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Berkeley launches $100,000 student competition
Students don’t often have access to venture capital, but UC Berkeley has put up more than $100,000 to fund some of Cal students’ best ideas for changing the community or the world. Called “Bears Breaking Boundaries,” the competition seeks creative ideas in a range of subjects including curricular innovation, green cities, and neglected diseases.

Breslauer named Berkeley’s provost
George W. Breslauer, a political science professor and Russia specialist, will be the campus’s next executive vice chancellor and provost. As the chief academic officer and the chancellor’s second-in-command, Breslauer succeeds Paul R. Gray, who will return to the faculty after six years in the position.

Blum Center for Developing Economies
Alumnus Richard C. Blum ’58, M.B.A ’59, pictured above (left) with Chancellor Robert J. Birgeneau, has initiated the new Blum Center for Developing Economies through a $15 million gift that includes a $5 million challenge grant. The center will combat poverty by launching initiatives that draw upon integrated coursework on developing economies, student service, and faculty fellowships.

Students aid Katrina relief efforts
Judy Wang is one of about 20 Berkeley students who spent time in Mississippi during spring break helping with Hurricane Katrina relief efforts. Her visit was part of the Alternative Spring Break program, which provides spring vacations devoted to service and learning.

UC compensation issue
A “Campus Context” Web site has been created to provide a central repository for documents, contextual information, and official communications that are related to news reports on compensation practices at the University of California. The site will continue to be updated as media stories appear.

For more on these stories and the latest campus news, link to the NewsCenter or subscribe to Berkeley Online at cal.berkeley.edu
Berkeley is world renowned for nurturing evolutionary — and revolutionary — concepts that expand humankind’s understanding of the world. Drawing on the strength of an unparalleled multidisciplinary environment, our brilliant scientists, working with exceptionally talented students, make breakthroughs that transform the world.

We discovered vitamin E, miniaturized the transistor, and have found more than a handful of new elements, including plutonium. Berkeley findings led to the influenza vaccine and linked diesel exhaust to lung cancer. In all, our scientists have won the coveted Nobel Prize 18 times. At times, Berkeley ideas have reshaped our vision of the universe, such as astronomer Alex Filippenko’s discovery of dark energy that showed — contrary to accepted scientific understanding — the universe is expanding at an ever faster rate.

Sometimes a “big” idea can be small at the same time. The world of nanotechnology holds the promise of creating atomic-sized engines, switches, and tiny nanorobots. Breakthroughs that will reshape the fields of manufacturing and computing, among others, are expected within the next decade or two.

The five ideas and areas of discovery explored in the next pages — synthetic biology, Gecko-inspired technology, new ways of understanding mental diseases, smart dust, and nanotechnology — are just a tiny sampling of some of the big concepts being probed at Berkeley.
How geckos manage to run across ceilings had been a mystery for years. Working in the PolyPEDAL Lab, Professor Robert Full found that the answer lies in the structure of a gecko toe, which has millions of microscopic hairs, or setae, on its bottom. Setae don’t stick by glue or suction, but take advantage of van der Waals forces — forces of weak intermolecular attraction. Just a dime-sized amount of setae could lift a small child without leaving a residue and latch on more easily than Velcro.

Based on principles from nature, Full and researchers from several other universities are developing synthetic copies of these microscopic hairs. The team has filed patents and is partnering with several companies to develop an adhesive with such diverse uses as moving delicate fiber-optic pieces, attaching glueless bandages, and securing equipment to the exterior of a space station. Artificial setae are being used by the team to build the most mobile robot yet — unfazed by slippery vertical surfaces and able to hang from the roof.

Full is developing a new center at Berkeley for biological inspiration at ciber.berkeley.edu that will allow undergraduates from diverse disciplines to make original discoveries and design their own nature-inspired robots.

“You’d be amazed what students from different disciplines and backgrounds come up with,” Full says. “It’s that mixture that really gives Berkeley our edge.”
Rethinking mental illness

Until an unprecedented study revealed that psychiatric conditions accounted for half of the ten leading causes of disability worldwide, the global impact of these illnesses was heavily underestimated. More surprisingly, the survey, conducted in the late 1990s by the World Health Organization, predicted that depression would become the leading impairer, among all diseases, by 2010. A significant factor contributing to the dramatic rise in predominance of mental disorders is the shame associated with them.

“Solid evidence exists,” psychology professor and department chair Stephen Hinshaw says, “that although these conditions themselves yield devastating consequences, the stigma attached to them makes things far worse. Insurance coverage is inadequate, housing and employment discrimination is huge, research is underfunded, families are blamed, and many people with mental disorders are reluctant to seek treatment.”

Hinshaw’s lab is one of the few in the nation investigating the root causes of this contempt and humiliation. His forthcoming book Stigma: Overcoming the Shame of Mental Illness is the first originally authored work on this issue. In it, he outlines a plan for transforming the cultural response to mental illness, including changes in policy (most notably, achieving parity with treatment for physical illnesses), stereotypical portrayals in the media, attitudes among health professionals, and improvements in access to validated interventions.

Hinshaw is partnering with faculty members across campus to examine the lifespan of disorders such as ADHD, depression, bipolar disorder, and schizophrenia, from their genetic roots, to their effects on individuals, to their impacts on families and the culture at large. “Only at UC Berkeley,” says Hinshaw, “do we have the capacity to blend a humanizing approach to psychological well-being with the best of basic and applied science on the genetic and social causes of mental illness.”

These mental illnesses account for five of the top ten causes of disability worldwide

Unipolar major depression
Alcohol use
Bipolar disorder
Schizophrenia
Obsessive-compulsive disorder

Dust in the wind

One of the first big tests for smart dust came in 2001 at a military base in Southern California. The cutting-edge material detected the speed and direction of 100 vehicles and instantly beamed the information to base camp.

Kris Pister, a professor of electrical engineering and computer science, and a pioneering theorist of smart dust, was delighted by the results. The technology, he says, is going to be “revolutionary.”

The basic unit of smart dust is a “mote,” a tiny computer that may someday be the size of a letter in this sentence. Each mote holds a sensor that detects and records data such as temperature, motion, and light intensity, along with a radio transmitter and battery. One solitary mote isn’t remarkable, but networks of them generate valuable information about the setting they are in. Research is moving forward at such venues as Pister’s campus lab, as well as Berkeley’s Center for Information Technology Research in the Interest of Society (CITRIS), and Dust Networks, a firm Pister founded in 2002.

Todd Dawson, a UC Berkeley professor of integrative biology, recently used 80 motes to monitor giant redwoods, eliminating the need to lug equipment high above the ground. For the project, Pister’s motes were combined with software designed by Cal professor of computer science David Culler — “an example,” says Pister, “of the interdisciplinary collaboration that helps make Berkeley great.”

Other potential applications for smart dust include monitoring the health of buildings, tracking temperature changes in farm fields, and a truly earthshaking idea: enabling traffic lights to turn green in a timely fashion.
Richard Feynman, the world-famous physicist, asked a powerful question in December of 1959: “What would happen if we could arrange atoms one by one the way we want them?”

Feynman’s dream advanced in 1981 when IBM introduced a special microscope to generate atomic-scale images. In the 1990s, federal funding began for nanotechnology.

Today, nanotech is set to take off. It could become a $1 trillion industry within 10 years, affecting the fields of manufacturing, computing, energy, materials, and the healing arts, among others. The phrase “the next Industrial Revolution” is bandied about by knowledgeable observers.

UC Berkeley is home to several important nanotech groups, including the new Molecular Foundry. This $85 million facility is part of the Lawrence Berkeley National Laboratory (LBNL), one of five U.S. Nanoscale Science Research Centers funded by the Department of Energy.

Housing more than 100 scientists and engineers, the foundry hopes to create a variety of products, including nanosensors for detection of environmental contaminants, efficient solar cells, speedy nanocomputers, and techniques for combating disease on the cellular level.

Carolyn Bertozzi, director of the facility, comments, “Berkeley is already a world leader in nanotechnology, with several research groups that have defined the field. The Molecular Foundry adds a powerful interdisciplinary presence. Over the next 10 to 20 years, this campus is going to be at the forefront of a wonderful revolution.”

Grad student Chieh Chang used nanofibers to spell out “Cal” in a technique developed on this campus. Such fibers are one aspect of the expanding field of nanotechnology.

The next small thing
What is the importance of research in teaching?

The single most important thing a teacher can bring to his or her students is the thrill and excitement of discovery. Our faculty communicate this sense of innovation and intellectual exhilaration in ways that textbooks never can. Berkeley is also an incubator of new researchers. Many of our undergraduates take advantage of the opportunity to explore what it’s like to conduct research while they are here. Even those who decide not to pursue research as a career are exposed to intellectual rigor and analytical skills that may influence their thinking throughout their lives.

Most graduate students, of course, were attracted to this institution because of the excellence of our research enterprise and our distinguished faculty. This, fortunately, is mutually reinforcing, since access to our top-notch graduate students attracts and retains our outstanding faculty.

How does research serve Berkeley’s mission as a public university?

With more distinguished research programs than any other U.S. university, Berkeley offers research excellence across a vast realm of inquiry. Berkeley’s mission as a public university is to provide the opportunity for qualified students — from all backgrounds — to study and learn what they need to know to be informed and productive participants in society, contribute to understanding the human condition, and improve it wherever possible. The outstanding students and faculty attracted by the vitality of Berkeley’s research are uniquely prepared to create new knowledge that helps to make the world a better place.

How does Berkeley’s preeminence in research contribute to the greater good?

Berkeley applies the significant force of its faculty and student expertise to research into areas that are deeply intertwined with the quality of people’s lives. Our reputation for cutting-edge research has drawn to Berkeley some of the world’s most prestigious, innovative faculty. The presence of these investigators attracts half a billion dollars in research funding to advance knowledge in an astonishingly broad spectrum of subjects. In addition, we are educating a highly skilled work force that will benefit society, not only in California but throughout the world. The new knowledge created through research at Berkeley will continue to fuel the country’s current thought leaders, provide answers to some of the world’s most complex problems, and inspire the next generation of scientists and scholars.
Practical Research Applications
Many campus discoveries benefit the public through commercial applications. Currently, Berkeley owns:

- 412 U.S. patents
- 187 foreign patents
- 187 active license agreements with commercial firms

What is the importance of basic research?
Both basic research and application-focused research are pursued with great energy at Berkeley, and both are central to our research mission. One can picture research as an elaborate continuum from purely basic to purely applied, with various mixtures in between. At one end, you have purely basic research whose primary objective is to understand how things really work and what’s true. Dramatic new applications often arise from new understanding achieved in this process.

If you move to the other end of the continuum, directed research is conceived from the outset as a strategy for addressing “real-world problems,” such as making sure bridges withstand earthquakes or finding therapeutic treatments for diseases. Toward the applications end of this continuum, often there is a process we call “technology transfer,” in which the outcomes of campus research are handed off to the private sector for development into specific products or medicines for public benefit.

Why have we heard so much buzz about multidisciplinary research?
Some of the most exciting new breakthroughs are occurring at the interfaces between different disciplines. Berkeley is powerfully positioned to be a world leader in multidisciplinary research because we have so many areas of academic strength, including more than 30 graduate programs ranked in the top 10 in their fields. Bringing together scientists from these fields — that have historically been quite distinct from one another — fosters interdisciplinary collisions that produce challenges to previous perspectives and can lead to creative breakthroughs and new ways of approaching problems.

Many of today’s challenges, such as water or energy, are so complex that one discipline cannot grapple with them effectively. Berkeley’s multidisciplinary research on water issues, for example, draws on a broad spectrum of perspectives from engineering, chemistry, and the physical, biological, and social sciences. Orchestrating the interactions of faculty from these various disciplines is at once enormously challenging and enormously promising.

What is the latest news on stem cell research?
The study of stem cells holds exciting promise for the future of research into disease therapies. Because stem cells are “unspecialized” cells — with the ability to generate healthy new cells, tissues, or organs — they hold the potential to provide new therapeutic treatments or cures for diseases ranging from diabetes to Alzheimer’s.

The passage of the California Stem Cell Initiative has stimulated the exploration of many new and significant areas of inquiry. We have launched Berkeley’s Center for Stem Cell Research, a model multidisciplinary effort with faculty from fields of molecular and cell biology, genetics, genomics, bioengineering, neuroscience, and ethics. Already we have been successful in the first round of Prop. 71 funding for training grants, and we have received several significant private gifts to support this research.

With so much federal research funding, why is private support important?
Berkeley researchers are brilliantly competitive, of course, and their exuberant energy is bringing in extramural research support at an impressive level. Last year, Berkeley received about $500 million in total funding for research, including approximately $290 million from the federal government, $80 million from the state, and $25 million from industry.

This money, however, does not support the very thing that needs our most urgent attention — research infrastructure. New laboratories, equipment, and shared workspace are key to attracting the most desirable scientists to Berkeley. The advancements made by these preeminent scholars ultimately will bring increased funding from all sectors, but it is an interdependent cycle that needs to be funded in its totality to be successful. Strategic investment in state-of-the-art shared research facilities and the latest technology will allow our faculty and students to stay at the absolute cutting edge.

With the unflagging support of our alumni, parents, and friends, I’m confident that Berkeley will continue to build upon its research successes and produce profound new insights that can change the world.

Berkeley’s Research Budget
Funding awarded from a variety of sources totaled $491.2 million in 2005

(dollars in millions)

Other Government $3.5
University of California $18.4
State $65.2
Federal $292.5
Not for Profit $84.8

(cont.) a conversation with Beth Burnside

12
Harnessing research to create real-world solutions

When Thomas Edison built a new headquarters in New Jersey in the late 19th century, he created the first modern industrial laboratory, and helped spawn an important idea — that technological advancement is often best achieved through teamwork and synergy.

Today, at Berkeley, this spirit of collaborative research is fostered at many venues, including CITRIS and QB3, two formidable efforts established by the state, designed to harness the research strengths of the entire University of California system and drive economic growth here and around the world.

The Center for Information Technology Research in the Interest of Society (CITRIS)

Involving more than 100 faculty members in engineering, science, social science, and other disciplines at four UC campuses (Cal, UC Davis, UC Merced, and UC Santa Cruz), as well as researchers at more than 20 supporting companies, Berkeley-centered CITRIS sponsors research that is creating solutions to grand-challenge social and commercial problems affecting the quality of life throughout the world: conserving energy; education; saving lives, property, and productivity in the wake of disasters; boosting transportation efficiency; advancing diagnosis and treatment of disease; and expanding business growth through much richer personalized information systems.

One example of CITRIS research is Technology and Infrastructure for Emerging Regions (TIER), an effort to bring information technology to large populations in developing countries. It’s the brainchild of Eric Brewer, a Cal professor of computer science and electrical engineering and cofounder of the technology company Inktomi.

Brewer is convinced that technology can play a large role in addressing the challenges of emerging economies. He’s not the first theorist with that idea, but he notes that, historically, similar projects have relied on high-tech equipment developed for affluent nations. Such an approach, he says, “fails to address key challenges in cost, deployment, power consumption, and support for semi- and illiterate users.”

One problem now being studied by Brewer and his cohorts: the quality of energy used to power computers in rural areas. “We’ll explore how to make computers that are more tolerant to bad power,” he says, and study how to design smarter and more resilient control systems for batteries and solar panels.

The California Institute for Quantitative Biomedical Research (QB3)

QB3 is a partnership between three University of California campuses — UC Berkeley, UC San Francisco, and UC Santa Cruz — private industry, and venture capital. Armed with quantitative tools integral to physics, chemistry, engineering, and mathematics, QB3’s 150 researchers explore how biological systems work, from atoms and molecules to cells, organs, and entire organisms.

Using advanced imaging, modeling, and computational tools, these scientists decipher the complex systems involved in living systems and discover groundbreaking applications for that basic knowledge. QB3 research is leading to new diagnostic tools and therapies for cancer, HIV/AIDS, and other diseases.

QB3 faculty affiliates Jennifer Doudna and Eva Nogales applied this multidisciplinary approach to their study of hepatitis C, one of the most common causes of chronic liver disease in the U.S. today. The hepatitis C virus has found a clever way to hijack the body’s cells and make an end run around defenses that cells throw up to stop its spread, according to recent research by the scientists, reported in the journal Science last December: Doudna and Nogales will probe ever finer details of the process so they eventually can develop drugs to prevent the virus from taking over and establishing an infection.

“The goal of this work is to get enough detail on the mechanisms involved to design a drug to prevent the disease,” says biochemist Doudna, professor of chemistry and of molecular and cell biology at Berkeley and a Howard Hughes Medical Institute investigator.

“The more we learn about how hepatitis C does things, the easier it will be to block it without interfering otherwise with the normal mechanism of the cell,” adds biophysicist Nogales, associate professor of molecular and cell biology at Berkeley and also a Howard Hughes Medical Institute investigator.

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Chancellor Robert J. Birgeneau and campus officials recently announced details of an ambitious plan that will include the renovation of California Memorial Stadium and the creation of a new academic facility in the southeast quadrant of campus.

The initial phase of the multi-year plan calls for construction of the state-of-the-art Simpson Student-Athlete High Performance Center, to be built just outside the stadium’s west wall. The 132,500-square-foot facility — which will house a sports medicine and applied sports science strength and conditioning center, as well as team meeting, study, and administrative spaces — will serve Cal’s reenergized football program along with 12 other men’s and women’s varsity sports. Construction of the center is estimated to cost between $100 million and $125 million — all of it to come from private funds, with roughly half that amount already donated. Named for Barclay ’66 (ex-’43) and Sharon Simpson, who recently made the project’s cornerstone gift, the center is scheduled to break ground in December 2006.

**Competitive Advantage**

The new Student-Athlete High Performance Center will be a major step forward for Cal Athletics. It will replace the current substandard equipment, meeting, and locker rooms, as well as coaches’ offices, that put Cal at a competitive disadvantage when it comes to recruiting top high-school talent.

It will also enable the University to address the seismic threat to the hundreds of students, coaches, and staff who now use rooms and offices under the stadium’s west rim.

“With the new center in place,” Cal Director of Athletics Sandy Barbour says, “the University will significantly enhance its ability to produce winning teams as well as provide the highest-quality student and student-athlete experience.”

Future components of the stadium renovation project will include a seismic retrofit in the north and south fault zones of the stadium, a new press box, and eagerly awaited fan amenities such as improvements to seats, concessions, and restrooms.

**Revitalizing the Southeast Campus**

The southeast quadrant plan also includes a future law and business building, as well as new landscaping and open-space improvements — key elements of what Chancellor Birgeneau predicts will be “a wonderful renaissance of the campus’s southeastern corner.” Besides providing an ideal venue for “four-star” campus events such as gubernatorial debates and talks by world leaders, the new academic building will give Berkeley’s law and business schools critically needed space to expand their faculties and research programs, and thereby maintain their international competitiveness. In addition, sharing the facility will enable the two schools to “marry their intellectual excellence and energies in various ways,” says Boalt Hall Dean Chris Edley, “that will be unprecedented on any campus in this country.”

In March, the University held a highly successful Community Open House to provide interested members of the public with an overview of the southeast quadrant plan and an opportunity to ask questions of Barbour, project architects, and campus staff.
The economist John Kenneth Galbraith first saw UC Berkeley’s International House in July of 1931, when he was 22 years old, at the end of a long trip to California from his home in Guelph, Canada. The evening sun lit up the building’s tan façade; Galbraith thought it a place of “unimaginable splendor.”

The intellectual fare was splendid too. As Galbraith recalled years later, he found at Berkeley’s I-House “an intensity of discussion” beyond anything he encountered in all the rest of his long career.

I-House was months old then, having welcomed its first residents in August 1930. It was inspired by a New Yorker named Harry Edmonds (1883–1979). One day in 1909, Edmonds said a simple “good morning” to a Chinese student at Columbia University; the student replied, “I’ve been in New York three weeks, and you are the first person who has spoken to me.” Edmonds, moved by this experience, began hosting suppers for foreign students with his wife, Florence, bringing together people from many countries, including the U.S., to try to overcome misunderstanding, forge cross-cultural friendships, and promote a more tolerant and peaceful world.

The concept reached maturity some years later when it met the generosity of John D. Rockefeller Jr. The first International House was established at Columbia; Berkeley followed. Today there are also houses in Chicago and Paris, along with dozens of sister institutions that emulate the original concept.

**Distinguished Company**

More than 60,000 students of more than 100 nationalities have lived at Berkeley’s I-House over the decades, including seven future Nobel laureates, a future prime minister, 10 future ambassadors (including John Kenneth Galbraith), and dozens of future CEOs. The house is currently celebrating its 75th anniversary while pursuing a $10 million campaign to preserve its facility, fund scholarships, and endow its intercultural programs and technology services. Now in the homestretch of the drive, the house seeks to raise an additional $1.6 million this year in order to secure a $500,000 challenge grant from the Kresge Foundation and achieve its goal.

**A Global Experience**

One of the campaign leaders, Arun Sarin, CEO of the telecommunications giant Vodafone, lived at International House in the 1970s; he and his wife, Rummi, whom he met at the house in 1975, have pledged $250,000 to the drive. Sarin recalls his time at the house fondly. “I would have breakfast with somebody from Israel and lunch with somebody from Latin America and dinner with somebody from Nebraska,” he says. “That experience was hugely beneficial to my development.”

In all, some 800 couples have kindled marriages based on I-House meetings, according to a house spokesperson.

In its long history, Berkeley’s International House has employed just three executive directors, which suggests something of the devotion engendered by the place. Joe Lurie, who has held the job since 1988, sums up what the institution is all about, saying, “Dismantling prejudice requires time and close contact. Things happen in a moment — that moment nourishes other moments — and a gathering of moments, over time, nourishes an enlargement of the human spirit.”
“Euphoria” was the word offered by The Economist magazine last December to describe the mood in the renewable energy industry. Huge global forces — escalating oil prices, environmentalism, improving technologies, and an eagerness for energy security — are generating a new level of investment in the field.

All of which is not terribly surprising to Daniel M. Kammen, director of UC Berkeley’s Renewable and Appropriate Energy Laboratory (RAEL). Right about now, Kammen says, the world is catching up to what he and his team have believed for years — renewable energy may become an economic cornerstone of our future.

Kammen’s lab is eclectic, interested in a range of clean energy technologies and markets, including solar power, ethanol for transportation, wind turbines, fuel cells, biomass, hybrids, and other fields. It also tackles weighty policy issues such as sustainable development and global warming.

Oddly enough, university laboratories devoted to renewables are rare, says Kammen. “Many talented individuals wishing to work in renewable energy and environmental issues have little or no opportunity to train, examine, and innovate,” he says.

**Karsten Challenge Grant**

RAEL’s ability to fill the gap — to provide training and do research — got a major boost recently with a gift from the Karsten Family Foundation, sponsored by Thomas Karsten ’80 and Janis Karsten ’80. The gift, which began in 2005 and will run through 2009, is a challenge grant. If RAEL can raise $50,000 a year from other sources, the foundation will provide $75,000 annually. “We met the goal in ’05,” Kammen says, “but we need help for this and coming years.”

He continues, “Clean energy falls through the cracks of federal funding. The National Science Foundation doesn’t have a program in this area, and the U.S. Department of Energy invests less in energy research and development — around $3 billion per year — than do some individual companies. We need help from Cal alums.”

The lab plans to use the Karsten gift, and funds from others, for work on several projects, including current efforts in wind energy, ethanol and sustainable biofuels, secondary-school-renewable energy education programs, and testing and implementing the UV Tube, a water disinfection system that’s affordable for households in developing nations. The tube is designed to be built by local people from local materials at a cost of $30 to $50 per unit. “This is an example of how simpler technologies can closely match local needs,” says Kammen.

**Wide-ranging Interests**

RAEL’s research is local, national, and international in scope.

Among the lab’s current projects:
- Collaboration with international energy research and development organizations, including the Energy and Development Research Center at the University of Cape Town in South Africa.
- Rural electrification and the connections between poverty and lack of access to energy.
- Studying and promoting a low-carbon energy future. Carbon emissions are thought by many scientists to make a major contribution to the greenhouse effect.
- Developing new designs and materials for solar panels, wind turbines, and other equipment.
- Public education in California, and around the world, on the prospects for clean energy.

The stakes in all of this are high, Kammen says. “Energy issues — the lack of basic energy resources, and unsustainable energy practices — may be the largest contributors to human and environmental problems and suffering today around the world.”

RAEL’s Web site at rael.berkeley.edu shows one particularly heartwarming photo. Shot in Africa, it shows a rural Kenyan woman holding an “amorphous silicon photovoltaic panel” — a solar energy panel perhaps 15 inches wide by 40 inches long. She received the device free of charge via a RAEL program that worked with Energy Alternatives Africa, based in Nairobi. The warmth of her smile suggests that she’s holding something of remarkable value — a better future.
Recognizing genius
Three young faculty named MacArthur Fellows

Nicole King, a UC Berkeley molecular biologist, was not exactly pacing the floor waiting for the phone to ring last fall as the MacArthur Foundation announced its latest round of “genius grants.”

“It never occurred to me that I would be considered for this,” says King. When she got the happy news by phone from the foundation, “it took quite a while for it to sink in.”

King will receive $500,000 over the next five years to use in any way she chooses. She’s taking her time deciding how to proceed, because, as she notes, the award is a “huge responsibility.”

UC Berkeley is home to three 2005 MacArthur Fellows, more than any other school or organization in the nation. The two other campus honorees are Lu Chen, a neuroscientist, and Michael Manga, a geophysicist.

Nationwide, 25 MacArthur fellowships were announced last September, bringing to 707 the total number of such grants made since the program’s inception in 1981. During these years, 39 UC Berkeley scholars have been honored, 28 of whom continue their work on campus today.

According to the MacArthur Foundation, the goal of the famous program is to find people with the potential to make “exceptionally creative contributions to their respective fields” and provide them with “a kind of seed money or venture capital for intellectual, social, and artistic endeavors.” Names of candidates are offered to the foundation by a secret network of nominators, and a small committee winnows down the list. The foundation, by the way, officially frowns on the nickname “genius grant,” but that phrase has worked its way into popular parlance.

Nicole King
King, 35, is an assistant professor of integrative biology and of molecular and cell biology. Her research seeks to reconstruct a primal moment in life — the emergence, 600 million years ago, of multicellular organisms from single-celled life. Her pathway into this process is a one-celled protozoan called a choanoflagellate, which probably contains many of the same proteins as the first multicellular organisms. Her work may shed new light on evolution and development of genes. King was raised in Nevada and earned a Ph.D. at Harvard.

Lu Chen
Chen, 33, an assistant professor of neurobiology, researches synaptic transmissions in the brain — the critical pathway for learning and memory. Specifically, she explores synapses that use the neurotransmitter glutamate. As she probes these cells, she draws from the disciplines of molecular genetics, cell biology, biochemistry, and electrophysiology. Her work has large potential impact on developing new treatments for neurological and psychiatric diseases. She was born in Jiangsu Province, China, and holds a doctorate from the University of Southern California.

Michael Manga
Manga, 37, an associate professor of earth and planetary science, has a background in fluid dynamics, and uses it to explore fundamental concepts in geology, ranging from the microscopic to the planetary. Among the questions he probes: How does molten rock in the Earth’s interior rise to the surface and create volcanic hot spots? What is the nature of the interaction between the Earth’s mantle and crust? What can we learn about earthquakes? A native of Ottawa, Canada, he holds a Harvard doctorate.
The human brain, with its billions of cells and its mysterious capabilities, has resisted disclosing many of its secrets for centuries, ever since Plato and Aristotle first contemplated it. Great scientists have won Nobel Prizes for their brain research, dedicated surgeons have probed its depths, but fundamental problems about the brain remain unsolved — how it makes sense of the world, how it converts raw data into fresh insights, and myriad other questions.

Today, study of the brain is one of the most exciting and promising of the sciences, thanks in part to new investigative tools, such as brain-imaging technology, and thanks also to the passion of young scientists and theorists who have swelled the field of neuroscience nearly tenfold over the last 30 years. Among the most impassioned is Jeff Hawkins, a renowned Silicon Valley entrepreneur, who, with his wife, Janet Strauss, has created a $4 million endowment for a new Berkeley research facility, the Redwood Center for Theoretical Neuroscience redwood.berkeley.edu.

The new multidisciplinary center is led by Bruno Olshausen, associate professor of vision science and neuroscience, and is one of four research facilities administered by the Helen Wills Neuroscience Institute neuroscience.berkeley.edu. The center seeks answers to complex questions about perception, cognition, learning, and motor function: How does one learn to catch a ball? How do we differentiate a nickel from a set of car keys when we put our hands in our pockets? How does the brain make predictions about the environment from its sensory inputs? By answering such questions — by building an accurate model of the brain and its operations — scientists will generate knowledge leading to improved health care and possibly the first generation of computers capable of learning.

Longtime Interest

Jeff Hawkins developed a passion for the brain in 1979, when he was in his early 20s, upon reading a special issue of Scientific American devoted to the topic. After graduating from Cornell in ’79, he worked in industry, studied biophysics and neuroscience for a time at Berkeley, and, in the 1990s, founded two important companies, Palm Computing and Handspring. He has since launched a third high-tech firm, Numenta. In 2002 Hawkins founded the Redwood Neuroscience Institute in Menlo Park, Calif., which has now evolved into the new center.

Most neuroscience theorists, including Hawkins, are deeply interested in the neocortex, the top-most layer of the brain, which has the size and thickness of a formal dinner napkin and is involved in perception, action, and higher mental functions, including vision, hearing, touch, attention, memory, and emotional responses. In 2004 Hawkins published the book “On Intelligence,” which lays out a strikingly clear and provocative theory of neocortical function.

Vast New Frontier

“Cortical research is a giant, giant field,” says Prof. Robert Knight M.D., director of the Helen Wills Neuroscience Institute, whose laboratory is affiliated with the new center. “The Redwood Center exists to attract spectacularly-talented people who can work in an interdisciplinary way on some of the most important topics in all of science.” Collaboration at the new center involves researchers from neuroscience, psychology, engineering, electrical engineering, bioengineering, optometry, public health, and other fields.

Jeff Hawkins fairly bursts with excitement about what’s in the offing. “In brain science, we can compare ourselves to the beginning of the computer era in the late 1940s,” he says. “They had some basic theories, but they didn’t know anything about software, disk drives, compilers, or central processing units. And there was a half-century evolution to today’s computers.

“I see the Redwood Center contributing to a similar evolutionary process. In our lifetime, we are going to solve how the brain works.”

Jeff Hawkins: Unraveling the neocortex
UPCOMING EVENTS

Homecoming 2006 is October 6–8!

All Cal alumni and friends are invited to campus for a weekend of faculty seminars, open houses, campus tours, and reunion events, including the Golden Bear Luncheon and the Blue and Gold Reunion. Call 888.UNIV.CAL (888.864.8225) or visit homecoming.berkeley.edu for more information.

1. Television journalist Dan Rather (right) visited campus recently to interview Daniel Kammen, director of UC Berkeley's Renewable and Appropriate Energy Laboratory, about alternative fuels for a late-April “60 Minutes” segment on CBS.

2. Class of 2006 Senior Gift Committee members (pictured left to right) Paula Silva, Bianca Alcala, and Lauren Wolf pose with Oski, who helped draw 500 seniors to this year’s Senior Class Gift Kick-Off to learn about the long tradition of alumni giving to Cal.

3. At a March reception following an alumni career panel (pictured left to right), Ananya Roy, associate dean for academic affairs in international and area studies, congratulates Kevin Lo ’00, Roberto Walton ’04, and Tovah Haim ’04 on successfully launching their careers.

4. Pictured left to right, Al Resnick Ellen Dale ’66; Joffa Dale ’66, M.B.A. ’67; and Barbara Resnick enjoy an afternoon of March sunshine and Cal sports at the Benjamin Ide Wheeler Society Reception. Guests including Larry Peirano ’51, M.S. ’52 and Mary Peirano, pictured above, heard campus and athletic highlights from Athletic Director Sandy Barbour.

5. Garrett Gruener M.A. ’77 (left) and Amy Slater welcome Robert Reich (center), former U.S. Secretary of Labor, to California with a dinner at their home. Reich has joined the Goldman School of Public Policy as a professor of public policy. Steve Silverstein ’64, M.L.S. ’77 (left) also attended.
6. On April 4, Florence Fang and former San Francisco mayor Willie Brown look over a small sampling of the Fang Family San Francisco Examiner Archives, a gift to the Bancroft Library including millions of photographic prints and negatives from 1919 to the late 1990s. The gift will more than double the size of the Bancroft’s photographic print collection.

7. T.Z. Chu ’58 listens to a presentation by Professor Emeritus Howard Mel Ph.d. ’54 at the annual Cupola Era Alumni Luncheon hosted by the College of Chemistry.

8. Chancellor Robert J. Birgeneau (center) was presented with the American Academy of Arts & Sciences’ Founders Award in March. He stands with Academy President Patricia Meyer Spacks (left) and Berkeley Professor Randy Schekman, who is a councilor of the Academy.

9. At the UC Berkeley Foundation Board of Trustees awards dinner in February at the Berkeley Art Museum, Barclay Simpson ’66 (ex-’43) received the Chancellor’s Award, the foundation’s highest honor, in recognition of his consistently distinguished service. Above, he enjoys the evening with his wife, Sharon Simpson.

10. Wheeler Oak Meritorious Awards were presented to five alumni who have excelled as leaders of fundraising programs over a period of time. From left, Page van Løben Sels (who accepted on behalf of his wife, D.D. van Løben Sels ’68), Lila Rich ’55, Shannon “Mike” Drew ’50, Charlene Liebau ’60, and Midge Zischke ’54.

11. The Trustees’ Citation is given to alumni and friends who have demonstrated outstanding achievement in a major fundraising program, or who are shining examples of service. Citations were given to (from left) Katherine Jackson and Stuart Jackson (accepting on behalf of their grandparents, Coleen Ricksen ’55 and Rupert Ricksen ’53); David Friedman ’75; Mary Bitterman (accepting on behalf of Barbro Osher); Judy Webb ’60; Richard H. Morrison ’58; Jay Paxton ’70, J.D. ’73; Kass Green ’74; Robert Katz ’46; and S. Allan Johnson ’62, M.B.A. ’69.

12. George Miller M.B.A. ’61 and Janet McKinley view the displays of “The Bancroft Library at 100,” an exhibit at the Berkeley Art Museum through Dec. 10 featuring more than 350 objects from its extensive collection of Western Americana.

13. During the event, four recent graduates also received Young Bear Awards in recognition of their outstanding service to the campus. Donald McQuade, vice chancellor for University Relations, is pictured (left to right) with winners Rica Azarcon ’05, cochair of the 2005 Senior Class Gift Committee; Boalt Hall’s Ritu Bhatnagar ’05; Jill Meyers ’05, Javier Rivera ’05 (not pictured); and Foundation Chair Robert O’Donnell ’65, M.B.A. ’66.

UC Berkeley Foundation Board of Trustees Awards Dinner

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A more scholarly version of his message was produced in a 500-page study by the National Academy of Sciences. The Bush administration listened, and the president’s State of the Union address proposed an American Competitiveness Initiative to lead the world in opportunity and innovation through investment in basic science education and research. The president’s initiative also proposed training 70,000 new math and science teachers.

We applaud these initiatives but, concurring with the San Francisco Chronicle editorial of Feb. 6 (“How to keep U.S. competitive”), we are concerned that this vision, which rolls far into the future and calls for $50 billion over 10 years, be supported by the necessary funding to realize it.

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First, it is a matter of sheer numbers. Friedman’s observations that China and India will overtake us technically are built on a New York/New England perspective. The academic establishment in the Northeast is dominated by elite private universities that in recent times have produced far too few graduates pursuing hard-core technical professions. The situation is quite different here in California, where we have what is broadly recognized as the world’s best public-university system.

California, and particularly UC Berkeley, have important roles to play in an agenda to revitalize basic science education and research. UC Berkeley, along with other world-leading universities in the Bay Area, has in good part driven U.S. global competitiveness in the biotechnology industry through their basic research.

by Chancellor Robert J. Birgeneau
public institution, we educate 23,000 undergraduate students, more than 40 percent of whom are in science and engineering.

Perhaps of equal significance, our students have the same fervor to succeed as Friedman witnessed in China and India. Our undergraduate population is much more the functional equivalent of the phenomenon that Friedman has observed in these emerging competitors. Twenty-eight percent of our undergraduates are the first in their family to go to college and approximately one-third are eligible for Pell Grants awarded to students from families with incomes of less than $35,000 a year. In fact, at UC Berkeley alone, we serve more of these economically disadvantaged students than all of the Ivy League universities combined.

Our students value education and approach it with a passion, an almost patriotic fervor to succeed. Admission as an undergraduate to science and engineering at Berkeley, or any one of the UC campuses, is a goal eagerly sought by countless California high-schoolers, including those from economically disadvantaged backgrounds. Moreover, California has a large and vibrant population of women and underrepresented minorities who are not participating fully in science and engineering. Accessing this population is one of the significant challenges of the UC system. Indeed, tapping into this large unrealized talent pool will be an important part of California’s edge in the economic battle that Friedman has identified.

To maintain our leading edge, public universities must remain accessible to all those Americans for whom higher education is the door to the American dream of a better life. This is particularly true for underrepresented minorities. In order to guarantee continuing accessibility, we at UC Berkeley have proposed to our legislators in Sacramento a novel program in which the state of California would match endowed donations for financial support for the neediest of our students.

We must also ensure that the children of the poorest citizens of California will attend high schools that aspire to educate the leaders of our state and our nation. Through programs such as UC’s California Teach Initiative and UC Berkeley’s California Preparatory College Academy, our charter school in Oakland, we are preparing these students for the opportunity to improve their own lives in a changing economy, as well as training them to transform the world. The 70,000 new math and science teachers proposed by President Bush’s initiative will make these programs even more attractive to prospective teachers.

Public universities serve as incubators of the next generation of innovators, who will ensure that California leads the United States in retaining its global leadership in competitiveness, the kind of innovation that spawned the Internet and biotech revolutions. Indeed, it is no coincidence that America’s new competitors are building mirror images of our public universities to fuel their continued ascendancy.

The Chronicle’s Feb. 6 editorial accurately characterized President Bush’s American Competitiveness Initiative as a “chance to push both the nation and the boundaries of science forward.” California’s universities have established a long tradition of playing a leadership role in inspiring and producing innovation and economic growth. We urge all Californians to meet and engage our students and faculty and to witness their fervor and readiness to transform the world. Seeing innovation where it begins will provide a renewed confidence in our nation’s continued global leadership and competitiveness.

This article was published as an “Open Forum” commentary in the San Francisco Chronicle on February 22, 2006.