

President's Report

A Report on
Discoveries and
Achievements
at the
University of
California

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The following is a glimpse of some recent achievements by the faculty, students and staff of the University of California and the national laboratories managed by the university.

In the News

New Nobel Laureates . . . Three UC faculty in October won Nobel Prizes, which recognize outstanding achievement. UC's latest crop of laureates includes *Alan J.*

Heeger and *Herbert Kroemer*, both of **UC Santa Barbara**, and *Daniel L. McFadden* of **UC Berkeley**. Heeger, professor of physics and materials, shared the chemistry prize with two other researchers for his groundbreaking research on electrically conductive plastics. Kroemer, professor of electrical and computer engineering, shared the physics prize with two others for his pioneering work in semiconductor technology. McFadden, an economics professor, shared the economics prize for his statistical analysis of basic personal and household behavior. Since 1939, 43 researchers affiliated with UC have won Nobel Prizes.

Contract Extension . . . The federal energy department and UC have begun negotiations on a three-year extension of the university's contract to manage the **Lawrence Livermore** and **Los Alamos national laboratories**. The current contract runs through Sept. 20, 2002. UC has managed both laboratories since their inception, which in the case of Los Alamos goes back nearly 60 years.

Medal Bestowed . . . The UC Presidential Medal has been bestowed on Henry Samueli, co-founder and chief technology officer of Broadcom Corp., in recognition of his contributions to the University of California. Samueli and his wife, Susan, made gifts of \$20 million and \$30 million to the engineering schools at **UC Irvine** and **UCLA**, respectively, and a \$6 million gift to the **UC Irvine College of Medicine**. The Samuelis' generosity constitute the largest personal gifts in UC history and the largest single gift in UC Irvine's history. The Presidential Medal, UC's highest honor, was presented at the dedication ceremony of the **Henry Samueli School of Engineering** at UC Irvine in October.

Charter School Dedicated . . . The \$13.1 million **Preuss School** was formally dedicated at **UC San Diego**. The Preuss School, with 430 new and returning students, is the only public charter school in the state to be established on a university campus through private support. The school is named in recognition of a gift from Peter Preuss of La Jolla, a UC regent, and his wife, Peggy.

Research Facility Dedicated . . . U.S. Commerce Secretary Norman Mineta, Chancellor *M.R.C. Greenwood* and Congressman Sam Farr dedicated a new federal marine research facility next to **UC Santa Cruz's Long Marine Laboratory**. The new laboratory will, in addition to conducting fisheries research, house the nation's first National Science Center for Marine Protected Areas.

Health and Nutrition

Pull Up a Rock . . . Today's office needs to be more Stone Age and less high tech, says **UC Berkeley** researcher *Galen Cranz*. So that workers can exercise more than one set of muscles, she says, offices should support a wide variety of seating options such as sitting up, lying down, kneeling, squatting, sitting cross-legged or perching halfway between sitting and standing. Workers even need to move about sometimes, like hunters and gatherers, because some people think better when in motion.

Sleepy Brains . . . The ability of the brain to function following sleep deprivation appears to vary with the task at hand, and in some cases, the brain attempts to compensate for sleep loss, report researchers from the **UC San Diego School of Medicine** and colleagues. The study, led by UCSD's *J. Christian Gillin*, suggests the brain is adversely affected by sleep deprivation because electrical and chemical activity that occurs during sleep is interrupted, impeding the brain's ability to function normally.

Peregrine Takeoff . . . An advanced method for targeting tumors with radiation treatment developed by researchers at **Lawrence Livermore National Laboratory** has won U.S. Food and Drug Administration approval. Dubbed Peregrine after the patron saint of cancer patients, the technology helps doctors target radiation at tumors, while minimizing damage to surrounding healthy tissue.

Older and Older . . . The age at death for humans has been rising for more than a century and shows no signs of leveling off, reports **UC Berkeley** researcher *John Wilmoth*. The new finding, based on Swedish national death records for each year since 1861, calls into question the belief that the human life span has a set end-point of 120 years. Wilmoth and colleagues say they have shown that maximum human life span is not a biological constant. The Swedish records are considered the world's best on birth and death.



Developments and Discoveries

Helpful Delicacy . . . Scientists searching the human genome data for genes and the DNA sequences that control their activity have a new resource, courtesy of the Japanese delicacy known as Fugu, the puffer fish. Researchers at the Joint Genome Institute plan to sequence the Fugu genome, which contains essentially the same genes and regulatory sequences as the human genome, but carries them in approximately 400 million bases versus the 3 billion bases that make up human DNA. The Walnut Creek-based institute is a consortium of the three UC-managed national laboratories, **Lawrence Berkeley**, **Lawrence Livermore** and **Los Alamos**.

Pleasure-Seeking Gene . . . Researchers from the **UCLA Neuropsychiatric Institute and Hospital** have linked a variation of a gene previously associated with pleasure-seeking behavior to heroin users who respond poorly to traditional addiction treatment programs. This suggests that new approaches should be found to help heroin abusers who have a variation of the D2 dopamine receptor gene, said researcher **Ernest Noble**, who led the study and first isolated the “pleasure-seeking” gene.

Predator vs. Prey . . . Tiny ground squirrels that can take on rattlesnakes – and win – may offer humans a key to developing better treatment for snake venom, say **UC Davis** researchers. Their study provides an excellent model of an evolutionary arms race between predator and prey. By natural selection, ground squirrels have developed resistance to rattler venom over thousands of years as the snakes have had to adjust their venom. The research may lead to more effective snakebite remedies.

Star Movement . . . For the first time, astronomers have seen stars accelerate around a supermassive black hole. **UCLA** astronomers report that three stars have accelerated by more than 250 thousand miles per hour per year as they orbit the monstrous black hole at the center of our Milky Way galaxy. The astronomers, led by UCLA’s **Andrea Ghez**, report that one of the stars may complete its orbit around the black hole in as little as 15 years.

Long Ago, Far Away . . . The afterglow of a gamma-ray burst in the southern constellation of Carina – more distant than any high-energy flare ever observed – has been detected by a network of spacecraft spread over the solar system and has been traced back to its original explosion about 11 billion years ago, reports researcher **Kevin Hurley** at the **UC Berkeley Space Sciences Laboratory**. The observations revealed that the burst probably came from a gigantic dying star more than 30 times as massive as the sun, when the universe was about one-tenth of its present age.

The Cutting Edge

Bouncing Buckyballs . . . Researchers at the **Lawrence Berkeley National Laboratory** and **UC Berkeley** have made a transistor consisting of a single buckyball bouncing between two electrodes. Buckyballs are molecules of carbon named after inventor Buckminster Fuller. The new electronic device is so small that, as a transistor, it permits only one electron at a time to move through it. The ability to use individual molecules as functional electronic devices is a coveted prize in the computer industry.

Gamma Ray Bursts . . . The High Energy Transient Explorer satellite, hailed as the next big thing in gamma ray burst (GRB) research, has been launched carrying advanced GRB equipment and software, thanks to **Los Alamos National Laboratory** researchers. The satellite can notify researchers of a gamma ray burst in seconds. Since the bursts are powerful but ephemeral, that rapid alert will make all the difference in catching GRB images and information or speculating about what just happened.

Sailing Outer Space . . . Researcher **Gregory Benford** of **UC Irvine’s physics and astronomy department** is developing a microwave sail prototype made of lightweight layers of carbon. The sail would allow a craft to be propelled from low orbit to high orbit and ultimately into space by microwaves of light, similar to the way wind pushes a sailboat across water. By using these electromagnetic waves, spacecraft employing this technology wouldn’t need an engine or fuel.

Signaling Molecules . . . Applying the tools of chemistry where modern genetic techniques have so far fallen short, **UC San Francisco** researchers and colleagues have developed drug-like inhibitors to study vital signaling molecules essential for almost all cell activity. The research opens the way to identify the functions of hundreds of these molecules, called kinases, crucial to signal transmission in all cells and, in the same step, identify precisely how drugs can inhibit kinases when they go awry and cause disease.

Stretched Molecules . . . Researchers at **UC Santa Barbara** have discovered that stretched molecules behave somewhat like atoms, which makes it easy to sort out and show the effects of vibration on electron transfer. Chemists **Alec M. Wodtke** and **Yuhui Huang** explain that with this research, valuable data have become available that will help in the improvement of the theory of electron transfer.

Planet and Environment

Pollution and Asthma . . . Research at the **UC Davis California Regional Primate Research Center** is bringing a new understanding of the relationship between air pollution, common allergies and asthma. The work shows for the first time that occasional exposure to the air pollutant ozone can change how the lungs of young rhesus monkeys develop and lead to a disease similar to childhood asthma in humans.

El Niño's Disruption . . . New evidence from researchers at **UC San Diego's Scripps Institution of Oceanography** shows that warm, nutrient-depleted waters ushered in during El Niño resulted in a reduction in phytoplankton – the plants that are the base of the marine ecosystem. *Mati Kahru* and *Greg Mitchell* argue that El Niño produces both a reduction and a more uniform distribution of phytoplankton, triggering a critical reduction in high-concentration patches of phytoplankton that may affect fish populations.

History of the Earth's Temp . . . UC Santa Barbara researcher *David Lea* and colleague *Howard Spero* of **UC Davis** report that several species of a tiny marine organism yield facts about the history of the Earth's climate going back in time 450,000 years and through several ice ages. Planktonic foraminifera, single-celled organisms that construct shells, have inhabited marine environments for millions of years. The amount of magnesium in their shells vary depending upon water temperature.

Insights on Society

LAPD Woes . . . The Los Angeles police department is beset by low morale caused by officers' increasing fear of punishment and division between rank-and-file cops and department leaders, says a six-year study of the department by a team of researchers from **UCLA** and the University of Southern California. A quarter of the department's workforce describe themselves as "burned out," and more than half say they would leave the department if given the opportunity.

Less Happy Astronauts . . . American astronauts and mission-control personnel who participated in missions to the Mir space station tended to be less happy and less satisfied with their working conditions than their Russian counterparts, **UC San Francisco** researchers and colleagues report. The reason may have been that U.S. crewmembers were a minority on crews composed of two Russians and one American. The researchers found that ground personnel scored lower than flight crews on surveys of emotional health.

Fathers Essential . . . UC Riverside researchers have uncovered findings among African American teen-agers suggesting fathers are more crucial to the healthy development of boys' self-esteem than previously thought. Researchers *Carolyn Murray* and *Jelani Mandara* found that boys need their fathers much more than girls do to develop healthy self images. The study is in sharp contrast to other research that concluded the role of fathers in African American households was not very important.

Attracting Teachers . . . The greatest challenge facing educators today is attracting students from a wide range of backgrounds into the teaching profession, says **UC Santa Cruz's June A. Gordon**. The number one reason ethnic minorities don't go into teaching is family discouragement, Gordon says, and recurring themes include the image of and lack of respect afforded teaching, as well as community influences.

Mainstreaming Immigrants . . . California policymakers need to recognize that immigration is here to stay and to develop strategies to encourage and hasten the integration of immigrants into the state's economy and society, says **UC Davis' Philip Martin** in a report published by **UC's California Policy Research Center**. He notes that 46 percent of Californians are either immigrants or have at least one foreign-born parent, and that in the past decade, one-third of the state's annual population growth was due to immigration, a trend expected to continue.

Electronic Commerce . . . Despite headline-grabbing stories of boom-and-bust cycles in the world of Internet commerce, the trend is clear: In the next 10 to 20 years, a large fraction of all transactions will take place electronically. **UC Santa Cruz** researcher *Dan Friedman* has launched a three-year project to help identify what works – and what doesn't – in the world of cyberspace markets. His findings are expected to help shape the design of future e-markets.

Love and Happiness . . . Ever wondered why teen-age girls – but not teen-age boys – make lists of what they want in an ideal mate? **UC Davis** psychologist *Richard Robins* has the answer: Women have higher expectations for what makes a happy relationship. Robins' study of 360 young couples found that while a man's relationship happiness is predicted only by his partner's low level of negative emotions, a woman's happiness depends on that low level of criticism and anxiety plus a high level of positive emotions and constraint.

Looking to the Future

Ever-Bigger Eyes . . . Today, the largest optical telescopes are the twin Keck Telescopes in Hawaii, with 10-meter mirrors that gather the faint light from distant galaxies. Now, **UC Santa Cruz** astronomers and colleagues are teaming up to design and build a 30-meter telescope, the California Extremely Large Telescope (CELT). It would enable astronomers to probe into nearby star-forming regions to study the births of stars, possibly even directly image planets around nearby stars and study the most distant galaxies, looking far back in time to understand how galaxies and stars formed early in the history of the universe.

New Materials . . . A **UC San Diego** team led by *Sheldon Schultz* and *David Smith* has developed a new class of composite materials, which is expected to open up an entire new sub-discipline within physics and form the foundation for a variety of commercial applications, particularly in wireless communications. The new materials reverse many of the physical properties that govern the behavior of ordinary materials, such as the Doppler effect.

Kudos

Presidential Award . . . *Luis P. Villarreal*, **UC Irvine** professor of molecular biology and biochemistry, has received a 2000 Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring. He was honored for his work in developing science education and research programs to assist minority high school and university students. The award was established by the Executive Office of the President in 1996 and is administered by the National Science Foundation.

MacArthur Award . . . *Matthew Rabin*, a **UC Berkeley** economics professor whose work integrates psychological research with formal economic models, is one of 25 recipients of a MacArthur Foundation fellowship, commonly known as a "genius" grant. Rabin, 36, will receive a \$500,000 award over the next five years with no restrictions on how the money may be used.

Feeds Millions . . . *Anthony E. Hall* of **UC Riverside** has spent 26 years in research that led to a substantial increase in protein-rich food for the poor in Africa. He recently received the Chair's Award for Scientific Excellence from the Board for International Food and Agricultural Development. Hall has improved varieties and management of cowpea, a crop that provides grain, fresh peas and hay. Hall's work has provided a partial solution to the drought and low soil fertility problems plaguing parts of Africa and has contributed to increasing the profitability of the state's cowpea (blackeye bean) industry.

Scientific Leaders . . . Four scientific leaders at **UC San Francisco** and two from **UC San Diego** are among the 60 scientists elected nationally to the Institute of Medicine. At UC San Francisco, they are *Elizabeth H. Blackburn*, professor of biochemistry and biophysics, *Thomas C. Coates*, professor of medicine and epidemiology and director of the **UCSF AIDS Research Institute**, *Deborah Greenspan*, professor of clinical and oral medicine in the **School of Dentistry's** stomatology department and *Mary Anne Koda-Kimble*, dean of the **School of Pharmacy** and professor of clinical pharmacy. At UC San Diego, they are *Jerrold Olefsky*, professor in the endocrinology division, and *Larry Squire*, professor in the psychology department, both of the **School of Medicine**.

Investing in Education

Digital Arts Showplace . . . The **Beall Center for Art and Technology** at **UC Irvine's School of the Arts** opened in October with a groundbreaking inaugural exhibition titled "SHIFT CTRL: Computers, Games and Art." The Beall Center, a 3,300 square-foot gallery and research center for new media arts, is the first of its kind in the UC system. It was established with a \$1.5 million gift from Rockwell International Corp. to honor Donald Beall's retirement as chairman and CEO.

Gift for Genetics . . . Pierre and Christine Lamond, through the Lamond Family Foundation, have pledged \$5.2 million to fund research in the **Program in Human Genetics** at **UC San Francisco**. Their support, establishing a distinguished professorship, an endowed fellowship and a technology acquisition fund, will be used to recruit a leading genetics researcher. Christine Lamond, of Atherton, is a member of the UCSF Foundation.

Improving Public Education . . . Santa Barbara businessman and former ambassador to Fiji Don Gevirtz and his wife, Marilyn, have donated \$10 million to the **Graduate School of Education** at **UC Santa Barbara** for research to improve the quality of education in California's public elementary and secondary schools. To honor the benefactors, the school will be named the **Gevirtz Graduate School of Education**.



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