talked and we have tinkered. We have tried and fallen short; we’ve stalled for time, and again we have failed to act because of Washington politics or industry lobbying.” We need to look no further than the protracted and heated debate over health care reform in which the country has been embroiled over the past year for proof that health care is political—rife with issues of power—as much as it is about medicine or economics. Nevertheless, the subject is relatively under-studied in the field of political science, says Julia Lynch, the Janice and Julian Bers Assistant Professor in the Social Sciences.

One reason for this, she believes, is that health care is wrapped up in policy, and over the past few decades, policy studies have taken a back seat in the discipline. “Political scientists are supposed to study abstract questions,” Lynch explains. “But increasingly we understand that power relations in society are central components in shaping people’s health and the delivery of health care. It’s the role of political scientists to unveil the power relations that lie behind the things we encounter every day.”

Since joining Penn’s political science faculty in 2001, Lynch has developed a body of research on the politics of health in advanced industrialized countries that both assesses nitty-gritty policy challenges—such as the impact of foreclosure on homeowners’ health (see sidebar)—and explores big concepts such as inequality and justice. Currently, she is completing a study on the American public’s attitudes toward health care inequalities. She wants to figure out which inequalities we consider natural or unproblematic and which ones we find profoundly unjust and what the implications of those perceptions are for health care policy.

Lynch has had a lifelong interest in questions of justice and fairness. “I’m the youngest child of three, so that probably has something to do with it,” she jokes. “Some of this might also come from being raised in a
nonreligious household. Because we didn't have that background telling us what is the right thing to do or the right way to treat people, standards of fairness were the standards we would hold ourselves to, and we had to figure those out for ourselves.”

By the end of freshman year at Harvard, Lynch was known among her peers as the “Justice Queen” for her passionate classroom discussions in a popular large lecture course on political theories of justice. She went on to earn her Ph.D. at the University of California, Berkeley, where she trained as a Europeanist, in part because she felt that political science research on the United States had become highly technical, centered on examining issues like voting or legislative behavior through statistical analysis.

**“Looking at health inequalities is an amazing way to explore how our society generates inequality.”**

“Political scientists who worked on Europe,” she says, “studied the stuff I was interested in, like the welfare state, labor parties and social mobilization around issues like wages and benefits. I felt like I couldn’t do this in American politics, even though sociologists, historians, economists, were looking at these very subjects.”

Lynch has since published extensively on the politics of inequality, social policy and the economy in Western Europe, and her book *Age in the Welfare State: The Origins of Social Spending on Pensioners, Workers, and Children*, was co-winner of the 2007 prize for the best book on European politics from the American Political Science Association. Although the United States was one of the countries she examined in that book, her health care research marks the first project in which she has ventured far into the terrain of American politics. The subject of health and health care, Lynch believes, provides especially fertile territory to glean insights into her longstanding questions about redistributive justice and beliefs about fairness.

“About 15 percent of variation in mortality is attributable to differences in health care,” Lynch says. “Apart from natural differences in human biology, the rest of that variation in mortality comes from the social circumstances people find themselves in. Looking at health inequalities is an amazing way to explore how our society generates inequality, and the health care piece is one way to deal with this inequality on the back end.”

With funding from Penn's University Research Foundation and an Investigator Award from the Robert Wood Johnson Foundation, Lynch designed and conducted a nationally representative, Internet-based survey. In one part of the survey, respondents were presented with a series of vignettes about inequalities in health status, health care access and health care quality. They were then asked to evaluate the fairness of the inequalities, to state their opinions on health care reform proposals and to choose a definition of fairness that resonated with them.

In a paper forthcoming in the *Journal of Health Politics, Policy and Law*, Lynch and co-author Sarah Gollust present findings that more than 70 percent of survey respondents thought that inequalities in access to health care and quality of health care were at least somewhat unfair—no matter the social group affected by these disparities. These perceptions of fairness strongly influenced their opinions about whether government or the private market should be providing health insurance, regardless of other influences on policy opinions, such as self-interest or political orientation. The more unfair respondents found health care inequalities to be, the more they supported government intervention.

However, Lynch also found that only 31 percent of respondents found inequalities in life expectancy to be unfair. These evaluations did vary depending on the social group presented in the survey vignettes—differences across groups defined by income were rated the most unfair, while those across racial and educational groups were rated more unfair than gender-group differences. Respondents’ beliefs about the fairness of life expectancy inequalities did not directly influence their opinions about health care policy.

A second paper that Lynch and Gollust just completed reveals that beliefs about personal responsibility play a key role in generating the public’s health policy preferences. For example, survey respondents’ perceptions of whether people’s behavior contributes to their own health outcomes—perceptions that were manipulated experimentally within the survey—strongly determined their beliefs about whether or not society should play a greater role in paying for health care. In a different vignette, survey respondents were allowed to make up their own minds about the likely contribution of personal behaviors versus other
contributors to health outcomes. Lynch and Gollust found that the social group described in the vignette (African Americans, low-income earners, people with less than a high school education or men) strongly influenced how much weight respondents accorded to personal behaviors as opposed to failures in the health care or economic system, or biological differences.

“On one hand,” Lynch says, “Americans are generally not blaming racial minorities for their worse health, which, given the amount of influence these beliefs about personal responsibility have, is good news. On the other hand, we’re seeing a potential biological reification of racial difference that may also lead people to perceive that racial disparities in health are inevitable. We can’t identify who’s to blame and there’s nothing we can do about them.”

Lynch continues to puzzle over why respondents find some inequalities to be morally unjust and worthy of social intervention and others to be inevitable or even deserved—particularly when it’s clear from a sociological perspective that many of these disparities overlap. However, her findings do make the case that politicians and policy advocates who are interested in health care reform can better mobilize public support if they make the moral case for it. This goes counter to conventional wisdom—employed by Clinton and Obama administrations—to appeal to individual

“Survey respondents’ perceptions of whether people’s behavior contributes to their own health outcomes strongly determined their beliefs about whether or not society should play a greater role in paying for health care.”

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“I stick out like a sore thumb in the biology department,” admits Joshua Plotkin. That’s because he’s a theoretician in a field that’s traditionally relied on fieldwork and laboratory experiments. Most of his work is done with a piece of chalk and a blackboard or even just pencil and paper. Yet with those simple tools, he’s trailblazing an entirely new direction in biology: applying mathematics to understand and explain the molecular workings of evolution, the guiding principle of all life.

Plotkin always liked puzzles—the more complex and convoluted, the better. He started out as a pure mathematician, the type who works on ephemeral questions far removed from the real world. “I wanted to work on the most abstract and esoteric puzzles that we could think of,” he says, “and it was exciting to me that they were intangible.” But while finishing his undergraduate work at Harvard, he had what he calls, quite seriously and without exaggeration, “an epiphany.” It was sparked by a course on evolution. “I’d had very little biology in college,” he recalls. “I didn’t really even know the details of the molecular basis of life, that there’s a DNA code and that strings of A’s, C’s, G’s and T’s encode proteins and that proteins are the building blocks of all life. It just struck me as completely impossible.

To Plotkin, it was the most fascinating puzzle imaginable. “The question of how all this diversity of life arose seemed to me such an obvious and interesting question, almost the central enigma that faces us as living organisms,” he says, excitement and wonder still catching in his voice. “So why not work on that?” A year abroad at Oxford, where he had the chance to meet some of the leading researchers in evolutionary biology, cemented his new direction. “I never had a second thought. I just realized that’s what I wanted to do.”

After earning a Ph.D. at Princeton, Plotkin returned to Harvard for postdoctoral work, then joined Penn’s faculty in 2007 to take up posts in both biology and computer science. He’s the Martin Meyerson Assistant Professor in Interdisciplinary Studies, an appointment...
very much in keeping with his untraditional background and the eclectic nature of his work.

For much of its history, biology has been largely a descriptive science, relying mostly on observations of living organisms and whatever experiments could be done in the laboratory. It lacked the mathematical rigor and predictability of the “harder” physical sciences. Plotkin observes, “I think the central problem for modern biologists, especially evolutionary biologists, is to be able to quantify our understanding, not of how life works in a mechanistic way, but more interestingly for me, how it evolves and how life forms change over time.” After the discovery of DNA and the subsequent ability to sequence genomes and read the genetic blueprint of a particular organism, he explains, “we had finally the ability to quantify the rates at which changes are occurring at the molecular level that are in the end responsible for the kinds of evolutionary changes that Darwin was describing in the 19th century on a more macroscopic level.” Plotkin was in the ideal place to join this renaissance in biology because his mathematics background is perfectly suited to exploring this new frontier of evolutionary science.

The main subjects of his work are microorganisms, particularly viruses, because their generation times and mutation rates are far higher than larger, more complex organisms. “That gives us the practical advantage of actually being able to observe the changes that occur over 10 years as opposed to over 10,000 years,” he notes. By tracking the changes that occur in the genome of a virus or a bacterium over generations, Plotkin can study the factors that affect its evolutionary path. The processes revealed govern the evolution not just of microbes but ultimately all life, because as Plotkin

“I WOULD LOVE TO BE TOLD THE ANSWER, BUT EVEN BETTER, I’D LOVE TO FIGURE IT OUT FOR MYSELF.”

Most of Plotkin’s work is done with a piece of chalk and a blackboard or even just a piece of paper.
explains. "The rules of physics apply to a viral protein just as they do to a human protein."

Because thousands of its genomes have been sequenced in recent years, the influenza virus is especially useful for such research, as is the *E. coli* organism. But the work can have more immediate payoffs. Better understanding of the evolution of the flu genome, for example, could allow some educated guesses about what mutations might arise next—leading to more effective vaccines targeted to those specific strains.

Much of the mathematical study of evolution involves probability theory, since randomness is an inherent element of the process. Just how random, however, is an open question and one of Plotkin's chief interests. Part of what drives evolution involves how a particular mutation affects an organism's "fitness," or its ability to survive and prosper in its environment—more

"**How could all of life be encoded in such a simple way and still be stable enough to function properly?**"

fit organisms survive and multiply; less fit ones don't, which is the essential idea that Darwin described in his theory of natural selection.

But some mutations persist even without any obvious enhancement of fitness. "Separating out the random processes from the Darwinian processes is the principal challenge," Plotkin says. "I think it's still unknown, for the most part, the degree to which genetic changes observed in natural populations are driven by randomness. That is an underlying and fundamentally important question to resolve. I would love to be told the answer, but even better, I'd love to figure it out for myself."

Although Plotkin is doubtful that biologists will ever achieve the sort of deterministic certainty that allows astronomers to predict eclipses or calculate orbits with painstaking precision, he believes that the marriage of mathematics and evolutionary biology could eventually lead to some ability to predict evolutionary outcomes. "Statistical physicists can't predict where every single one of a billion particles is going to be, but they can tell you something about the likelihood of different outcomes," he observes. "We can do the same thing in evolutionary theory, and people have started to develop such theories. We can't tell you which exact mutations will occur next in a population, but we can tell you what types of outcomes are likely and what types of outcomes are unlikely."

Aside from the role of randomness in evolution, another unanswered question involves what biologists call an organism's "fitness landscape." Plotkin explains, "It tells you for any possible genome how fast will that organism replicate, what will its fitness be. It's a lot like an energy function in physics that tells you which of many different states is more likely to be observed. The fitness function for even a very simple biological organism is completely unknown." That's because the only way to truly define it would be to synthesize and study every possible genome of the organism and observe how it replicates, an impossible task. The only possibility is to look at the evolutionary pattern and extrapolate backward in time for clues about what sort of fitness landscape might have produced the observed traits, taking into account the specifics of the environment in which the organism evolved.

Plotkin is not so much a descendant of Darwin as of theoretical physicists like Albert Einstein and Niels Bohr. He works in a different field but uses similar
Most of the time, biologist Josh Plotkin works at a chalkboard calculating the workings of life at the smallest scale, but sometimes his work leads into the field and to the larger view. "Nowhere is it more apparent that there’s a question about the source and origin of all the diverse life in front of you than when you’re sitting in the middle of a tropical forest," he muses. "You can’t look anywhere without seeing some new life form you’ve never even observed before. It’s a place where it becomes a pressing question to you of how this arose." How does such an incredible diversity of species, all competing for the same limited resources, evolve and coexist in the same environment?

To find out, Plotkin has ventured to Malaysia, Thailand and Indonesia, where despite steady deforestation, there are still large tracts of ancient tropical forest with intact ecosystems that have been exhaustively studied and catalogued. "As a result, we know the exact spatial arrangement and species identification of everything that’s coexisting in these little slices of forest," he says, which ties directly into his work at the molecular level. "That kind of information coupled now with what’s emerging in molecular data, where we actually sequence the individual characteristics of individual trees and thereby can reconstruct which tree is the parent of another tree, allows us to understand how a forest was specifically assembled. That kind of information gives you an incredible view on the ecological question of diversification in tropical forests."

There’s also a personal element to his tropical work. "It gave me a lot of inspiration to work in biology. " And perhaps even more important, he adds, "I got engaged to my wife in Borneo."

—Mark Wolverton

Techniques—analyzing, interpreting and building on data obtained by experimentalists to find new truths and develop new theories. "Most of my time’s spent at the chalkboard, I’d say 80 percent of my time," he guesses. "Ten percent of the time is at the computer and maybe once in a while the lab bench, but very seldom. We have to use a computer, of course, when we try to reconcile a theory with data because massive amounts of data are generated. But computers are not used to actually develop the theory or to develop our expectations for how the data should look. That’s mostly pencil-and-paper work."

As for the evolution of his own career, Plotkin considers himself a late bloomer who’s followed a rather unconventional path as a scientist: starting college intending to major in the classics, switching to advanced mathematics and now working as an evolutionary biologist. "But it’s fun to be at the beginning of a new field," he says. "I think the circuitous route is more enjoyable. It gives you a different perspective."

A trim, dark-haired man who looks more boyish than his 34 years, Plotkin is happily settled in at Penn. "Penn Biology is a very broad but fairly small department, and they’ve therefore been welcoming of a theorist in their midst," he says. Although he’s a fairly new addition to the Penn family, he’s no stranger to the University. "My father actually attended Penn for college, and I recently found some old diary or something from my childhood. My dad had taken me to a reunion event at Penn," he recalls, "and I wrote in this journal, ‘I definitely want to go to college at Penn.’ I didn’t actually attend Penn for college, but I ended up here as a faculty member—close enough."

Finding new and original ways to explore and explain the basic mysteries of life will continue to be Plotkin’s abiding passion. "I do think that some of the neatest topics in biology border on the subjects of philosophy of biology and philosophy of life," he says. "That’s something I think a lot of people can immediately appreciate. Physics and astronomy have amazingly vast questions to ask about the entire cosmos, and it can be exciting to think of those things, but somehow the fact that life is all around us and visible in front of us and completely unexplained seems to be an issue that everyone must face every day."
you will have generated more than 1,000 false-positive screens and all the overtreatment they entail.” Despite the numbers, doctors have long screened women in their 40s, women continue to demand early screening and “medical opinion” is divided on the matter. The main concern, he stresses, is not only whether over-diagnosis has very tiny effects or leads to costly over-treatment, but whether it causes outright harm: pointless mutilating surgery, useless and injurious chemo and radiation, needless pain and anxiety. We just don’t know.

Solutions for turning aside the forward thrust of history, Aronowitz suspects, might lie in getting at “upstream” policies and practices that inflame the fear of cancer by blurring “the differences between different points on the cancer-risk-to-terminal-disease continuum. … We may need to restrain the way we discover and define cancer and cancer-risk states. We should split up cancer risk and different types of cancer and not lump them together into one feared territory.”

Separating “cancer” from “cancer risk” and “pre-cancer,” the conjoined triplets loaded into a word we’ve inherited, is pretty tricky semantic surgery. Clarifying what’s in a name might not seem to be a medical procedure that holds much therapeutic or health-policy promise, but that’s where Aronowitz brings in another name. “I think to not talk about fear—and call it ‘fear’—is to ignore the elephant in the room. How much fear is appropriate? It’s these harder things about fear and how knowledge is created and how people understand their bodies and think about cancer that are a large part of the issue.”

“I don’t feel comfortable offering Dr. Aronowitz’s Guide to the Perplexed,” he adds. “These are very perplexing problems, and I’m just a messenger of the news—very complicated news.”

**Father of American Surgery**

Penn alumnus (1785) Philip Syng Physick was an eminent surgeon who labored to bring Philadelphia’s devastating Yellow Fever epidemic under control in 1793 and again in 1798. Even when stricken by the illness, he remained at his post at the Yellow Fever Hospital at Bush Hill. An innovative surgeon, Physick pioneered the use of the stomach pump, introduced cat-gut sutures, performed the first successful blood transfusion and designed a number of surgical instruments and techniques. Starting in 1800, he delivered lectures on anatomy and surgery at the University of Pennsylvania and in 1805 was appointed to Penn’s first Chair of Surgery.

In *Unnatural History*, Robert Aronowitz discusses Physick’s operation on Susan Emlen for cancer of the breast. Emlen found the breast lump when it was about the size of a partridge egg but opted first for nonsurgical treatments more in line with notions of humoral imbalance, the prevailing medical paradigm for understanding and healing illness. “I knew Dr. Physick’s preference of a surgical operation in such cases,” she wrote to her father, “and I had not yet suffer’d enough to endure the thought of so terrible a measure.” The invention of ether anesthesia was still three decades away.

On June 4, 1814, Physick performed the surgery on Emlen in her home, removing a one-pound tumor from her left breast. The procedure took 25 minutes. “My whole being seemed absorbed in pain,” she wrote. The surgeon informed the family that “the disease had been completely eradicated,” but the cancer would eventually return. Aronowitz surmises that “when the parts were laid open” Physick found the malignancy too advanced and was likely “shielding the Emlens from the disturbing interoperative findings.” Although Emlen tried other remedies, she declined slowly and died five years after the surgery.

“Cancer in the breast was generally defined by its behavior over a sustained period of time rather than its clinical appearance in a single moment,” Aronowitz writes. “It was a disease that often began as a localized lump but quickly or slowly caused much more harm. Along with its emphasis on the idiosyncratic and contingent nature of health and illness, this definition meant that the cancer diagnosis was often haltingly and flexibly attached to individuals, revealed in the course of time and often only at the end of life. The inability to cure cancer was a defining feature in this way of understanding the ailment, so much so that if surgery resulted in an apparent cure, surgeons often believed that they had removed a non-cancerous lump.”

—PN
self-interest, such as the threat of losing one's health insurance and rising health care costs.

“If you think back to Obama’s big health care speech,” Lynch says, “he basically mentioned the moral component of health care once, and he used Ted Kennedy’s words in order to do it. The rest of his speech was larded with references to personal responsibility and pocketbook concerns. Whereas I think it might be much more effective to have the overwhelming thrust of a speech like that be, ‘In a civilized society, this is what people do.’”

From the perspective of her fairness research, Lynch is encouraged by the new health care reform law’s potential to introduce Americans to the idea that a reasonable level of health care is a public right. However, she is concerned that it does not address several fairness issues, foremost of which is cost control. “We can’t consume as much health care as we do,” Lynch explains, “and have enough resources to go around. So we either have to radically change the way health care gets delivered or we have to confront that we’re going to need to ration care in some way or another. We are currently rationing care through the market—people who can afford it get it, and people who can’t don’t. In health policy circles it’s called the ‘r’ word, but we haven’t had the conversation about what’s the right way to ration care.”

Lynch also worries that Americans’ tendency to attribute health inequalities to personal responsibility or immutable biological differences will deflate momentum to address more systemic inequalities that create ill health or unequal access to health insurance. Nevertheless, she is optimistic that there is room for improvement.

“I was deeply pessimistic when I began this research,” she says, “in thinking that people who didn’t share my political beliefs didn’t care about fairness. But increasingly I don’t think that’s the case. I’ve discovered that people from all walks of life really believe in fairness and find it to be an important motivating principle in their own lives. They may not share the same views about what constitutes fairness, but that’s something we can talk about.”

Foreclosure’s Health Toll

Along with exploring such abstract ideas as fairness and justice, political scientist Julia Lynch has also been conducting research about the tangible impact of the recent foreclosure crisis on the health of homeowners. In a paper published last fall in the American Journal of Public Health, Lynch and co-author Craig Pollack presented sobering findings culled from a survey of 250 Philadelphians who had sought credit counseling for home mortgage foreclosure.

More than one-third of study participants met screening criteria for major depression, and after adjusting for demographic and financial factors, people undergoing foreclosure had significantly higher rates of hypertension and heart disease than others in the community. They were also more likely to be uninsured and to have forgone filling a prescription. Additionally, nearly 60 percent reported that they had skipped or delayed meals because they couldn’t afford food; nine percent reported that a medical condition in their family was the primary reason they were undergoing foreclosure, and a quarter said they owed money to medical creditors.

Although the study has garnered national media attention, Lynch says it has also been met with some head-scratching in political science circles because it sits in the crosshairs of a debate over how involved in policy-making political scientists should be. “For good reason,” she explains, “many political scientists have been skeptical about a very engaged political science because they’re worried about us coming down on the ‘wrong’ side and about compromised scientific rigor. I’m more confident in us as a science than that.”

Lynch herself was on the fence about this issue until the foreclosure study, which made clear the hard times being faced by fellow Philadelphians. She and Pollack are now seeking funding for a much larger study using Kaiser Permanente HMO medical records to look at the effects of foreclosure on children’s health.

“Because I’ve had this longstanding interest in justice,” she says, “when I think about studying power, I think about studying the ways power relations in society affect people’s life chances. When that’s what’s at stake, we have to get our hands dirty.”

—PR
In Robert Maxwell’s freshman seminar, “Reading” Medieval Art at Penn, students get their hands on a 15th-century illuminated manuscript in Van Pelt’s Rare Book & Manuscript Library. The prayer book is in Latin, but there’s no language prerequisite. “I’m asking them to place themselves in the position of a young Medieval reader, who would have learned to read—and also learn Latin—by reading a Book of Hours just like this one,” says the associate professor of art history. The Penn students, like their counterparts in the Middle Ages, use the manuscript’s artwork as a clue to Latin text they don’t understand.
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