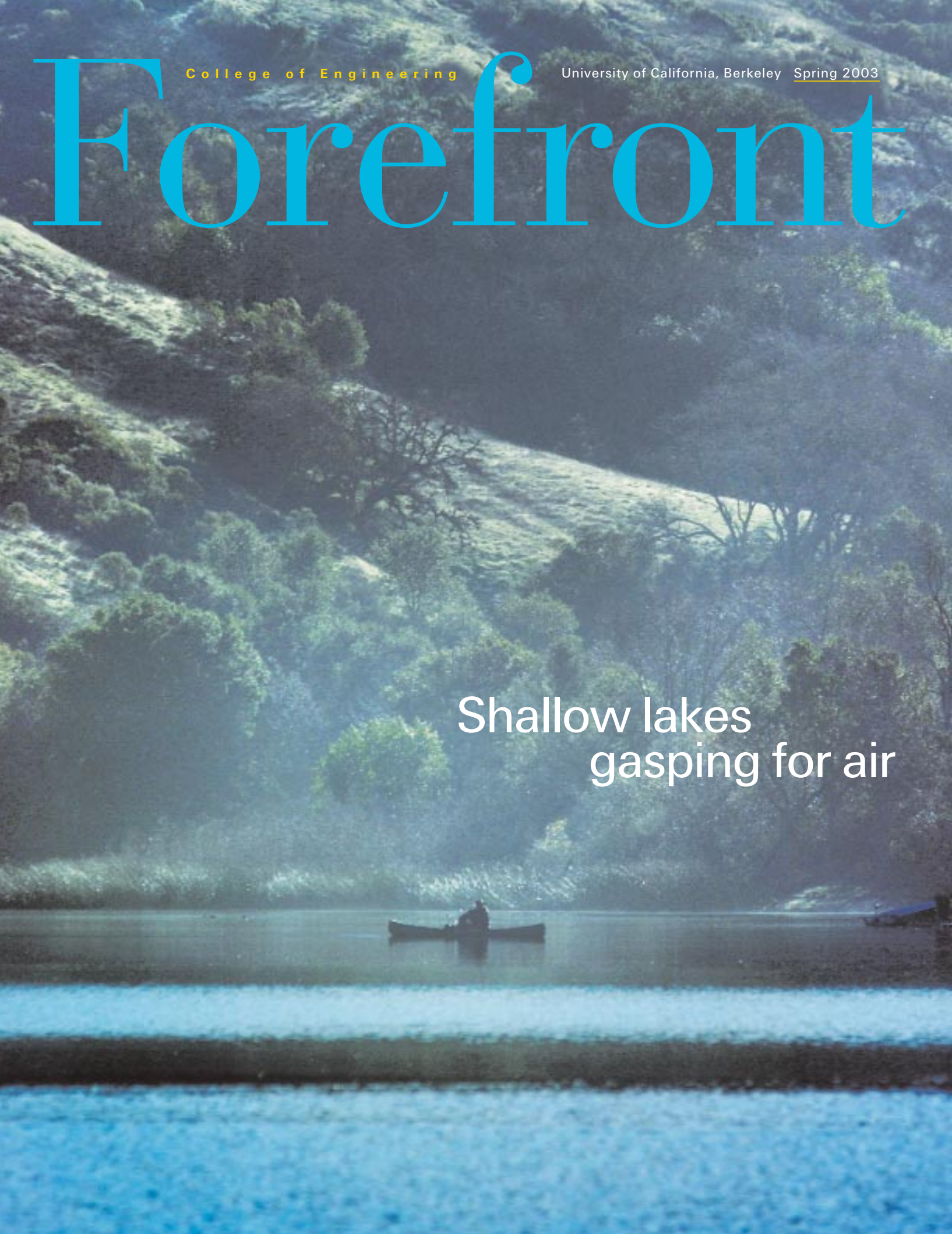
College of Engineering

Forefront

University of California, Berkeley Spring 2003



Shallow lakes gasping for air

College of Engineering University of California, Berkeley Spring 2003

Forefront

FOREFRONT takes you into the labs, classrooms, and lives of professors, students, and alumni for an intimate look at the innovative research, teaching, and campus life that defines the College of Engineering at the University of California, Berkeley.

Published three times a year by the Engineering Public Affairs Office 102 Naval Architecture Building #1704 University of California Berkeley, CA 94720-1704

Dean
A. Richard Newton

Assistant Dean for College Relations
Melissa Nidever

Public Affairs Director
Teresa Moore

Alumni Affairs Director
Gina Rieger

Forefront Editors
Nancy Bronstein
Patti Meagher

Design
Cuttriss & Hambleton

Printing
Dome Printing

For Information

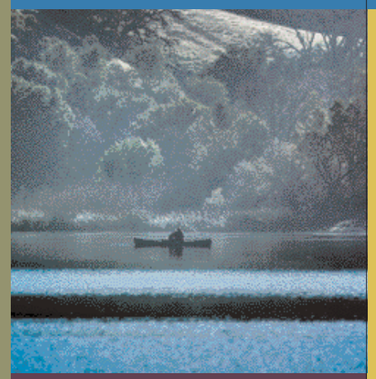
College of Engineering
University of California
Berkeley, California 94720-1700
www.coe.berkeley.edu

Engineering Public Affairs
102 Naval Architecture Building #1704
510/642-5857
Fax: 510/643-8882

Send comments to:
forefront@coe.berkeley.edu

Change of address information:
ffaddresschange@coe.berkeley.edu

Berkeley Engineering Fund
208 McLaughlin Hall #1722
510/642-2487
Fax: 510/643-7054



On the cover

It's not how deep the water is, it's simply a matter of air, says Berkeley civil and environmental engineer and aquatic expert Alex Horne. Shallow lakes like southern Oregon's Klamath Lake and the Bay Area's Lafayette Reservoir (pictured on the cover), can be so nutrient-rich that periodically fish die in massive numbers as they struggle to grab enough of the lake's limited oxygen supply to stay alive. For decades, Klamath Lake's precious waters have been a source of bitter wrangling and heated disputes over how best to solve the lake's ongoing problems.

Read the story on page 10

Cover photos by Bart Nagel

Contents

Features


BART NAGEL PHOTO

From the Dean

Welcome to the first issue of *Forefront* in this, our 35th year of publication. The magazine in your hands is the first to include *Class Notes*, updates from our alumni worldwide.

Behind every entry in these brief notes is a compelling story and a reminder that our past and present are continuous in many ways. Indeed, our Klamath Lake feature was well under way when we got word that pioneering alumna Helen Joyce (Pease) Peters (B.S. '51 CE) had passed away last fall.

In her first professional assignment, Mrs. Peters supervised field crews in the Klamath River Basin as preparation for the Klamath River Compact. Created in 1957, the compact was designed to facilitate orderly development, use, and conservation of the vast water resources in the area, as well as adjacent land and resident wildlife.

Nearly 50 years later, Berkeley engineering still has a presence at Klamath in the person of Alex Horne, an international expert on water quality. The problems may be different, and we may be solving them in different ways today, but it is reassuring to know that Berkeley engineers are doing what they have done for decades: going out into the world with a commitment to tackling the toughest problems and finding the most elegant and effective solutions possible.

We hope you enjoy hearing about your fellow Berkeley engineering alumni and we invite you to let us keep up with you too. Please submit your entry for *Class Notes* to *www.coe.berkeley.edu/alumni_friends/class_notes.html*. We would certainly like to hear from you.

– A. Richard Newton
Dean, College of Engineering and the Roy W. Carlson Professor of Engineering

Chang-Lin Tien (1935-2002): a chancellor's extraordinary legacy

Chang-Lin Tien is still remembered and mourned across the Berkeley campus and throughout the many communities he warmly inhabited, following his death last fall at age 67.

Tien was University Professor Emeritus, NEC Distinguished Professor Emeritus in the Department of Mechanical Engineering, and Chancellor of UC Berkeley from 1990 to 1997. A beloved teacher, scientist, and administrator, he was celebrated for his omnipresence around campus and his enthusiastic cheering at Cal sports events.

Diagnosed with a brain tumor in 2000, Tien suffered a crippling stroke shortly afterward and never fully recovered. The Taiwanese immigrant and aspiring basketball player became the first Asian American to lead a major U.S. research university.

His years as chancellor were distinguished by his outspoken support of equal opportunity and his unflagging efforts to stabilize campus funding during a state budget crisis in the early 1990s. His dedication, high standards, energy, and accessibility endeared him to undergraduates, movie stars, and international statesmen alike.

"When we walked down the streets of Taipei together, it was like walking the streets of Chicago with Michael Jordan," said C.D. (Dan) Mote Jr., who served as vice chancellor under Tien. Passionate about bridging communications between East and West, Tien was an unofficial diplomat in Asia and active on many commissions and foundations to promote U.S.-Chinese relations.

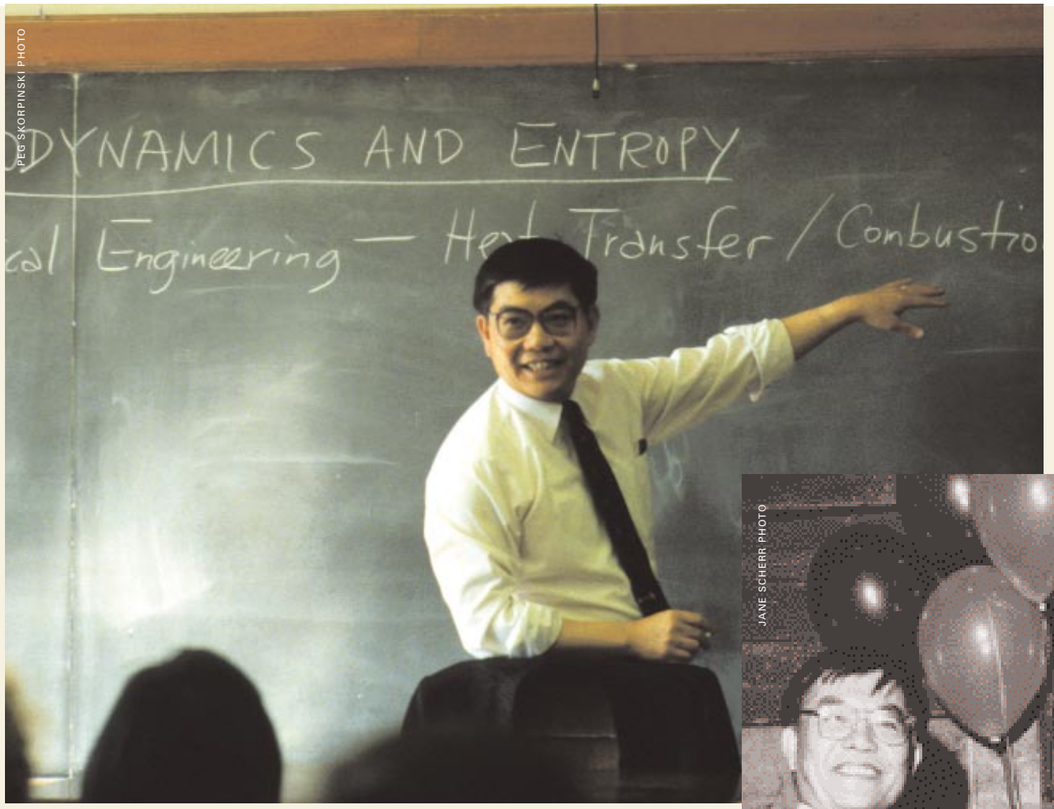
As an engineer, Tien's work in heat transfer and thermal science earned him worldwide recognition and many honors, including the highest international award in the field, the Max Jakob Memorial Award. He pioneered a new field known as microscale thermophysical engineering and made notable contributions to fluid flow, phase-change energy transfer, heat pipes, reactor safety, cryogenics, and fire phenomena. He served as chair of the Department of Mechanical Engineering for seven years.


JOHN BLAUSTEIN PHOTO

When Tien stepped down as chancellor in July 1997, he said, "Perhaps the most important thing that I would like to be remembered for is that I injected a bit of a human touch on the campus and made it more humane, personal, and caring,"

Nearly his entire 41-year career was devoted to Berkeley. As chancellor, he fortified undergraduate education and worked to improve the quality of the undergraduate experience on campus. He revitalized intercollegiate athletics and, despite the Regents' 1995 decision to eliminate affirmative action programs, fostered diversity among faculty, staff, and students by expanding appointments and admission opportunities to women and underrepresented minorities.

In the face of the deepest budget cuts in campus history, Tien responded by initiating – in the words of current Chancellor Robert Berdahl – "the most audicious capital campaign of any public university in history." Under Tien's leadership, the campaign raised nearly $1 billion. Despite the budgetary woes, new facilities continued to be built (including the Haas School of Business), and Cal maintained its excellence. In 1995, the National Research Council ranked 35 of Berkeley's 36 doctoral programs in the top 10 nationally, the best record of any university.


PEG SKORPINSKI PHOTO

Tien joined the Berkeley faculty in the Department of Mechanical Engineering in 1959; by 1962 he received the Distinguished Teaching Award, an honor he cherished. He guided more than 60 students to their doctorates and, even during his term as chancellor, continued to mentor graduate students and teach classes in mechanical engineering.

Tien set personal records wherever he went. At Princeton he earned his master's and doctorate degrees in 1959 after only two years of study, later explaining that he worked quickly toward his degree so that his parents would permit him to marry his future wife, Di-Hwa. At age 24, he was the youngest appointee ever to Berkeley's Department of Mechanical Engineering and, two years later, the youngest faculty member ever to win Berkeley's coveted Distinguished Teaching Award. At age 41, he was the youngest individual ever elected to membership in the National Academy of Engineering.

Other honors included, in 1997, the first UC Berkeley Presidential Medal as well as title of University Professor, bestowed by the UC Regents on scholars of international distinction; and, in 2001, the Berkeley Citation, a campuswide honor for retiring faculty. The International Astronomical Union named an asteroid after him in 1999, and Chevron christened its newest tanker the *Chang-Lin Tien* in 2000. On campus, the East Asian Library and Studies Center will bear his name.


JANE SCHERR PHOTO

Chancellor Tien was a champion for Cal locally, nationally, and worldwide. On Oct. 24, 1995, he and Berkeley Mayor Shirley Dean celebrated the City of Berkeley's official proclamation of "Cal Day," occasioned by the National Research Council's study giving Berkeley's doctoral programs top ranking nationwide. The College of Engineering was ranked second overall.

Tien is survived by his wife, Di-Hwa, of Hillsborough; his son, Norman, a professor of electrical and computer engineering at UC Davis; daughter Phyllis, a physician at UCSF; daughter Christine, deputy city manager of Stockton; and four grandchildren.

Donations in honor of the former chancellor may be made to the Chang-Lin Tien Center for East Asian Studies. Checks, payable to the UC Berkeley Foundation, may be mailed to Vice Chancellor-University Relations, University Relations, 2440 Bancroft Way, Room 4200, UC Berkeley, CA 94720-4200. For more information on the center or to make an online contribution, see *www.urel.berkeley.edu/tiencenter*.

Hearst Mining Building opens a new chapter in history

Hearst Memorial Mining Building officially reopened last fall, following a sweeping four-year renovation, restoration, and retrofit project that ushers the 1907 architectural landmark into a new era of high-tech engineering, nanoscience, and interdisciplinary research.

The building is rich in architectural detail and steeped in the history of California, the campus and the College. From its magnificent front doors, through the vaulted skylights of the entryway, to the Douglas fir window frames, its original features have been painstakingly restored and protected against the inevitability of a major quake on the nearby Hayward fault.

In the process, the 19th century relic has been transformed into a 21st century marvel, providing an entirely updated infrastructure and new classrooms and labs for the most advanced materials science and nanoengineering research. The pristine labs are equipped with precise light and temperature controls, mechanically stable space frames, and speedy power connections. These features will facilitate engineering advanced materials for everything from golf clubs to semiconductors, airplane parts, and artificial joints.

PEG SKORPINSKI PHOTO

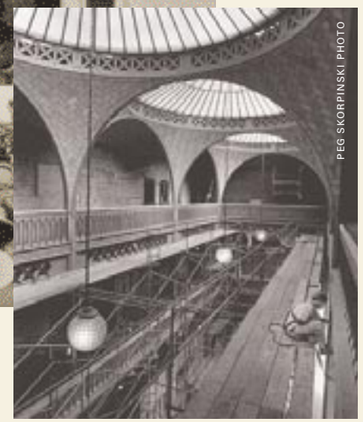
The September 22, 2002, gala event celebrating the reopening of Hearst Memorial Mining Building attracted nearly 1,000 guests and featured remarks by College, campus and state luminaries, lab demonstrations, and a rousing performance by the Cal Band.

The Department of Materials Science and Engineering, which relocated to Evans Hall during construction, will return to Hearst Mining this May. New tenants will include components of the Center for Information Technology Research in the Interest of Society (CITRIS), the intercampus initiative launched by Gov. Gray Davis to apply information technology solutions to pressing societal concerns such as energy supply, the environment, and homeland security.

The retrofit involved *base isolation* technology, pioneered by Berkeley engineers 20 years ago, replacing the building's brittle foundation with a shock-absorbent system of 134 composite steel and rubber bearings that allow the building to roll horizontally 28 inches in any direction. The $90.6 million project was funded by state, individual, and corporate donations.

PHOTO COURTESY OF UC ARCHIVIST, BANCROFT LIBRARY

Mining was at its peak in 1907, and Hearst Memorial Mining Building was designed to be the largest and finest facility in the world devoted to mining education. The architect was John Galen Howard, and the benefactor was Phoebe Apperson Hearst, who dedicated the building to the memory of her husband George Hearst, a U.S. Senator and prosperous miner. She is pictured here at the August 23 opening, nearly a century ago, black parasol in hand.



PEG SKORPINSKI PHOTO

Inside the front entrance of the four-story, 135,000-square-foot, 60-million-pound building, the exquisite Memorial Gallery features skylights and arches decorated with Guastavino tiles. Each pane of glass was inventoried and repaired or restored, and individual tiles were reinforced with pins for seismic security.

| NEW FACULTY PROFILE |

Myers joins College faculty following work on human genome

More than two years after the landmark sequencing of the human genome, the computer whiz behind the algorithms used to decipher millions of pieces of genetic material has joined the College of Engineering as a professor in the Department of Electrical Engineering and Computer Sciences.

Gene Myers, former vice president of Informatics Research at Celera Genomics in Rockville, Md., will work closely with researchers in the Department of Molecular and Cell Biology, Lawrence Berkeley National Laboratory and the Department of Energy's Joint Genome Institute.

The move marks a return to academia for Myers, who taught at the University of Arizona in Tucson for 17 years before the race to sequence the human genome inspired him to pack up for Celera in 1998. He gambled that the "whole-genome shotgun sequencing method," used to sequence the genome of microbes, could also work for the human genome.

Many fellow scientists were doubtful, but Myers proved them wrong by altering the traditional protocol to handle the much larger number of repeating structures in animal and human genomes, then designing computer algorithms to reconstruct the sequence in the correct order.

We sat down with Myers to find out more about this innovative thinker, one of the most influential players in the field of genomics.

Q: Why did you leave academics for Celera?

A: Celera gave me the opportunity to prove that whole-genome sequencing could work. The public genome project said it couldn't, that what I was proposing was clearly high risk. In some sense they were right. My idea was wild and it was difficult to execute in academia. Academia is a great place to spawn ideas, but the commercial sector is a good place to execute them.

Q: What kept you believing in your idea in a climate of doubt?

A: I was the only person who had been thinking about this, and I had a hard time publishing articles about it from 1995 to 1998. I had given up on the idea that the human genome would be sequenced in this way. But then Celera contacted me and said they were going to do what I proposed. They had already built a business plan around it, so it was an offer I couldn't refuse.

Q: How did you get into the field of computational biology ?

A: I was interested in the process of comparing computer files, which is similar to comparing DNA sequences. Computational problem-solving in molecular biology was a new area when I got into it as a new professor back in the early '80s. I believed I could apply the computational methods to molecular biology and make my mark there. I enjoyed working in such a wide-open area where nobody else was working. I don't like working in crowded areas and I don't really enjoy competition.

Q: Then how did you handle the "race" to decode the genome?

A: I went to Celera because I could do what I wanted to do, but I didn't really care who got there first.

Q: How has decoding the genome changed the world of bioinformatics?

A: The whole-genome shotgun method has been adopted, shifting the prevailing paradigm for genome sequencing, and accelerating the pace of discovery.

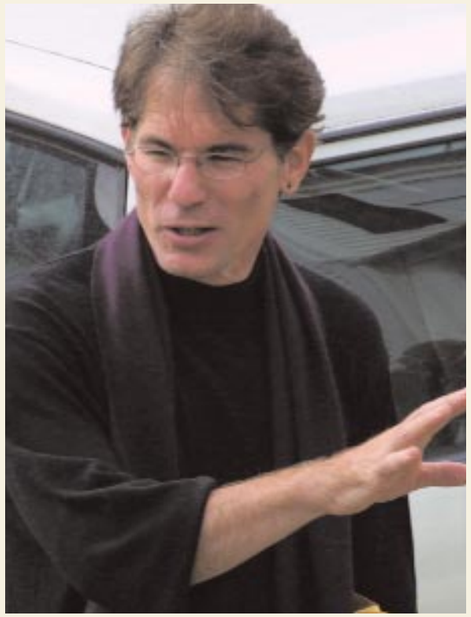
Q: How has the experience changed you?

A: Now that we have the human genome the large question is, what to do next? I am back to the point of doing fundamental research and exploring possibilities. I've become more interested in the biology. Now I want to learn how cells work as molecular machines.

Q: Why did you choose to come to Berkeley?

A: It is one of the top institutions in the country in computer sciences and biology, and the Joint Genome Institute and Lawrence Berkeley National Laboratory are here. I really enjoy the unfettered creativity of the academic environment and being around students, and I felt this was a place where I could grow and learn from the people around me.

Angela Privin, editor of *Engineering News,* and **Sarah Yang,** Berkeley Media Relations, contributed to this story.



Six weeks after joining the Berkeley faculty, newsmaker Gene Myers became the 78th College of Engineering professor to be elected to the National Academy of Engineering, one of the highest honors for engineers in the U.S.

Popular scientific press cites College faculty

At year-end 2002, three faculty in the College's Department of Electrical Engineering and Computer Sciences (EECS) hit the top pick lists of three popular science magazines, all singled out for a wide range of achievements in the field of information science and computer technology.

Ruzena Bajcsy, director of the Center for Information Technology Research in the Interest of Society (CITRIS), was recognized by *Discover Magazine* in November as one of the 50 "most important women in science." **John Kubiatowicz** was named by *Scientific American* in December to its list of the "*Scientific American* 50," a select ranking of both individuals and organizations who have made major contributions. **David Wagner,** the youngest member of the College's faculty, was chosen by *Popular Science* in January for its "2002's Brilliant 10," an index of the 10 most promising researchers from all scientific disciplines.

Bajcsy came to Berkeley in 2001 as director of CITRIS and professor in EECS. Her 30-year career has combined the traditionally discrete fields of cognitive science, applied mechanics and computer science. A member of both the National Academy of Engineering and the Institute of Medicine, Bajcsy was previously on the faculty at the University of Pennsylvania and served as assistant director of the National Science Foundation's Computer Information Science and Engineering Directorate.

The *Discover* list selected 50 women internationally known for their "spectacular" successes in the "intensely male world" of science. Bajcsy was recognized for her work on robots that respond to their environment and for her direction of the "innovative" CITRIS, which is researching the development of smart low-power sensors capable of computing and communicating.

Kubiatowicz, professor in EECS, is a specialist in computer architecture, hardware, operating systems, and compiler issues for parallel multiprocessing. His invention, *OceanStore*, is a massively distributed hard drive that copies data fragments and saves them in many locations around the world, making it difficult to destroy or lose the information. He holds a Ph.D. from MIT and joined the Berkeley faculty in 1998.

Scientific American compiled its list of 50 top contributors for the first time this year, recognizing accomplishments that demonstrate a "clear, progressive view of the technological future." As chief architect of the *OceanStore* system, Kubiatowicz was recognized for "work that could lead to an Internet scale grid computing system linking processing and storage capabilities of millions of computers."

Wagner joined the EECS faculty in 2000. His work focuses on computer security in large-scale systems, cryptography, and operating systems. He advises government agencies and industry on how to improve security in everything from wireless networks to digital cell phones. With an A.B. in mathematics from Princeton, he completed his Ph.D. in EECS in 2000.

The *Popular Science* "Brilliant 10" list, also new this year, celebrates scientists "who are shaking up their fields and whose work will touch your life." In recognizing Wagner, the magazine acknowledges his extraordinary skill as a computer scientist as well as his investigations into security holes in software, particularly software that safeguards large amounts of money or information relevant to national security.

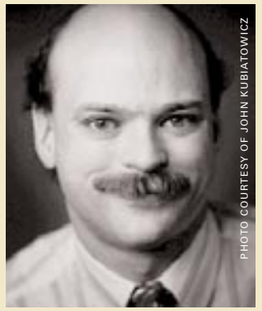


PHOTO COURTESY OF JOHN KUBIATOWICZ

John Kubiatowicz, EECS professor and a specialist in computer architecture and operating systems, was recognized by *Scientific American* for his invention OceanStore, a massively distributed hard drive storage system.

BART NAGEL PHOTO

Ruzena Bajcsy, CITRIS director and an innovator in artificial intelligence, robotics and machine perception, was named by *Discover Magazine* as one of the 50 "most important women in science."

David Wagner, EECS professor and youngest member of the faculty, was named by *Popular Science* as one of its "Brilliant 10" for his work on improving security in everything from wireless networks to cell phones.

Engineering alum selected for Haas award

Not your typical banking professional, Armando de la Libertad (B.S. CE '93) has other things on his mind than high finance or the global market. On any given day you might find him developing new housing construction for low-income families or working with nonprofits to raise scholarship funds for young Hispanics.

His public service record earned him the 2002 Peter E. Haas Public Service Award, one of Berkeley's most prestigious honors, to be presented at a ceremony on Cal Day April 12. The award recognizes a Cal alumnus "who has made a significant public contribution to the betterment of society," singling out grassroots efforts like de la Libertad's.

A resident of Orange County, de la Libertad is a vice president for community development at Wells Fargo Bank specializing in lending and investment programs that finance affordable housing, serve small businesses, and revitalize low-income communities. He is also chair of the Orange County Hispanic Education Endowment Fund, a community-based organization providing scholarships for financially needy Hispanic students at all educational levels, and an active board member of the Southern California branch of the Engineering Alumni Society.

During his undergraduate years studying structural engineering, de la Libertad tutored students at Berkeley High, an experience that inspired a change in his career path.

"I enjoyed the math and science aspect of engineering, but I wanted to use my skills in a unique way to help impact public policy," he says. "The tutoring exposed me to the educational and economic needs of a diverse population and sparked my interest in working to open doors for others."

The Haas award carries a cash prize of $20,000 and a $20,000 donation to the recipient's charity of choice. De la Libertad plans to use part of his award to start a scholarship fund to finance vocational or college training for victims of domestic violence.

A child of Mexican immigrants, he pursued a master's in public policy at Harvard's Kennedy School. During his first year working for Wells Fargo, he helped double the bank's local economic development investment portfolio. His work with community lending and investment programs has brought needed cash flow and affordable housing to neighborhoods throughout Orange County.

Armando de la Libertad, B.S. CE '93, won the 2002 Peter E. Haas Public Service Award for his service to low-income communities and small businesses in Southern California.

Cal stuns Stanford in Big Game

History was made and several records broken when Berkeley defeated Stanford 30-7 at the 105th Big Game at Memorial Stadium last fall.

The sellout crowd of 71,224 and a 23-point scoring margin were just two of the stratospheric stats as the Cal Bears recaptured the Axe last November. They broke a seven-year losing streak against their historic opponents to the south and ended the season with a 7-5 record, the first winning season since 1993 and the second-best one-year turnaround since 1947.

The victory came at a fitting moment, on the 20th anniversary of "the Play" – the legendary five-lateral kickoff return in which Cal's Kevin Moen trampled a Stanford trombonist to a 25-20 victory as the clock ran out.

Cal Bear tailback and CEE senior Joe Igber's brilliant performance made the victory even sweeter for Berkeley Engineering. Igber set a Big Game rushing record, finishing his Cal career with 3,124 yards on 678 carries, to finish second in school history.

PHOTO COURTESY OF CAL MEDIA RELATIONS OFFICE

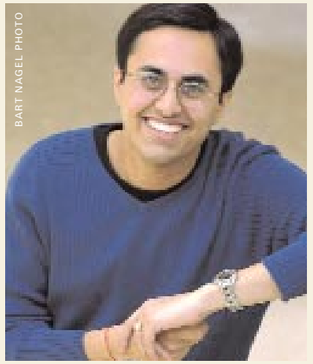
CEE senior Joe Igber (number 20) ran for 226 yards and a score to contribute to Stanford's defeat. The Nigerian native arrived at Berkeley in 1999, after completing a high school career in Hawaii as Offensive Player of the Year. About Igber's performance, Cal quarterback Kyle Boller says, "Joe did an amazing job. He has so much fun playing the sport. I can't say enough good things about him, off and on the field."

Engineering whiz wins prestigious Rhodes Scholarship

Ankur Luthra, a Berkeley senior double majoring in electrical engineering and computer sciences (EECS) and business administration, has been awarded a prestigious Rhodes Scholarship for 2003. He is the 21st Rhodes scholar from Berkeley and the first since 1989.

The Rhodes Scholarship Trust in December announced 32 U.S. winners, chosen from 981 applicants representing 341 colleges and universities nationwide.

"This is fantastic and a great honor for Ankur Luthra and his parents," said Chancellor Robert M. Berdahl. The Rhodes Scholarship is widely recognized as one of the most competitive and prestigious because so many Rhodes scholars have achieved leadership positions and distinction. Past Rhodes Scholars include Bill Clinton and Bill Bradley.



BART NAGEL PHOTO

Ankur Luthra, winner of a 2003 Rhodes Scholarship, is the only child of Ravi and Tripta, who immigrated to the U.S. from Punjab, India. "I've been very fortunate in my life, so it's important for me to give back to society," says Ankur. "My inspiration – my parents – are very self-less, and they instilled those values in me."

The 21-year-old Luthra maintains a 4.0 grade point average and is editor-in-chief and founder of the *Berkeley EECS Research Journal*, as well as a member of several honor societies, including Phi Beta Kappa and MENSA. In the past three years, he has received 14 scholarships and awards, including the Regents', Barry M. Goldwater, and Donald A. Strauss scholarships.

In 2001, he founded the Berkeley nonprofit Computer Literacy 4 Kids to help underprivileged youth receive computers, software, and training. In 1999, he founded the music portal, *YourMP3Guide.com*, which fell victim to the dot-com meltdown one year later. Still, Luthra looks upon the experience with fondness.

"You learn from your failures as well as your successes," he said. "You have to be able to take risks in life if you're going to succeed, and you can't do that if you're afraid to fail once in a while."

The scholarship, created in 1902 through the will of British philanthropist Cecil Rhodes, is the oldest international study award available to American students and provides two to three years of study at the University of Oxford in England. Luthra said he intends to pursue a master's degree in computer science there.

Recipients are chosen for their academic achievement, integrity of character, spirit of unselfishness, respect for others, potential for leadership, and physical vigor. The 32 Americans will join a group of international scholars from 18 other jurisdictions worldwide.

Luthra has worked on game-theory models of the Internet and artificial intelligence projects designed to improve the throwing skills of robots. His career goal, he says, is to work on assistive robotics and technology that solves societal problems. He is also studying the business of nonprofit organizations.

BART NAGEL PHOTO

Let there be light: Berkeley's library is top-ranked among public universities in North America and third among public and private institutions (after Harvard and Yale), according to the 2002 Association of Research Libraries ranking. University Librarian Thomas Leonard credited Berkeley's steady climb from fifth place two years ago to Chancellor Berdahl's commitment to beef up the collections. CEE Professor Garrison Sposito, a member of the Academic Senate Library Committee, says the University library is "the most important repository for the collective experience of the life of the mind." Students, faculty, and staff receive priority access, but library services, including the government document collection, are always open to the public.

Two Cal engineers stump "Gimpy" bot blocker

An ingenious computer security system designed to stop automated Internet robots from trying to impersonate humans was cracked by two Berkeley computer scientists, in response to an open challenge from the researchers who created it.

Known as "Gimpy," the program was originally created by researchers at Carnegie Mellon University to stop computer-automated robots or "bots" from taking online polls, creating new e-mail accounts, signing up for free Web-based mail, and all the other things human beings use their computers for. Bot programs can produce e-mail accounts that are difficult to trace, making them ideal vehicles for proliferating unwanted spam messages to legitimate e-mail users.

Gimpy adds a step in an online registration process asking the user to read a word on the screen that has been distorted by a fuzzy background. Most people have no trouble with this, while computer programs based on optical character recognition can't pass the test. Yahoo, one of the largest providers of free Web-based e-mail, implemented Gimpy last year in its new account registration process. Users who pass the test can proceed to the next step to get an account, but those who cannot read the word are blocked.

"We were able to crack Gimpy because of our previous research on a technique called 'shape contexts' for object recognition," says Jitendra Malik, the Arthur J. Chick professor of EECS. "The idea is to match shapes based on relative configuration of contours in a way that can tolerate small distortions."

It took Malik and computer science doctoral student Greg Mori just five days to create a program that empowered their computer to read the Gimpy text. They then called Manuel Blum, professor of computer science, and his graduate student Luis von Ahn at Carnegie Mellon to announce their result.

"I was delighted when I heard from them," Blum said. "They were the first ones to successfully take up the challenge." Blum taught computer science at Berkeley for 30 years before joining Carnegie Mellon. His project there, of which Gimpy is a part, is called CAPTCHA, or "Completely Automated Public Turing Test to Tell Computers and Humans Apart."

Malik and Mori stumped EZ-Gimpy, the simpler of two versions of the program. They also devised a program to beat a more difficult version, which requires users to identify three words instead of just one, but it works only about a third of the time.

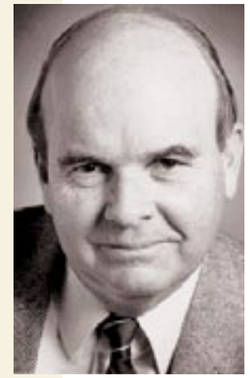
PHOTO COURTESY OF THE CAPTCHA PROJECT, CARNEGIE MELLON UNIVERSITY.

A picture is worth a thousand words. You need just one word to get past Gimpy, but it must be the right one. While humans can decipher it with ease, computer-generated bot programs have difficulty reading the distorted text.

| OBITUARY |

William Jewell: international expert in risk analysis

William S. Jewell, professor emeritus of operations research and an internationally recognized expert in risk analysis, died last January in Walnut Creek at the age of 70.



William Jewell, professor emeritus and IEOR chair from 1976–1980, had many interests beyond the mathematical analysis of risk. He was also a talented musician and an aficionado of beer-making in Czechoslovakia.

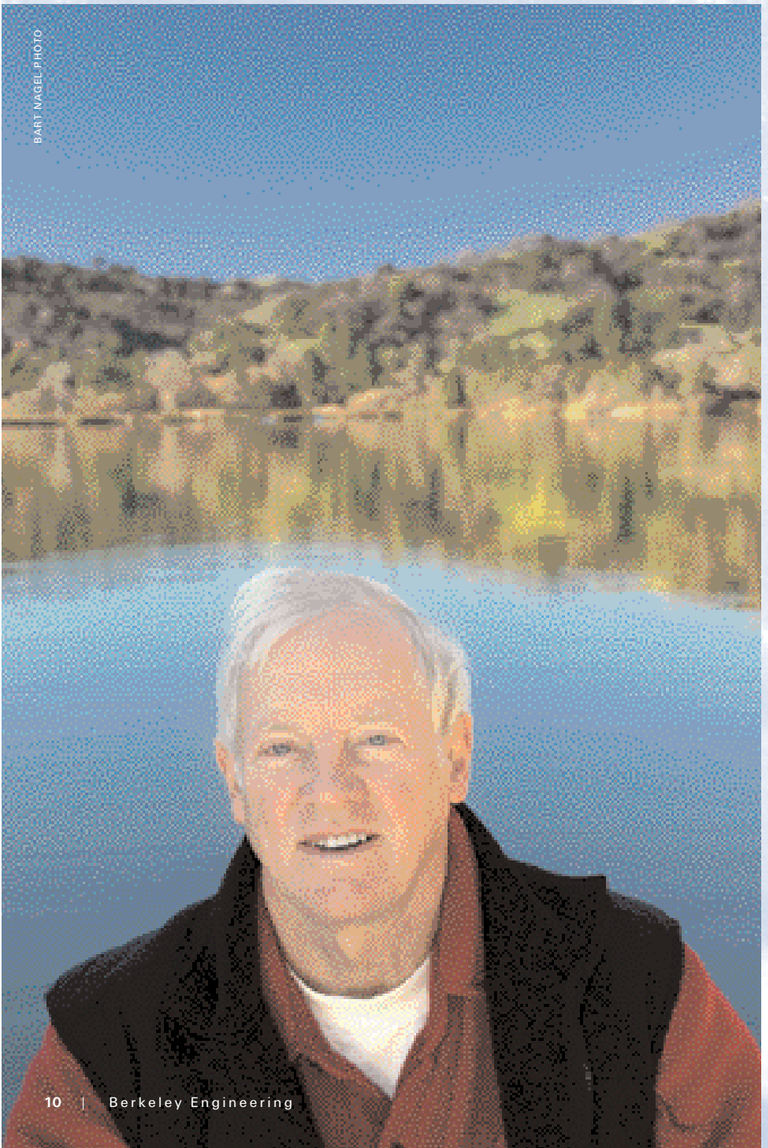
Jewell joined the engineering faculty in 1960. He served as IEOR chair from 1976 to 1980 and was director of the College's Operations Research Center (ORC). An early proponent of interdisciplinary research, he was the driving force behind the 1989 reorganization of the ORC into the Engineering Systems Research Center (ESRC).

"Bill possessed a tremendous intellectual curiosity that covered a wide breadth," says C. Roger Glassey, professor emeritus of industrial engineering. "Throughout his life, he maintained a degree of optimism that was infectious." Jewell's many honors include a Fulbright Research Fellowship to Paris and a Halmstad Memorial Prize in recognition of significant research in actuarial science.

Born in Detroit in 1932, Jewell held a bachelor's from Cornell and a Ph.D. from MIT. He is survived by his wife Elizabeth, a sister, four children, and five grandchildren.

Saving Klamath Lake:
the solution that could slip away

By Blake Edgar


BART NAGEL PHOTO

Alex Horne at Lafayette Reservoir

Snowmelt flowing to the flat high desert of the Klamath Basin once fed a vast network of marshes and shallow lakes. Nearly a century ago, this region that spans the California-Oregon border was chosen for an ambitious federal farming effort. Dams were erected and canals excavated. Today, this massive Klamath Project provides crucial water for cattle ranchers and farmers of potatoes, onions, and alfalfa on 230,000 acres. But this being the West, where water flows, fights erupt.

The Klamath Project's largest reservoir, Upper Klamath Lake in southern Oregon, supports two rare fish species, the Lost River sucker and the shortnose sucker. Populations of both species plummeted during the 1980s, so the fish were protected under the U.S. Endangered Species Act. Yet mysterious mass fish dieoffs still plague the shallow murky lake.

"If the lake were shallower, that would be fine," says Berkeley civil and environmental engineer Alex Horne. "If it were deeper, that would be fine. But where it is, is just the wrong depth."

Federal policy for the past decade has maintained the Upper Klamath Lake's water level at higher than normal elevation for the suckers' sake. Keeping more water in the lake for fish already meant that less was getting released to farmers. When in 2001, drought conditions prompted the U.S. Bureau of Reclamation to cut off all water diversions from the lake, local farmers mounted heated protests. A billboard that appeared at the time read: "Call 911 – Some sucker stole our water." Eventually, the farmers received a fifth of their usual water allotment.

During four decades of research on aquatic systems from Spain to California, Horne has confronted water quality problems and earned an international reputation for finding elegantly simple and environmentally sound fixes. About two years ago, the Klamath Water Users Association, a group of farmers and ranchers, asked Horne to help solve their problem.

Horne, whose straightforward engineering solutions successfully cleared up water at Camanche Reservoir on the Mokelumne River, insists that keeping more water in the lake won't help and could place the fish in greater jeopardy. "You might think that more water is better," he says, "and in large lakes that would be true. But in shallow lakes the same rules just don't apply."

While Upper Klamath Lake covers 70,000 acres, its average depth ranges a mere six to ten feet. Since fish kills have occurred there when the water level was above and below average, Horne sees no clear relationship between lake levels and lethal conditions.

Horne suspects another culprit. "When fish die like that, it means they've run out of oxygen," says Horne. That's not a problem for fish in deep, clear lakes like Lake Tahoe, he says, but Upper Klamath quickly accumulates nutrients from surrounding farms that promote water-clouding blooms of blue-green algae – cyanobacteria. These abundant microbes breathe day and night, competing with fish for oxygen.

Horne believes that the fish in Upper Klamath benefit from frequent nocturnal convective mixing that stirs oxygen-laden surface water down to the bottom, until calm, cloudy summer evenings come along and curtail the nightly mixing. When wind does return, the now stagnant deep water infiltrates the water column along with toxic hydrogen sulfide gas that builds up in the lakebed when oxygen is absent. "It's like mixing a foul brew," says Horne, "and that's what causes the fish kills."

Instead of adding water, says Horne, add air. "If the fish are short of oxygen, we add it. This lake needs an emergency iron lung soon." Admittedly simple, Horne's oxygenation solution has created clearer water in many Western lakes and is a common tool at overcrowded fish hatcheries. Using benign wind or solar power, oxygen could be pumped to the bottom of Upper Klamath Lake, forming instant refuges for suckers. Diffusers on the lakebed could aerate surface water and prevent the stratification that restricts oxygen at depth. At a cost as low as $50 per ton of oxygen, Horne says, it's affordable. "The great thing about oxygenation is that it's dirt cheap."


BART NAGEL PHOTO

Horne proposes planting thousands of acres of reeds, which would act like filters, cleaning Klamath Lake of its nutrient-rich blue-green algae that rob fish of oxygen.

Horne testified before Congress with his solution in 2001, but the dueling interest groups – politicians, farmers, and biologists – who keep a watchful eye on Klamath Lake have yet to agree. Critics say Horne's plan either won't work or doesn't address the lake's ongoing problems.

But Horne remains confident that his solution will work, and work immediately. He knows there's a larger pollution problem behind Upper Klamath's murky green water – a problem he would solve by engineering the wetlands with thousands of acres of reeds and other native plants to trap nutrients and modify the water flow patterns through the wetlands.

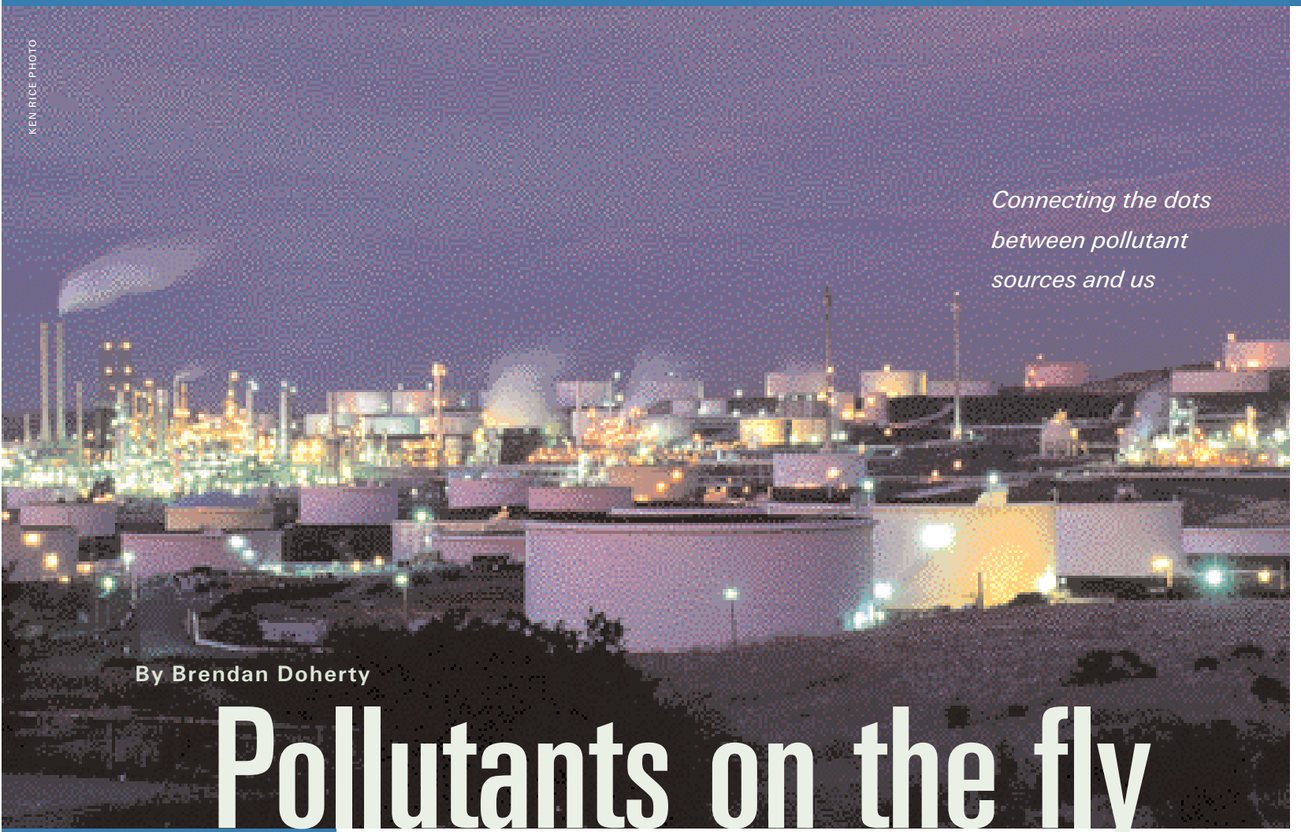
For now, though, no technology exists to detoxify the lake's sediments. Although the latest government guidelines for managing Upper Klamath Lake omit any mention of oxygenation, a recent report by the independent National Research Council concluded that there was no scientific basis for the federal policy to keep more water in the lake. That gives Horne hope that political currents could change, allowing him to demonstrate what a little, or especially a lot, of oxygen could do.

"We're working to change the conventional wisdom," says Horne, "and for Klamath Lake the clock is ticking. Suckers live a long time – they're tough as old boots – but they only have a decade or two. Let's keep the fish alive, and then we'll clean up the whole lake with a long-term solution."

"When fish die like that, it means they've run out of oxygen."

Blake Edgar, science acquisitions editor at the University of California Press and former senior editor of *California Wild*, has co-authored three books on paleoanthropology, including the *Dawn of Human Culture* and *From Lucy to Languages*. His work appears in Bay Area and national magazines.

"The great thing about oxygenation is that it's dirt cheap."



KEN RICE PHOTO

Connecting the dots between pollutant sources and us

By Brendan Doherty

Pollutants on the fly

"Raising new questions about which sources are most harmful to public health has only just begun."

Buses huff fumes and belch particles. Industrial smokestacks spew gases. And we inhale it – at least some of it. Depending on where you are, you may get more or less.

A novel approach to pollution research may provide a crucial link between emissions and their effect on human health. Berkeley civil and environmental engineer William Nazaroff is among a handful of engineers experimenting with a newly minted analytical concept called *intake fraction*, which allows researchers to quantify the pollutants people inhale from sources.

"Only a fraction of emissions from each source is inhaled," says Nazaroff, who has studied the physical and chemical processes that control human exposure to air pollutants for more than two decades. "We're trying to understand what controls that fraction, then explore how knowing it changes the way we think about the importance of different pollution sources."

Conceived in 2002 by researchers from Berkeley, Harvard, and the Swiss Federal Institute of Technology in Lausanne, intake fraction – the amount of pollution a person takes in from a specific source – unifies previous descriptions and equations to pinpoint the emissions-to-intake relationship more precisely than ever before.

"It's not just how much is emitted, but where people are located that affects exposure," says Nazaroff. "Our goal is to understand how each emitting activity contributes to the public's pollutant exposures. Raising new questions about which sources are most harmful has only just begun."

Over the past two years, Nazaroff set three graduate students to work on this project. Their work focuses on three issues: transportation emissions and their effect on human health; electricity and newly emerging distributed generators; and modeling spatial relationships between people and pollutant sources to help inform public policy.

Getting on the bus

Buses fill our city streets, carrying riders to and from work, thereby reducing the number of cars on the road. As cities grow, urban planners in growing numbers support the use of public transit through a hub and corridor system. However, as Nazaroff points out, there's a lot to be learned about the "exposure toll" paid by bus riders and those along the bus corridor.

Energy and Resources Group (ERG) doctoral student Julian Marshall is using intake fraction to quantify the impact of transit choices on public health. Looking at different modes of transportation – automobiles and light rail – and various bus fuels including diesel, compressed natural gas, and electricity, Marshall hopes to determine how the potential health impact varies with the mode of transportation.

"Causal links between motor vehicle exhaust and human health are well established," says Marshall. "But who is exposed and at what levels? This depends on how a city is laid out and on which transportation options people choose."

Whether you and your neighbors hop on a train, diesel bus, or a bike determines the type and concentrations of pollutants emitted into the transportation corridor, typically a densely populated area. It is often assumed that public transportation reduces pollution, but concentrating people along efficient transportation corridors may expose some travelers to higher concentrations of pollutants.

"Air pollution control policy exists to protect the public health," says Nazaroff. "What's novel about Julian's work is the element of proximity. It will answer questions about how commuting and living near a freeway could affect your health."

Local power generators are in, but should they be?

Distributed generators, or DGs, are cheap and efficient, and they're catching on nationwide as the new wave of power-generating technology. These small power generators, which can be widely distributed near demand locales, alleviate the need for long transmission wires, are relatively easy to deploy, and have the advantage of offering greater control of power quality and production for the user.

A relatively novel power source, DGs are making their way into our lives. While they can be designed to run on diesel fuel, natural gas, even solar and wind power, it's those that run on natural gas that are proliferating most quickly. While natural gas is cleaner than most other fuels, some researchers are concerned that even natural gas DGs may harm our health more than large power plants because they pollute air right where we are – at home or at work.

"They are being placed in neighborhoods all over the country in close proximity to people, unlike more traditional, large power plants, which were routinely located far from urban centers," says Garvin Heath, who is pursuing dual master's degrees in civil and environmental engineering (CEE) and ERG.

Power generation has been a hot button issue since the summer of 2001, when rolling blackouts threatened Californians and the price of electricity skyrocketed from $30 per megawatt to $330. Traditional power plants – nuclear, coal, or natural gas-burning plants – are tremendously expensive and time consuming to build. Deregulated in 1996, the power industry has not built a new major power plant in 15 years, despite growing demand.

"It's not just how much pollution is emitted, but where people are located that affects exposure."

KEN RICE PHOTO

"Intake fraction is a lens through which we can view the problem and bring important aspects into focus that have never been seen before," says Nazaroff (left), talking to Julian Marshall, who is studying the "exposure toll" paid by drivers and those who live or work along the transportation corridors.

KEN RICE PHOTO

In contrast to the more traditional ambient air quality monitoring, intake fraction stresses the proximity of pollution sources to people. Garvin Heath (left) and Abby Hoats are using intake fraction to investigate human exposures to pollution.

To help alleviate that demand, industry turned to small, quick-to-build distributed generators. The California Air Research Board estimates that there are 11,000 distributed generators in California. There are 40 on the Berkeley campus alone.

"Distributed generators are largely unregulated," says Heath, "and there is no clear understanding of their impact on public health. With the intake fraction approach, we hope to clarify key issues and gain a better understanding of the health risks."

Using the Los Angeles air basin, Heath compared a small DG power source to a central station plant and found a dramatic difference in the proportion of emitted pollution that is inhaled.

"Per unit of electricity delivered, the DG unit increased the amount of pollutants inhaled by nearby residents by an order of magnitude," says Heath. These small generators let out their exhaust just five meters from the ground. In contrast, large centralized power station stacks spew their exhaust sky high.

The state of California is trying to regulate distributed generator emissions so that they would, in theory, be equivalent to emissions from centrally generated power on a per kilowatt-hour basis. Other states and nations are also investigating DG policies.

"Our research puts a big exclamation point behind the word caution," says Nazaroff. "We want to know more about how DGs affect public health."

Public policy and where you live

Location, location, location, say the realtors of the world. "Making the links between pollution, location, and health is a first step to significantly improving environmental health problems and exposure inequities," says CEE doctoral student Abby Hoats, who is modeling how pollutants travel from one point to another in order to develop new tools to help shape public policy.

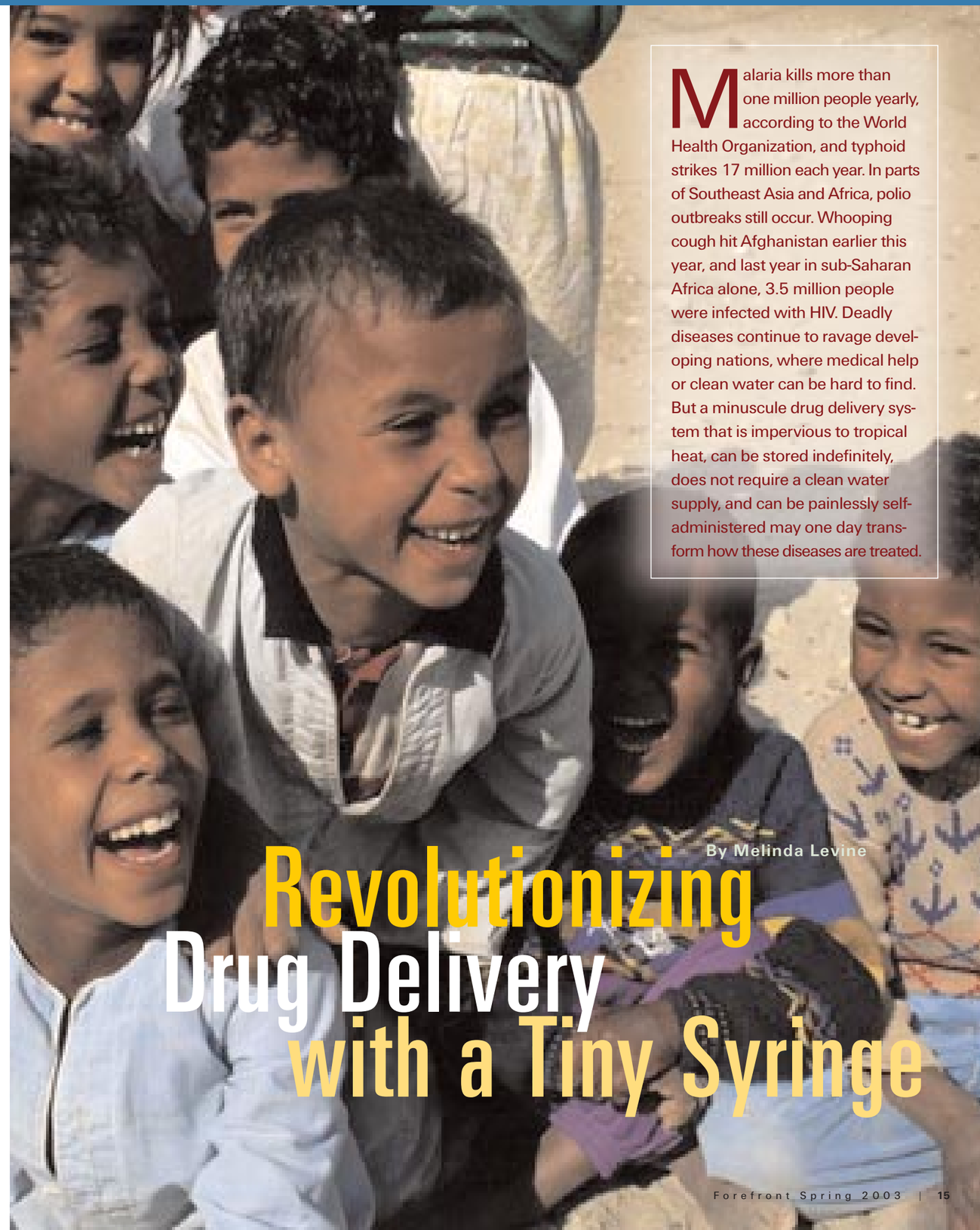
"Environmental justice issues are politically charged," says Nazaroff. "It pushes to the front burner the issues of who benefits from specific activities and who bears the burden. Up to now, the relationship between who benefits and who is burdened has defied quantification. But soon, the questions cities wrestle with about where to locate a major polluter may include an additional component calculating the total burden of inhaled air pollutants in the surrounding neighborhood."

While industrial emitters may know the type and amount of their emissions, ambient air quality measurements do not always reveal the full story of public health impacts from emissions.

"In one Southern California case, we studied the pollutant plume around a particular fixed source," says Hoats, "We were able to identify one demographic group there that made up only 30 percent of the population, but may have inhaled as much as 70 percent of the emissions simply because they lived or worked closest to the source. We hope intake fraction will be a good way to quantify the amount of pollution impacting different population segments."

Demographic data, such as that managed by Geographic Information Systems (GIS), which attaches key categories such as race and income to location, could provide that information. "Once we know the location of an emissions source," Hoats believes, "quantifying it with intake fraction analysis and GIS mapping would identify specific localities and demographic groups that shoulder a disproportionate pollution burden."

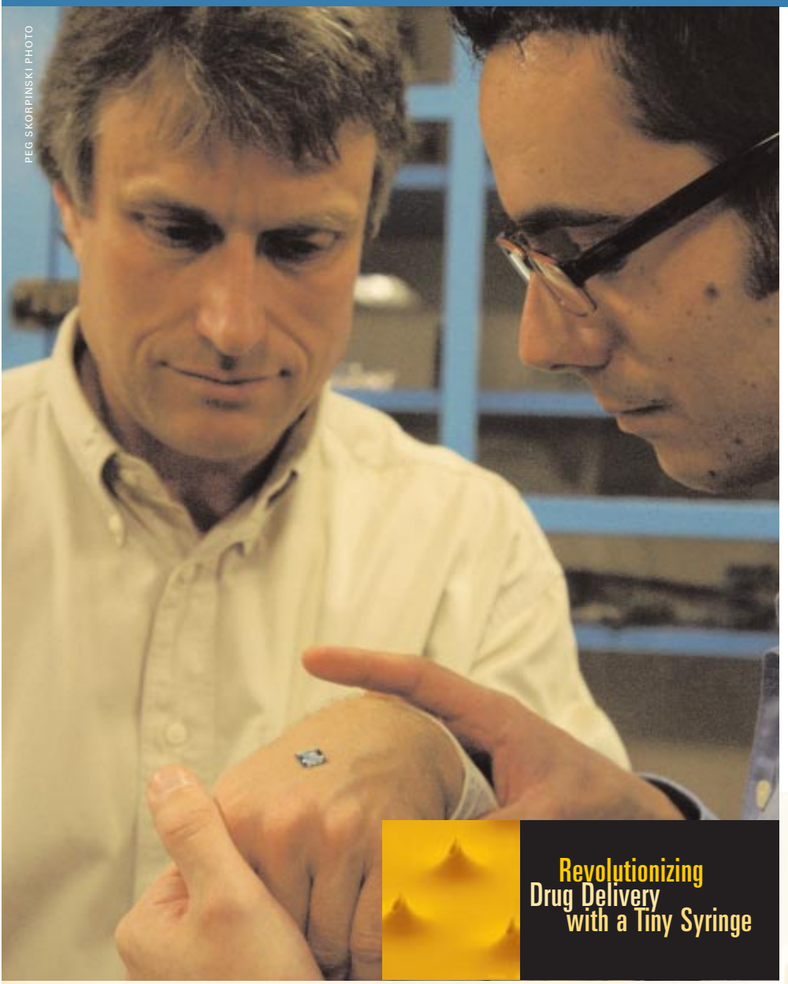
Brendan Doherty is a Bay Area-based science, health, and technology writer.



Malaria kills more than one million people yearly, according to the World Health Organization, and typhoid strikes 17 million each year. In parts of Southeast Asia and Africa, polio outbreaks still occur. Whooping cough hit Afghanistan earlier this year, and last year in sub-Saharan Africa alone, 3.5 million people were infected with HIV. Deadly diseases continue to ravage developing nations, where medical help or clean water can be hard to find. But a minuscule drug delivery system that is impervious to tropical heat, can be stored indefinitely, does not require a clean water supply, and can be painlessly self-administered may one day transform how these diseases are treated.

Revolutionizing Drug Delivery with a Tiny Syringe

By Melinda Levine



PEG SKORPINSKI PHOTO

Revolutionizing Drug Delivery with a Tiny Syringe

Boris Stoeber (right) gently presses the MEMS chiclet on Dorian Liepmann's hand, all it takes to deliver a life-saving dose of antibiotics. Stoeber fabricated the 10 mm x 10 mm MEMS syringe prototype in the Berkeley Microfabrication lab, a project funded by the Defense Research Projects Agency, and Becton, Dickinson and Company.

"The field of opportunity for this syringe is enormous."

New technology emerging from Berkeley's bioengineering labs could revolutionize the treatment of deadly diseases that threaten rural populations from the highlands of Kenya to the townships of Kentucky.

"By finding an alternative way to deliver drugs, we can open the door to more effective treatment of life-threatening illness," says Berkeley bioengineering professor Dorian Liepmann, who has been looking at new ways to deliver lifesaving drugs for almost a decade. Liepmann and postdoctoral researcher Boris Stoeber have developed a microelectro-mechanical system (MEMS) syringe – a fingernail-sized syringe, dubbed a chiclet for its resemblance to the squares of sugarcoated gum by the same name. The chiclet delivers a freeze-dried drug painlessly into the skin through an array of microneedles.

With oral medications, only about 10 percent of the actual dose reaches the blood system, says Liepmann. "But with the delivery system we are developing, nearly the entire dose hits the bloodstream immediately, making it infinitely more efficient," he says.

The chiclet seems simple in construct: a flexible shell made of silicone rubber, a drug suspension in a reservoir and, in a chiclet-sized syringe, up to 100 hollow silicon microneedles. Yet the device is anything but simple. It is designed to contain lyophilized, or freeze-dried, compounds that are extremely stable. To deliver the drug, the syringe is pressed against the skin for a few seconds. That pressure pushes the suspended dry drug out of the reservoir and into the microneedle channels, then out the microneedle tips and into the skin, where the body's own interstitial fluids assist in rapidly absorbing the drug directly into the bloodstream.

The targeted site in the epidermis is out of reach of sensitive nerve endings so, unlike deep injections from stainless steel needle syringes, this device comes pain-free. "Imagine children getting their childhood vaccinations without shedding a single tear," says Liepmann.

Storage and safe delivery are the two main problems medical personnel confront in getting certain drugs into remote areas where there are no trained medical workers to mix the drug compounds with sterile water and no electricity to power coolers, Liepmann explains. Some drugs, like antibiotics routinely prescribed to children – from amoxicillin to penicillin – must be refrigerated after they've been reconstituted into liquid form. "MEMS syringes could be kept anywhere, even in a Quonset hut, and delivered by anyone," he says.

Many drug compounds are unstable when mixed with aqueous liquids. But storing drugs as freeze-dried compounds, as the chiclet does, assures a long shelf life. These syringes can be shipped and stored at any temperature, require no preparation with water, and perhaps most crucial, the drugs they carry can be self-administered.

"The MEMS syringe will be attractive to developed countries too," adds Stoeber, whose work focuses on microfluid mechanics. "It could make drugs available that have been avoided because taking them orally causes liver and kidney damage. Drugs delivered through the MEMS syringe would bypass the liver, directly entering the bloodstream."

According to Liepmann, the chiclet will work best for those drugs that don't require precise doses – drugs like antibiotics and vaccines that are not supersensitive to overdoses. This is because the amount of pressure a finger exerts on the flexible reservoir determines how much medicine is delivered, and this varies from dose to dose and person to person.

Even with the limitations of imprecise dosage confining the MEMS syringe to delivery of specific drugs, the field of opportunity for this syringe is enormous, says Stoeber. "It's easy to use, inexpensive to produce, and doesn't require trained personnel or sophisticated storage facilities," he says. "It really could improve health care in the Third World and beyond."

Although the project is still in its early stages, Stoeber has completed tests of the chiclet on chicken breast tissues, where a suspension of microparticles was successfully delivered at the target depth with good results. And preliminary clinical trials, where drug absorption by the body can be monitored, are set to begin this spring at University of California, San Francisco Medical Center.

"We need to see just how far the needles have to go in and how large they have to be," Liepmann says. "We've proved the principle. Now we have to move on to clinical trials with specific drugs – the final validation of the drug delivery concept."

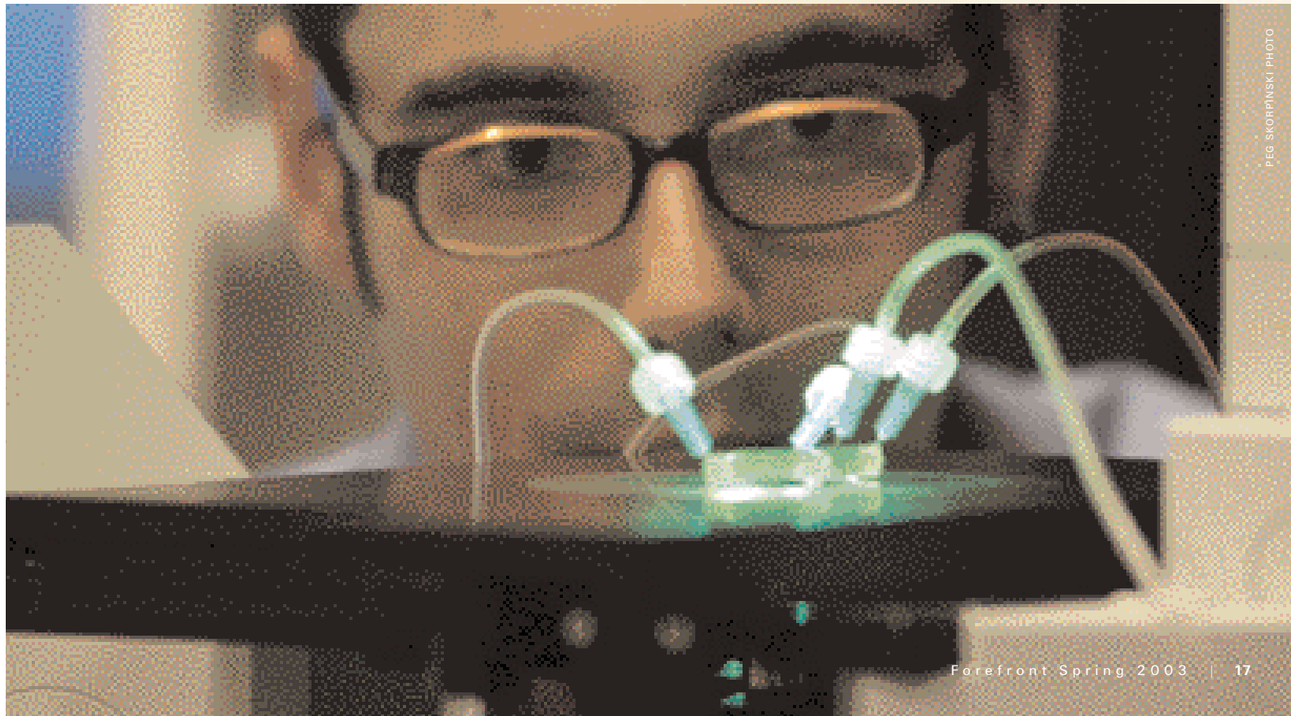
Future applications for the MEMS syringe are numerous. Paramedics could shave off precious minutes in an emergency preparing a lifesaving syringe. NASA has always sought compact, light, ready-to-use drugs for astronauts aboard a spacecraft. And in the event of a bio-terrorist attack, the MEMS syringe would make it easier for large numbers of sickened people to receive quick treatment.

Two years ago a yellow fever epidemic in Guinea threatened the lives of several million people because 1.5 million doses of vaccine could not be delivered. "The chiclet could provide a way for the rapid deployment of medication, anywhere in the world," says Liepmann.

Melinda Levine is an Oakland-based book editor and freelance writer specializing in health, technology, and community relations.

PEG SKORPINSKI PHOTO

Fussball in Liepmann's Microfluids Research Lab is an all-time leveler and stress reducer. "We work collaboratively," says Liepmann, who holds the Lester John and Lynne Dewar Lloyd Distinguished Professorship in Bioengineering. "My students are colleagues. But," he says, "if they beat me at Fussball, I add chapters to their dissertations."



PEG SKORPINSKI PHOTO

This neon-lit, transparent microfluidic device, seen here on an inverted stage microscope, allows Stoeber to visualize the route particles travel as they enter a small channel, much like the microneedle channels in the chiclet-sized syringe.

PEG SKORPINSKI PHOTOS

"How many parts does your bike have?" Devine asks. "Would you believe more than a thousand?

The closer you look at the bike, the more you realize how many parts there are and how they function," he tells the students, who will soon be afloat in hundreds of parts, from rims, spokes, bushings, and tierods, to break levers, steering tubes, and aluminum lugs.

Matt Sherburne (left), MSE graduate student, former bike racer, and Devine's graduate assistant, says, "We talk about why the components work the way they do. When we talk about spokes, we talk about 'Euler' buckling and why a bicycle wheel is built with the spokes in tension, unlike the old wagon wheels built with the spokes in compression. Now the students understand the engineering principles that go into making a wheel, and why and where steel or aluminum frames sometimes break."

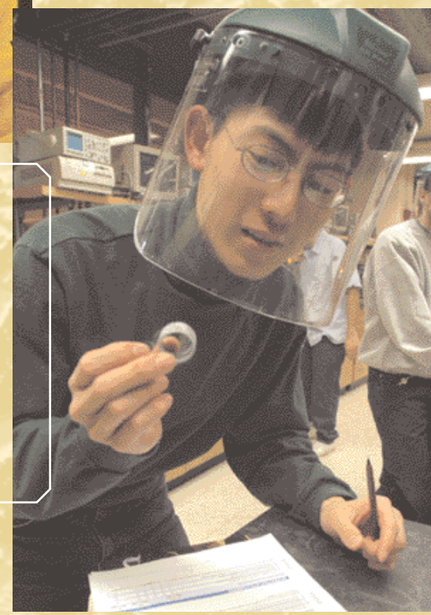
Getting to know your bike atom by atom

Pedaling 16 hilly miles from Moraga to the Berkeley campus and back – a daily journey Professor Tom Devine made rain or shine for a year – gave the materials science and engineering professor ample opportunity to plan a class using his bike to teach basic engineering concepts. The result: MSE 24, a popular freshman seminar Devine has taught on and off for the past nine years. "Biking is a good way to teach the fundamentals of engineering systems and engineering design," says Devine. "No one is intimidated when you talk about bikes."

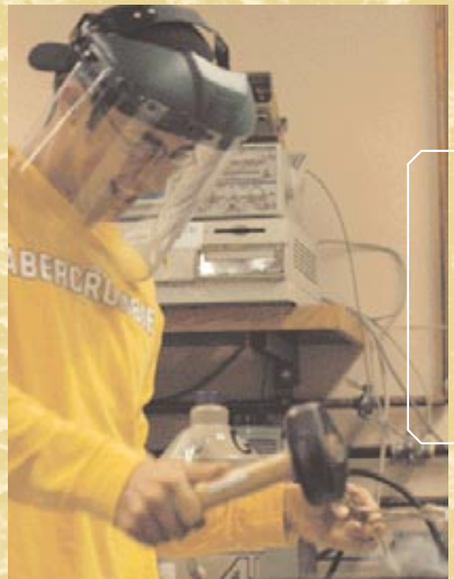
Last fall a relaxed group of 18 students met weekly with Professor Devine, to tear down and reassemble bikes, peer at parts under a microscope, then analyze the materials for hardness, strength, impact loading, resistance, and metal fatigue. Their analyses led to their final project: select resilient materials, then design a "perfect" bike.

PHOTOS BY PEG SKORPINSKI

"I'm interested in the molecular level of materials," says Julie Chao, having just completed a set of metal impurities tests. Sometimes, she says, impurities can strengthen a metal. "At the molecular level, all the atoms are next to each other. To make a dent, the atoms have to break the bond and form another bond with the atom right next to it. When an impurity gets into a metal, the atoms around it can't move as easily as if it was a pure metal. So the bond of the atoms around the impurities can be harder to break."



Mountain biker and ChemE freshman Vincent Chan sawed quarter-inch lengths of metal tubing, sampling carbon and low-alloy steel, aluminum, and titanium – the metals used in bike frames – testing them using the Rockwell hardness tests. After heating the steel samples to 800º C, and the titanium tubes to 1,000 º C, Chan quenched some of the red hot samples in oil, to cool them slowly. He quenched others in water, to cool them rapidly, before testing both batches. "Freshman seminars are different from other courses," says Chan. "They are low pressure classes that encourage students to interact more with professors."



BioE major Stephan Zmugg took his turn smashing a piece of low-alloy steel tubing that had been heated, then plunged into a vat of liquid nitrogen at a frigid –196 º C for 15 minutes. Smash tests help assess whether or not a frame has core resistance to impact.

"We want to know if the metals behave like glass or taffy," says Devine explaining the test. "What we want is taffy, for a ductile, tough material. It's a simple binary test. You grab the sample, drop it, smack it, and either it breaks or it doesn't."

Graduate student brings books to life

With just a zap of a handheld computer, oral histories can now talk and move, thanks to the work of a Berkeley engineering doctoral student.

Scott Klemmer's *Books with Voices* is an interface that uses an enhanced personal digital assistant (PDA) and barcodes to link transcripts with corresponding video from an historical interview. Klemmer and his collaborators will present the project this spring at the 2003 Conference on Human Factors in Computing Systems, the largest meeting worldwide on human-computer interaction.

A Ph.D. student in EECS, Klemmer worked with the prestigious Berkeley Regional Oral History Office (ROHO) and office technology company Ricoh Innovations to develop the system. *Books with Voices* introduces into the reading experience the primary source materials of oral history – the videotaped subject interviews – which until now might sit gathering dust on a library shelf.

"Predictions of a paperless office in the information age didn't happen, and more paper is generated now than ever before," says James Landay, EECS professor and Klemmer's faculty advisor. Landay also co-directs the Group for User Interface Research (GUIR).

ANGELA PRIVIN PHOTO

Doctoral student Scott Klemmer synchronized video and text to create a multimedia experience that adds a compelling, personal dimension to reading oral histories. "Building technology based on what people do is a huge improvement over ignoring people," he says.

Here's how *Book with Voices* works: The printed transcript is tagged with barcodes, like UPC codes on grocery store products, which correspond to the original videotape of the subject interview. Using the PDA – which is augmented with a barcode reader and a tiny 2-gigabyte hard drive – the reader clicks to scan the code beside a passage and, within seconds, the corresponding video clip plays on its screen.

Books with Voices and a companion project, *The Designers' Outpost*, inspired Klemmer's dissertation, *Papier-Mâché*, a toolkit for building tangible interfaces to link physical and electronic media. "The paper-saturated office," Klemmer writes, "is not a failing of digital technology; it is a validation of our expertise with the physical world." He describes himself as a technologist working with user-centered design research methods that focus on the needs of a particular community.

In his research for *Books with Voices*, Klemmer picked the brains of ROHO's professional oral historians and took training in the field. He conducted oral histories with computer sciences professors David Patterson and Carlo Séquin, and generated *Books with Voices* transcripts. To get an idea of how it works, see these oral histories at *http://guir.berkeley.edu/oral-history/*.

Through feasibility testing with 13 people experienced in oral history or computer technology, Klemmer found that readers accessed the video an average of 10 times per hour. "It's typical to access the video in the beginning to get a sense of the subject's character," he says. Users also consulted the visual component for details about the subject's facial expression or intonation.

Jamey Graham and Gregory Wolff of Ricoh spent a year researching the barcode integration technology for the project. As ROHO moves from analog to digital transcription for its oral histories, *Books with Voices* will be incorporated into the archive.

PHOTO COURTESY OF SCOTT KLEMMER

The Books with Voices PDA is used to scan a barcode in the oral history text and display the corresponding video with a single click. Users tend to reference the video component to get a sense of the subject's personality or intonation.

David Pescovitz, editor of the College's online publication *Lab Notes*, and **Angela Privin,** editor of *Engineering News*, contributed to this story.

Google's Schmidt takes center stage at tech event

Eric Schmidt (M.S. '79, Ph.D. '82 EECS) has seen the future and "it's frighteningly smart." The chairman and CEO of Google, Inc. – the world's fourth most popular Web destination – addressed nearly 200 Berkeley engineering alumni, students, and guests at the third annual Berkeley in Silicon Valley Symposium. Held in March at the Sun Santa Clara Conference Center, the symposium explored new directions in science and technology.

Schmidt's keynote address opened the symposium, which showcased Berkeley engineering and chemistry faculty and an afternoon panel discussion entitled *Homeland Security and Privacy: Can We Strike the Right Balance?* featuring experts from industry, government, and academia.

"The next generation of 20-somethings is frighteningly smart. I'm really glad they work for me," joked Schmidt in a spirited and entertaining talk on technology's past, present, and future. The tech bubble of the mid-1990s is unlikely to repeat itself, he predicted, and as a CEO he is troubled by the tech sector's drop in profits. But with the high level of innovation percolating in technology, particularly in universities, he expressed optimism that the "clever entrepreneurs" will drive a recovery for the ailing industry.

Engineering faculty presenters included Lisa Alvarez-Cohen and Daniel Kammen speaking on the environment, Boris Rubinsky on medicine, and Eric Brewer and David Wagner on cybersecurity.

The afternoon panel discussion addressed the national focus on homeland security; the intersection of public needs and private rights; and the role of government, academia, and business in gathering information and protecting individual privacy. Panelists included Teresa Lunt, a scientist at the Palo Alto Research Center; Charles Shank, director of the Lawrence Berkeley National Laboratory; Mark Kvamme, Berkeley alumnus and partner at Sequoia Capital venture capital firm in Menlo Park; EECS professor and cybersecurity expert Doug Tygar; and panel moderator Shankar Sastry, EECS chairman and professor.

Sun Microsystems donated its facility for the event, which was sponsored by the Colleges of Chemistry and Engineering. To see Schmidt's keynote address and engineering faculty presentations, go to our multimedia gallery at *www.coe.berkeley.edu/multimedia/index.html*.

Angela Privin, editor of *Engineering News*, contributed to this story.

YVETTE SUBRAMANIAN PHOTO

Eric Schmidt's 20-year career in software development, management, and marketing was launched with degrees from Berkeley engineering and included stints at Xerox Palo Alto Research Center, Bell Laboratories, and Sun Microsystems before he landed at Google.

Engineering Short Courses

For a full list of courses offered by UC Berkeley Extension, visit *www.unex.berkeley.edu*. Courses listed below are part of the Berkeley Summer Engineering Institute, *www.unex.berkeley.edu/eng/sum*.

JUNE 2003

2-3	Project Risk Management for Major Engineering and Construction Projects
5-6	Supply Chain Management for the Delivery of Capital Projects
9-10	Lean Construction
12-13	Project Management Master Simulation
16-18	Fundamentals of MEMS
16-18	Inventing the Future: User Interface Design, Prototyping, and Evaluation
16-18	High-Speed Networks: SONET, ATM, IP, and MPLS
16-20	UNIX Kernel Internals
19-20	Parametric Design of MEMS
19-20	Bioinformatics: Key to a New Biology
23-24	BioMEMS
23-24	Optical MEMS in Communication and Sensing
23-25	MOSFET Physics, Technology, and BSIM Models
25-26	Engineering Practical Microsystems for Biochemical Analysis
26-28	Seismic Isolation and Energy Dissipation Systems
30-July 1	Developing FPGA Digital Signal Processing Systems

JULY 2003

14-16	Plasma Etching and Reactive Ion Etching
14-18	High-Speed Low-Noise Analog IC Design
21-24	Airport Systems Planning and Design

Four engineering alumni honored for exemplary careers

Four illustrious engineering alumni and one young up-and-comer were honored for their achievements with the 2002 Distinguished Engineering Alumni Awards (DEAA) from the Engineering Alumni Society (EAS). Awardees included:

- George Leitmann, Ph.D. '56 ME;
- Robert S. Pepper, B.S. '57, M.S. '58, Ph.D. '61 EE;
- Theodore W. Van Zelst, B.S. '44 CE; and
- Valerie E. Taylor, Ph.D. '91 EECS.

Nearly 200 fellow alumni, faculty, family members, and other guests celebrated the award winners at a dinner last November at Berkeley's Claremont Hotel, where multimedia presentations told the stories behind these remarkable engineers and their careers.

In its 28th year, the awards program recognizes lifelong career achievement in engineering, as well as service to the University and engineering community. New this year was the Outstanding Young Leader Award, designed to honor and inspire young engineering alumni just establishing their careers.

The awards committee, comprised of Dean A. Richard Newton, EAS officers, chair of the engineering faculty, a past award recipient, and other alumni, is now accepting nominations for 2003 awardees. For details, contact Gina Rieger at 510/643-7100.

GEORGE LEITMANN: new millennium Renaissance man

Known worldwide as the father of modern geometric optimal control and game theory, George Leitmann has served the College for more than four decades as faculty member, educator, and administrator. Although he officially retired in 1991, he remains active in research, administration, and public service.

A native of Austria, Leitmann completed his B.S. and M.A. degrees in physics at Columbia University. He earned his Ph.D. in engineering science at Berkeley and joined the faculty in 1957, becoming a full professor of engineering science in 1963.

Among his many credits are serving as the first ombudsman of any UC campus, a title he held at Berkeley during the troubled Vietnam-era years 1968-1970. Other administrative posts included vice chair of mechanical engineering, associate dean for graduate study and research, and chair of the faculty of the College of Engineering. He is currently professor of the Graduate School and director of International Programs for Engineering at Berkeley.

In 1991 Leitmann received the Berkeley Citation, one of the University's highest honors, and was named Professor Emeritus. His international stature is reflected in his six foreign memberships in science or engineering academies, his three honorary degrees from European universities, and his membership in the U.S. National Academy of Engineering. A highly respected teacher, he has mentored more than 100 postdocs who hold important positions worldwide in academia, industry, and government.


PEG SKORPINSKI PHOTO

George Leitmann (third from left) is known for his sense of humor, athleticism, love of the arts, and devotion to family. Also shown are his wife Nancy and former student Majdedin Dean Mirmirani, now chair of mechanical engineering at Cal State LA, and his wife. Between the Leitmanns in the background is their grandson Joseph.


PEG SKORPINSKI PHOTO

Bob Pepper left academics in 1964 to begin a brilliant entrepreneurial career that culminated at Intel.

ROBERT PEPPER: from cyberspace to outer space

Bob Pepper's innovations and achievements in the integrated circuit industry have garnered him worldwide acclaim and made his name synonymous with the term *semiconductor*.

Pepper entered Berkeley's electrical engineering department fresh out of high school, earned his bachelor's and master's degrees with honors and, before even completing his Ph.D. in 1961, was invited to join the faculty. In that capacity, he was instrumental in establishing the integrated circuits laboratory, forerunner of today's state-of-the-art Microlab.

In 1964 he joined Sprague Electric as engineer and manager. There he assumed a major role in developing the rocket motor ignition trigger on the Apollo 11 lunar excursion module, as well as the famed *moon wafer*, the 1.5-inch silicon wafer that preserved 74 messages from world leaders and was left behind as a historical marker of the mission.

In 1986 he founded Level One, a pioneering developer of high-performance Internet products that was eventually acquired by Intel. Here Pepper developed his vision for the Fabless Semiconductor Association, a worldwide organization for subcontracting chip manufacturing to outside suppliers. He retired from Intel in 2000.

Pepper competed in motorcycle road racing for 14 years, once winning 21 races in a row. He now shares his wheels with wife Star, whether it's their Yamaha FJR 1300R, their powerboat, or motor home. He continues to support Berkeley through the Robert S. Pepper Distinguished Chair and the Engineering Advisory Board.

THEODORE VAN ZELST: forging real-world solutions

A visionary and leader in materials testing, Theodore Van Zelst has left a legacy of civil engineering inventions and designs still in widespread use today, from the Alaska pipeline to the Aswan Dam, down highways, across the globe, and on the moon.

Van Zelst earned a Bachelor of Applied Science in 1944 from Berkeley, then returned to his native Chicago to get his B.S. and M.S. in civil engineering from Northwestern University.

In 1948 he co-founded Soiltest Inc., which became the world's largest provider of materials testing equipment for soil, rock, concrete, and asphalt. His impressive list of accomplishments includes devising the swing-wing design that enabled supersonic aircraft to penetrate the sound barrier, developing the first mobile baggage inspection unit, and planning lunar construction and soil testing years before Neil Armstrong set foot on the moon.

He was named Chicago Engineer of the Year in 1988 by the American Society of Civil Engineers and in 1989 received the Alumni Medal, Northwestern's highest award.

He keeps active in both his Alma Maters and has been an outspoken advocate for education, the environment and public policy. Van Zelst is nationally revered as the "father of chronic fatigue syndrome advocacy" for his and his wife Louann's efforts on behalf of the disease that struck a family member.


PEG SKORPINSKI PHOTO

Ted Van Zelst (right) was instrumental in donating land for Alaskan national parks in the 1980s and has labored to improve science education in the U.S. At left is Professor Emeritus Karl Pister, who nominated him for the DEAA.


PEG SKORPINSKI PHOTO

Through her many outreach activities in the community, Valerie Taylor (center) hopes to inspire young people the way her engineer father inspired her. Also pictured are fellow alumna Barbara Simmons (left) and EECS Academic Coordinator Sheila Humphreys (right).

VALERIE TAYLOR: bridging the digital divide

Valerie Taylor is the College's first recipient of the Outstanding Young Leader Award. Formerly professor of electrical and computer engineering at Northwestern University, Taylor moved to Texas A&M in January to become head of computer science.

In computing circles, she is respected for her research in techniques to analyze and improve performance in parallel and distributed computing applications. While this work has uses in cosmology, molecular dynamics, and high-energy physics, Taylor's vision includes using high-performance computing to improve education in the African American community.

As a child in Chicago, Taylor was encouraged to pursue science by her engineer father. She excelled as a student, earning bachelor's and master's degrees in electrical engineering from Purdue University and a Ph.D. in EECS from Berkeley. Now a mother of two, Taylor hopes to inspire young people through outreach efforts, like teaching math and science in a downtown Chicago housing project.

Taylor is a founding member of the Institute of African American E-Culture, supported in part by the National Science Foundation (NSF), and chair of the Coalition to Diversify Computing. Her awards include the NSF's prestigious National Young Investigator Award, the Computing Research Association's A. Nico Habermann Award, and the Hewlett Packard Harriet B. Rigas Award.

Alumnus Jurafsky wins coveted MacArthur Fellowship

Berkeley engineering alumnus Daniel Jurafsky ('83 Linguistics; Ph.D. '92 EECS) is a genius when it comes to teaching computers how to better understand people. The winner of a prestigious MacArthur Fellowship, commonly called a "genius grant," Jurafsky teaches linguistics and computer science at the University of Colorado at Boulder.

Jurafsky, 39, was one of 24 recipients of the 2002 grants, a $500,000 award to "pursue their own creative, intellectual, and professional inclinations."

Developing a better understanding of how people use language is essential to the development of more advanced natural language processing so we may someday talk to computers in our native tongue. To that end, Jurafsky is working on new speech recognition technology that is more forgiving of foreign accents. He's also developing Web-based natural language software so users can query Internet resources in plain English.

The MacArthur Selection Committee – a group of about a dozen leaders in the arts, sciences, humanities, and nonprofits – praised Jurafsky's research in computational linguistics for providing "clues to the underlying semantic structure of communication."

Jurafsky's research may help humans talk to one another more effectively as well. For example, Jurafsky and his collaborators have shown that we pronounce more precisely words that are key for the listener to be able to accurately understand potential ambiguities.

In 2000 he literally wrote the book on computational linguistics, *Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition,* co-authored with CU-Boulder computer science professor James Martin.

PHOTO COURTESY OF CU-BOULDER PHOTOGRAPHY OFFICE

Daniel Jurafsky was recognized by the MacArthur Foundation for his "extraordinary originality and dedication" in computational linguistics.

"Not only is Dan a brilliant and creative thinker, but he is a kind, generous and giving human being," says CU-Boulder Linguistics Chair Barbara Fox. "We are immensely proud of him and extremely fortunate to have him in our community."

After a post-doctoral position at the International Computer Science Institute in Berkeley and an affiliation with the University's Department of Linguistics, Jurafsky joined the University of Colorado in 1966.

By **David Pescovitz,** editor of the College's online publication *Lab Notes*.

An engineering approach to preventing HIV in women

David Katz (Ph.D. '72 ME) is leading a group of Duke University biomedical engineers investigating topical microbicides that could be administered intravaginally to prevent sexually transmitted HIV infection in women.

Returning to Berkeley last fall to speak, Katz described his efforts to find antiviral agents that would reach the right tissues, adhere to them, and remain in place long enough to annihilate the virus. The delivery system – the gel or cream that carries the agent to its target – is as critical as the agent itself.

The Centers for Disease Control estimate that as many as 160,000 adult and adolescent women in the U.S. have AIDS-causing HIV infection, most caused by heterosexual exposure to HIV. Ultimately, Katz and his colleagues hope, women could apply such agents themselves to prevent the spread of HIV.

"About 40 percent of topical medication failures result from bad delivery systems rather than failure of the active ingredient," says Katz, who describes the project as a classic engineering problem. He is the Nello L. Teer Jr. Professor of Biomedical Engineering and a professor of Obstetrics and Gynecology at Duke.

The research is being supported by a $2.3 million grant from the National Institutes of Health, a $90,000 award from the American Foundation for AIDS Research, and other funding agencies, including the Food and Drug Administration.

JENNIFER PETERS PHOTO

David Katz (Ph.D. '72 ME) says he grew up with a "heavy dose of reproductive rights" from his mother, one factor influencing his career interest in reproductive biology and clinical obstetrics and gynecology.

Class Notes

Share your news with Berkeley Engineering alumni in *Class Notes*. These entries are condensed, but you can see them in full on the Web at *www.coe.berkeley.edu/alumni_friends/class_notes.html*. From there, click on *Submit your Class Note* to send us your entry and photo for future listings.

2000s

Jerry Fairley Jr. (Ph.D. '00 MSE) is assistant professor at the University of Idaho Department of Geological Sciences.

Vibert Greene (M.S. '01 ME) of Newark, California, writes, "I have been working for the California Public Utilities Commission for 34 years now."

Meena Makhijani (B.S. '00 ME) of Berkeley writes, "I work in the medical device industry as a product development engineer. I am on my company's Cal recruiting team, so I remain tied to the campus. I continue to play *tabla* (Indian drum) and perform Indian classical dance."

Bassam Tabbara (M.S. '98, Ph.D. '00 EECS) of San Jose is busy with the Verdi™ and other projects. He is volunteering in the community and planning a vacation trip to Lebanon.

1990s

Stephen Blackburn (B.S. '98 EECS) moved to England in 2001 and is working as a software engineer for a startup company in Cambridge.

Tom Boardman (B.S. '90 CE) is a geotechnical engineer with Kleinfelder in Oakland. He writes, "Katherine and I are getting married next May and plan to honeymoon in southeast France."

Florence Yao Claros (B.A. '96 CS) has worked as an information technology engineer for Hewlett-Packard and Agilent Technologies. She lives in San Francisco.

Staci (Edlund) Davis (B.S. '93, M.S. '95 ME) and her husband Peter Davis announce the birth of their daughter, Sara Marie, on Oct. 1, 2002, in Los Angeles.

Bryan Fox (B.S. '96 ME) works for Capstone Turbine Corp. in Chatsworth, California, as a quality control manager. He and his wife Tammy live in nearby Agoura Hills.

Saul M. Kane (M.S. '96 CE) is a traffic engineer in San Diego.

Karen Navas (B.S. '92 EECS) of San Jose, writes, "I have started a nonprofit organization to benefit our local school and community by purchasing lab buildings and equipment for music, math, science, and computers."

Chris Tow (B.S. '93 EECS) of Redwood City finished a master's degree in 1994 at UCLA. He worked for Oracle Corp. and now works for Openwave Systems Inc., formerly *Phone.com*.

1980s

Michael Alston (M.S. '81 EE) of San Diego will teach the VLSI Physical Layout and Verification course in UCSD Extension's new certificate program in VLSI design.

Masayoshi Fuse (M.S. '84 IEOR) is general manager of the Plant and Production Systems Engineering Division at Sumitomo Electric Industries Ltd. in Osaka, Japan.

Linda Herkenhoff (M.S. '81 ME) of Orinda is human resources director at Stanford University.

Stephen Keehn (M.S. '82 CE) of Delray Beach, Florida, is a coastal engineer with projects from Florida to New York, including beaches, inlets, and sand searches.

Jane C.S. Long (B.S. '75 CE, Ph.D. '83 MSE) is dean of the Mackay School of Mines at the University of Nevada, Reno.

1970s

Louis De Waal (M.S. '72 CE) of Cape Town, South Africa, is chairman of Hawkins Hawkins & Osborn consulting civil engineers and Table Mountain Cableway Company.

Howard Elliott (B.S. '70 IE) is a retired part-time management consultant in Cincinnati.

Robert Gravano (M.S. '75 CE) of Fresno is president of Advanced Structural Design Inc.

Bob Guletz (B.S. '70 CE) was recently named director of management services for Harris & Associates, an engineering and management consulting firm in Concord, Calif.

Ethlyn Ann Hansen (M.S. '72 CE) of San Rafael is an honorary member of the Institute of Transportation Engineers. She received the Theodore M. Matson Award for outstanding contributions in the field of traffic engineering.

Douglas Howie (M.S. '75 EECS) works with mobile Internet protocols and the NS-2 simulator, developed in part at Berkeley.

Wayne Paulsen (B.S. '70 ME) of Redwood City works in engineering management at Genentech. He is still the consummate sports fan and woodworker and "hopes to escape the rat race soon."

Richard Prima (B.S. '74 CE) is public works director for Lodi.

Douglas Raymond (B.S. '67, M.S. '70 ME) of Orinda, retired from Teradyne in 2001. Since then, he writes, "I have had two interesting temporary jobs on campus, one at the Alumni House and the other in the Molecular and Cell Biology Department."

Mike Selna (B.S. '70 CE) is deputy assistant chief engineer of the Los Angeles County Sanitation Districts.

Hann So (B.S. '79 IEOR) of Cupertino was CTO of an Internet company until last year. He is now a consultant and teaches Web technologies at De Anza College and the University of Phoenix online.

Glenn Tango (B.S. '74, M.S. '76 CE) of Waipahu, Hawaii, runs a family mechanical construction company. He still enjoys watching Cal beat Stanford in the Big Game.

Michael Zywokarte (M.S. '71 CE) of Washington, D.C., is president of MDZ Associates Inc.

1960s

Richard Frankel (M.S. '44, Ph.D. '65 CE) serves as industrial environment advisor to the Ministry of Industry and Handicrafts, Vientiane, Laos, training government officers in industrial environmental management methodologies.

Ralph Iwens (M.S. '64, Ph.D. '67 EE) has been traveling in Europe, China, and Hawaii since retiring from TRW in 1999. His last project was manager of systems engineering for the NASA Chandra X-Ray Observatory.

Howard Maccabee (M.S. '64, Ph.D. '66 NE) recently completed the expansion of the Radiation Oncology Center at John Muir Medical Center in Walnut Creek.

Jay McCoy (B.S. '63 CE) of Concord travels to Bangkok each month to teach English to Thai fifth- and sixth-graders.

Stanley Meresman (B.S. '68 IEOR) of Los Altos joined a venture capital firm, Technology

Class Notes

www.coe.berkeley.edu/alumni_friends/class_notes.html

IN MEMORIAM

Helen Peters (B.S. '51 CE) became the fourth woman to register as a civil engineer in the state of California in 1955. Pictured with her are, left, Harold Yackey (B.S. '55 ME) and, right, Bernard Etcheverry, professor (1915-1951) and chairman (1923-1951) of engineering, for whom Etcheverry Hall was named in 1964.

Helen Peters: pioneering woman in groundwater hydrology

Helen Joyce (Pease) Peters (B.S. '51 CE), the fourth woman to become registered in California as a civil engineer, died Sept. 1, 2002, at age 72.

Peters was the first woman engineer at the California Department of Water Resources (DWR), where she began a 40-year career as a student aid in 1950. Known statewide, nationally, and internationally as a specialist in groundwater hydrology and management, she also advised the Department of the Interior, U.S. Geological Survey, and worked for both Australia and Morocco.

In her first DWR position, Peters supervised the field crews who documented water availability and use in the Klamath River Basin as groundwork for the compact formed between Oregon and California in 1957. When her appointment as chief of flood forecasting coincided with the 1976-77 drought, the most severe in California history, she converted the flood center to the drought center.

Peters was a member of the American Society of Civil Engineers, the Society of Women Engineers, the American Geophysical Union, the U.S. Department of Interior Advisory Committee on Water Data for Public Use, and the UC Engineering Advisory Council. She is survived by her sister Marianne Robertson of Newcastle, California, and several nieces and nephews.

Crossover Ventures, as general partner and COO. His daughter is in college. He and his wife Sharon have attended 34 consecutive Big Games.

Katta Murty (Ph.D. '68 IEOR) of Ann Arbor, Mich., writes, "I prepared the *Self-teaching Webbook on Computation and Algorithmic Linear Algebra* and have been critically examining the trends in technology. Go Bears!"

Michael Silverstone (B.S. '65 EE) of Irvine was chief engineer of Radio KAL, forerunner of KALX.

Paul S.L. Wu (B.S. '63, M.S. '64 ME) of San Diego writes, "I work as a design engineer with Hewlett-Packard Imaging and Printing Group, doing mechanical system and electronic control circuits design and enjoying it."

1950s

Bernard Barden (B.S. '53 ME) retired in 1987 from IBM and is now a docent at the San Francisco Maritime Museum and Hyde Street Pier. He sails "tall ships" whenever he can.

Lou Beck (B.S. '53 CE) of Fresno writes, "Since retiring, I've been catching up on house maintenance and working on my hobbies, Dixieland jazz and collecting California license plates."

Ralph Bishop Sr. (B.S. '51 CE) has enjoyed a successful career with the California State Highway Bridge Department for 37 years and as a consultant for 12 years.

Burton Corsen (B.S. '50 ME) is happily retired in San Jose.

David Hendricks (B.S. '54 CE) of Fort Collins retired from the Colorado State University faculty in January after working there 30 years.

Harry Krueper (B.S. '53 ME) of San Bernardino is a consulting engineer in civil and traffic engineering, environmental reports, and land surveying.

Charles Lawson (B.S. '53 EP) of Sunnyvale is tutoring kids in East Palo Alto.

Robert Lee (B.S. '42, M.S. '55 CE) retired in November as chairman of the Residential Users Appeal Board of the San Francisco Public Utilities Commission after 15 years of service.

Saifullah Paracha (B.S. '54 ME) of Quetta, Pakistan, has served in the Pakistan Senate, the Pakistan Chamber of Engineers, and as president of the Federation of Pakistan Chambers of Commerce and Industry.

Edward Phillips (B.S. '54 EP) of Troy, Michigan, builds cardiology and paraplegic rehabilitation equipment.

Ejlef Sorensen (B.S. '58 CE) of Northridge, California, writes, "At the age of 78, I'm mostly retired but still do some city engineering projects."

Jodean Sparling (B.S. '52 ME) of Inglewood retired in 1991 and did some engineering consulting in 2000 and 2001. He is studying transformational breathing.

Carl Weinberg (M.S. '53 CE) of Walnut Creek is mostly retired but still does some consulting in the electric utility system.

Charles E. Zell (B.S. '50 CE, M.S. '53 TE) of Sacramento, writes, "I continue to pursue my lifetime hobby of trains and railroading and this year was elected president of the Organization of Macular Friends, a support group for persons with macular degeneration."

1940s

Rino Bei (B.S. '48 CE) moved to Sonoma in 1999. He turned 80 in July and has seven children and 18 grandchildren.

George Cooper (B.S. '40 MM) is retired in Saratoga, California, following a long career with NASA, where he was chief of flight operations at the Ames Research Center and a chief of research engineering test pilot.

John Good (B.S. '48 IE) is a property management and construction industry consultant in Alamo, California.

Charles Hepner (B.S. '48 ME) retired from a patent law practice in Sharon, Connecticut, and is setting up a woodworking shop. He writes, "At the rate I'm going, I may never make anything, but I will have a really nice shop."

Robert Moeller (B.S. '42 EE) is back to gardening at his home in Los Angeles after surviving a heart attack in June.

William Silcox (B.S. '47 ME) of Incline Village has climbed Mt. Whitney three times, in 1940, 1990, and in 2002. He writes, "Went up to the top at 14,497 feet and back at age 80. Can't go any higher in the contiguous U.S."

John Vidmar (B.S. '43 ME) is retired in Los Angeles but keeping busy visiting five children, 24 grandchildren, and 20 great-grandchildren.

Richard Ward (B.S. '49 CE) of Walnut Creek retired in 1979 after a long career in municipal administration. He was public works director for the cities of Turlock, Redding, and San Leandro.

Thomas Whitlow (B.S. '40 ME) of Long Beach writes, "I just returned from a trip to Pensacola to tour the National Museum of Naval Aviation. What a glorious sight it was!"

Alexander "Bud" Wilson (B.S. '48 Metallurgy) of Los Altos Hills was inducted into the National Mining Hall of Fame Sept. 7, 2002, in Salt Lake City.

C. Norman Winningstad (B.S. '48 EE) of Newport, Oregon, writes, "Strangely enough, this 'tech-weenie' is now treasurer of Black Light Power." He also holds an MBA and law degree from Pacific State University.

1930s

Homer Fuller (B.S. '36 ME) of West Lake Village, Calif., was issued a U.S. patent in 2001 for a rough-terrain, large-water volume firefighting vehicle. He is looking for an organization to sponsor its development.

Jim Hammon (B.S. '37 CE) sees George Hill (B.S. '37 CE) about once a month at the SIRS Club meeting in Auburn, Calif.

Frank Lord (B.S. '30 EE) writes, "I'm still plugging along at 94-plus. I live in a retirement residence in Redding."

In Memoriam

Gene Kan (B.S. '97 EECS) died June 29, 2002. He became an unofficial spokesman for the Gnutella file-swapping community during the height of the Internet's peer-to-peer software fad.

Thomas Long (B.S. CE '39) died Oct. 16, 2002, at his home in Hayward. He is survived by his wife Velvia, a 1937 Cal graduate, and his children.

Peter Paul (B.S. '52 EE), formerly of San Bernardino, died Nov. 30, 2001. He is survived by his wife Elizabeth, son Michael, and daughter Catharine (Paul) Bissell.

Louis Rahlves (B.S. '47 CE) died March 5, 2002.

Vala D.S. Rao (M.S. '67 ME) died recently and is survived by his wife of Bangalore, India, and one son.

Arun Sudhakar (M.S. '72 CE), formerly of Concord, died Sept. 11, 2002. An employee of Pacific Gas and Electric, he is survived by his wife Neeli and their children.

Kenneth Wright (B.S. '60 ME), formerly of Jacksonville, Oregon, died Nov. 6, 1999.

IN MEMORIAM

Louis Riggs (left) at a 1948 Berkeley Engineering dinner with an unidentified colleague. In addition to his work on BART, Riggs worked on Atlanta's MARTA rapid transit system and delayed his retirement until he was successful in getting the train system extended to the Atlanta airport.

Louis Riggs: builder of BART and bridges worldwide

Louis Riggs (B.S. '48 CE), who helped build BART and Europe's longest bridge, died June 12, 2002, in Lafayette, California, at age 79.

When World War II interrupted his studies, Riggs served as a bombardier in Italy and spent several months as a prisoner of war in Bulgaria. He returned home and finished his Berkeley degree in 1948. President Harry Truman spoke at his graduation ceremony.

Riggs joined Tudor Engineering in 1952 and became president in 1963. It was through his work at Tudor that he helped build the Bay Area Rapid Transit system, the first of a new generation of modern transit systems in the U.S. His company designed many of the aerial tracks and bridges that formed the early structural foundation of the BART system.

In the 1960s and '70s, he traveled extensively, building bridges, highways, dams, ports, and rapid transit systems in Hawaii, Peru, Guam, Washington state, Oregon, the Philippines, and other sites. The project he was most proud of was the foundation engineering for the Tagus River Bridge in Lisbon, Portugal, the longest suspension bridge in Europe, with a main span of 3,324 feet. At the time it was completed in 1966, the bridge had the deepest piers of any pier bridge in the world, sunk to 262 feet.

Among his many honors, Riggs was a member of the National Academy of Engineering, president of the Society of American Military Engineers, and the UC Engineering Society, and winner of the Berkeley Engineering Distinguished Engineering Alumnus Award in 1984. He is survived by his wife Patricia, his children Jim Riggs and Katherine Stimson, and four grandchildren.

Kuang-Lu Lee: solutions are his domain

After two years designing integrated circuits for National Semiconductor, Kuang-Lu Lee decided in 1980 to pursue a doctorate in electrical engineering and computer sciences at Berkeley. Instead of entering an ivory tower, however, Lee encountered colleagues who were finding answers to the very same questions asked in industry.

As a research assistant to EECS professors Robert Meyer and Paul Gray, Lee was able to contribute solutions to their textbook on analog integrated circuit design, a classic work now in its fourth printing and used worldwide.

"It was really exciting," recalls Lee, "because the problems they were using for the textbook were completely up-to-date research problems. We were collecting solutions from students' papers, not even knowing at the start what the answers would be."

Today, as president of Taiwan-based Ambit Microsystems, Lee remains grateful for his experiences at Berkeley. In spring 2002, Lee was invited to join the Berkeley Engineering Fund board, which advises Dean Richard Newton on the College's fundraising and external affairs. Of the board's 35 members, Lee travels the farthest – from Hsinchu, Taiwan – to attend the twice-yearly meetings.

"I feel that over the years I have benefited greatly from the training I received at Berkeley," says Lee, who heads a company that posted $730 million in worldwide sales last year. "Now I feel an obligation to pay back. The thing is, I'm 6,500 miles away! But it's worth it to me. I hope I can make some kind of contribution, and I also would like to see if we can pursue some research topics together."

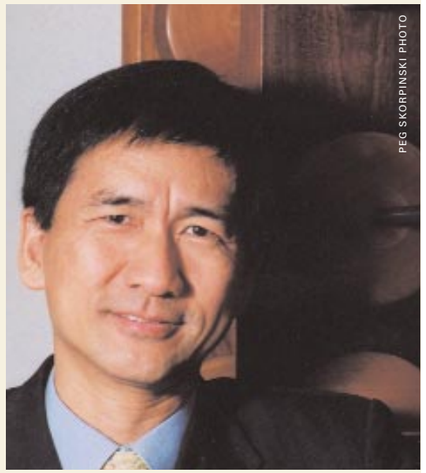
Ambit Microsystems develops and manufactures intelligent power and connectivity products for the computer and communications industries. Last year, the firm produced one-third of the ADSL modems sold worldwide.

One Berkeley research area that Lee is watching closely is broadband communications. "This is a relatively new field, and there's still a lot to be explored," he says. "We are doing similar things, so there must be something we can work on together."

Raised in Taipei, Lee earned his undergraduate degree in electrical engineering from National Taiwan University. Berkeley's dominance in semiconductor technology is common knowledge among the 300 high-tech companies neighboring Ambit Microsystems in the Hsinchu area southwest of Taipei.

"Many of the executives and chief scientists here are Cal graduates," he says. "Berkeley is extremely well-known in Taiwan. Its reputation here is similar to its reputation back home – a strong international character and plenty of down-to-earth and hands-on teachers always willing to try something new."

By **Karen Rhodes**



PEG SKORPINSKI PHOTO

Kuang-Lu Lee, Ph.D. '85 EECS, swims or runs every morning. "This industry is very tough," he says. "You need to have the energy to work 12 to 15 hours a day."

Engineering gifts

Private funds are vital to Cal's excellence in engineering. Here the College recognizes new pledges and gifts received between August 26 and December 31, 2002. Gifts and pledges from individuals range from $25,000 and above. Corporate partners of $200,000 or more are also listed.

We are grateful to our donors for their support of Berkeley engineering.

New Major Gifts and Pledges

Raymond W.H. Chu, ME '77
Berkeley Engineering Fund

H.T. Chua, EE '61 & Jessie Chua, L&S '61
H.T. and Jessie Chua Distinguished Professorship

Paul and Stacy Jacobs, EE '84, EECS '86 '89
Paul and Stacy Jacobs Distinguished Professorship

Burton and Deedee McMurtry
Berkeley Engineering Fund

Barbara P. Newell
The Gordon F. Newell Fellowship Fund

Dean A. Richard Newton, EE '78 and Petra Michel
Berkeley Engineering Fund

Bruce and Amy Pauly
The Gordon F. Newell Fellowship Fund

Robert D. Sanderson, IEOR '66 '70 and Shirley A. Sanderson, Zoology '66, Law '75
Berkeley Engineering Fund

Susan Trescher
The Ferdinand George Trescher Memorial Scholarship Fund

Organizations

Hitachi, Ltd.

Infineon Technologies

Intel Corporation

Suss Microtec, Inc.

BART NAGEL PHOTO

Coming Events in Berkeley Engineering

Cal Day

April 12, 2003

Berkeley Campus

Cal Day is a great day to come back to campus. Bring your family and friends and explore what makes Berkeley and the College of Engineering tops. Hands-on demonstrations in College labs, open museums, tours of the campus and the College, and lots of fun for Bears of all ages. For more details, go to www.coe.berkeley.edu/ alumni_friends/calday.

2003 Nominations for Distinguished Engineering Alumni Awards

May 1, 2003

Our alumni have been making a difference for 130 years. We will honor a special group in 2003. We invite you to submit nominations for the award, including the Outstanding Young Leader Award by May 1. For more details, go to www.coe.berkeley.edu/ alumni_friends/deaa.

College of Engineering Commencement

May 24, 2003

Hearst Greek Theatre, Berkeley Campus, 8:30 a.m.

Families, graduates, alumni, faculty, and friends will gather for a morning filled with processions, pomp and circumstance. Inventor and entrepreneur Dean Kamen will be commencement speaker. For more details, go to www.coe. berkeley.edu/current_ students/ commencement.html.

For details on these and other engineering events, visit www.coe.berkeley.edu/events

University of California
College of Engineering
Public Affairs Office
Berkeley CA 94720-1704

Change Service Requested

NonProfit Org.
U.S. Postage
P A I D
University of
California

www.coe.berkeley.edu

Engineering@cal

great minds online

Visit **engineeralum.berkeley.edu**

Join the community and stay in touch!

A Web-based community for
Berkeley engineering alumni

- online directory
- e-mail forwarding
- e-mail discussion lists

NEW
- career networking
- student mentoring
- class notes