

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 faculty, staff and students of the University of California and the national laboratories managed by the university.

In the News

Geffen Gift ... Entertainment executive and philanthropist David Geffen has donated \$200 million to endow the **UCLA School of Medicine**. The gift represents the largest single donation of its kind ever made to a school of medicine in the U.S. and the largest donation ever received by the **University of California**. The gift will enhance the research and teaching programs of the school, to be named the David Geffen School of Medicine.

Poet Laureate ... UC San Diego's Quincy Troupe has been appointed California's first official Poet Laureate. His duties will include a minimum of six poetry readings during his two-year term, spread around the state to give residents an opportunity to attend at least one of the readings. Troupe also will participate in projects to bring the poetic arts to Californians who might otherwise have little opportunity for exposure to poetry.

Veterinary Groundbreaking ... UC Davis has broken ground for its \$77 million laboratory facility for the **School of Veterinary Medicine**. The building will range from one to six stories and will include 98,000 square feet of classrooms, laboratories, clinical services and offices.

Top Library ... UC Berkeley has the top-ranked library among public universities in North America, according to the latest annual rankings of 113 institutions by the Association of Research Libraries. Berkeley is No. 1 among public universities, third overall. Harvard University tops the list, and another private, Yale, is second.

New Buildings ... UC San Diego has broken ground on two buildings with state-of-the-art facilities to support technology research and education. The larger of the two structures, at 215,000 square feet, will house the headquarters and UCSD division of the **California Institute for Telecommunications and Information Technology**, a collaboration between UCSD and **UC Irvine**, which seeks to extend the Internet throughout the physical world. The other building, at 148,000 square feet, will include the **Jacobs School of Engineering's computer science and engineering department** and the administrative offices of **Earl Warren College**.

Adaptive Optics Center ... UC Santa Cruz has dedicated its new 4,000-square-foot **Center for Adaptive Optics** with the help of Rita Colwell, director of the National Science Foundation. Adaptive optics is used in astronomy and vision science to correct the blurring of images caused when light travels through a distorting medium. The center is funded by a \$20 million, five-year grant from the foundation, extendable for an additional five years of funding at the same level.

Health and Nutrition

Feeling Better Faster ... A new **UCLA Neuropsychiatric Institute** study shows for the first time that measurable changes in the front of the brain can predict the effectiveness of an antidepressant within days of treatment – weeks before a patient begins to feel better. The findings could lead to treatments that help depression patients feel better faster by cutting treatment evaluation periods from weeks to days. The findings also could aid in the development of new medications.

Glaucoma ... Research conducted at **UC Davis Medical Center** and 21 other leading clinical centers shows that pressure-lowering eye drops reduced by more than 50 percent the development of primary open-angle glaucoma, the most common form of glaucoma and one of the nation's leading causes of vision loss. The results mean that people at higher risk may delay – and possibly prevent – the disease by using prescribed drops.

A Molecule and Atherosclerosis ... A small molecule in the liver plays a major role in starting the cellular processes that lead to the hardening of the arteries and heart disease that's common in kidney failure, a **UC Irvine** study has found. The study is the first to link the enzyme molecule to high cholesterol levels and hardening of the arteries, also known as atherosclerosis, and suggests that the molecule's action may be happening in many cases of heart disease and stroke, currently the leading killers of Americans.

Costly Osteoporosis ... A first-ever report from the **UC San Francisco School of Nursing Institute for Health & Aging** says costs for osteoporosis in California topped \$2.4 billion in 1998, with hip fractures accounting for 64 percent of the burden. It says the disease mostly affects women, and of those hospitalized, 80 percent are white and 75 percent are over age 65.



Stopping Cancer Cold ... *UC Berkeley* researchers and colleagues have found that freezing cancer cells in test tubes made them far more vulnerable to attack by bleomycin, a potent anti-cancer drug also known by the brand name Blenoxane. Freezing cells to destroy them and bleomycin are approved treatments currently used separately for cancer patients, but researchers say that combining the two therapies may eventually lead to a powerful new form of cancer treatment that targets malignant cells while leaving healthy tissue unharmed.

Breastfeeding Boosts Resistance ... Babies who are fully breastfed for six months are less likely to suffer from respiratory illnesses than babies fully breastfed for only four months, say researchers at *UC Davis Children's Hospital* and colleagues. The study is the first to demonstrate that an additional two months of full breastfeeding – from four months to six months – substantially increases an infant's protection against pneumonia and recurrent ear infections.

Developments and Discoveries

New Tangerines ... *UC Riverside's Mikeal Roose* has developed three varieties of tangerines, now released. The new varieties are large compared to other varieties, have a sweet taste, and bear fruit with a deep orange rind. All three are also very low seeded, with one seed per fruit.

Anti-Alzheimer's Jogging ... That daily jog may do more than keep you fit – it might also prevent the deterioration of brain cells that can lead to Alzheimer's disease, say researchers at *UC Irvine*. Their work indicates that regular exercise controls the expression of genes in an area of the brain important for memory and maintaining healthy brain cells; the maintenance breaks down in cases of Alzheimer's.

Cell Guides ... Biologists at *UC San Diego* have found that two genes associated with the development of human cancer play a central role in orienting a cell's "internal compass," guiding white blood cells to the sites of infections and leading other types of cells directly to nutrients and a myriad of other important chemical cues. Their discovery sheds light on the long-standing mystery of how cells are able to steer directly toward the source of chemical attractants.

Alcohol Response ... Neuroscientists at *UC San Francisco's Ernest Gallo Clinic and Research Center* report that a molecule in neurons boosts the brain's response to alcohol, triggering in minutes chemical changes that maintain an urge to drink. The discovery may lead to medications to impede alcohol-seeking behavior and prevent relapse in dependent drinkers.

Ancient Factory ... Working in a remote desert area in southern Jordan, *UC San Diego* archeologists and colleagues have discovered the largest Early Bronze Age metal factory in the Middle East, dating to about 2700 BC. Thousands of stone hammers, anvils, crucibles, metal objects and ancient metallurgical debris were unearthed at the site.

Planetary System ... After 15 years of observation and patience, the world's premier planet-hunting team has finally found a planetary system that's reminiscent of our own solar system. *UC Berkeley* and *UC Santa Cruz* astronomers and colleagues report discovery of a Jupiter-like planet orbiting a sun-like star at nearly the same distance as Jupiter orbits our sun.

Night and Day ... A team led by *UC Irvine College of Medicine* researchers has discovered the molecule that signals the body to respond to night and day. The discovery marks the first time the biological mechanism that regulates night and day cycles (known as circadian rhythms) has been identified. The study may eventually lead to treatments for jet lag, shift-work syndrome, sleep and eating disorders and other conditions.

Brain Workings ... Researchers at *UC San Diego* and colleagues have revealed how the brains of higher animals and probably humans integrate sensory information and motor control signals to heighten our senses to smell a faint odor, visualize an individual in a crowd, or even discern the sounds of a single instrument in an orchestra. Their discovery could have a direct application to future efforts to help victims of stroke or spinal injury with "neuroprosthetics" that might move artificial limbs, or other procedures that might lead to the re-establishment of motor control in stroke victims.

The Cutting Edge

Three-dimension Supernovae ... Astrophysicists from *Los Alamos National Laboratory* have created the first 3-D computer simulations of the spectacular explosion that marks the death of a massive star. The work by *Michael Warren* and *Chris Fryer* paves the way for rapid advances on more exotic questions about supernovae.

Hidden Life of Rocks ... Geologists at *UC Davis* are using neutron beams from a nuclear reactor to see inside rocks. They are using the methodology to find bacteria living inside rocks collected in the Mars-like environment of Antarctica's dry valleys and Israel's Negev desert.

Detecting Anthrax ... Scientists from *Lawrence Livermore* and *Los Alamos national laboratories* and colleagues have discovered new DNA regions unique to the bacterium that causes anthrax, potentially providing a way to improve the disease's detection. It's hoped the method can be used in portable detection systems previously developed by Livermore and Los Alamos scientists.

Long-Distance Lasers ... Scientists at *Lawrence Livermore National Laboratory* have completed a 28-kilometer, high-capacity laser communication link between the laboratory and Mount Diablo in the San Francisco East Bay region. It is one of the longest terrestrial high-capacity air-optics links in existence. The experiments are part of an effort to develop advanced technologies for long-range laser communications.

Active Cells ... White blood cells are much more active and dynamic than previously assumed and show complex behaviors for responding to foreign bodies, a **UC Irvine** study has shown for the first time. The study also marks the first time researchers have seen single immune system cells operating in intact lymph nodes, their native environment in the body, and gives new insight into the tactics used by these cells to fight disease. The results could help scientists understand how the immune system fights disease.

Biology and the Web ... A team of computer scientists working with cell biologists at **Lawrence Berkeley National Laboratory** has created BioSig, a Web-based bioinformatic system that links collections of microscope images to a wide variety of quantitative experimental data. The new program can be used by multiple researchers to answer questions and test hypotheses about protein expression, cell morphology and cellular organization in tissues and cell cultures.

Next-Generation Magnets ... UC Riverside researchers have prepared a "singlet diradical" using the specific properties of two non-metallic elements – boron and phosphorus. Their innovation helps pave the way for the manufacture of materials with the mechanical properties, transparency and low density required for a new generation of magnets, magneto-optical and electrical devices.

Planet and Environment

Dust Devils ... UC Berkeley physicist *Greg DeLory* and colleagues are stalking dust devils in the dry flats of Arizona. The common mini-tornadoes are helping the study of their bigger cousins on Mars. Though 10 to 100 times smaller than dust storms on Mars, Arizona dust devils will give the researchers an idea of the effect dust storms could have on instruments aboard future Mars landers and how they might affect robots exploring the surface. The tests also will help identify instruments needed to study dust devils on Mars.

Asteroids and Tsunamis ... Researchers at **Los Alamos National Laboratory** have completed the largest and most accurate simulation of tsunamis caused by asteroids. They found that a one-kilometer iron asteroid striking a three-mile-deep patch of ocean at a speed of 45,000 miles an hour would have an impact equal to about 1.5 trillion tons of TNT and produce a jet of water more than 12 miles high. The researchers hope their better model will help predict how tsunamis behave, aiding emergency responders.

Vulnerable California ... UC Santa Cruz and **Lawrence Livermore National Laboratory** researchers have used a sophisticated computer model of the regional climate system to produce a detailed picture of how California's climate is likely to change within the next 50 to 100 years as a result of global warming. The study supports what many people have already guessed – global warming will mean warmer temperatures and smaller snowpacks in California, with serious adverse effects on the state's water supply.

Lowering Pollutants ... Engineers from the **Lawrence Livermore National Laboratory** have developed an easily retrofitted combustion method that results in lower power plant pollutant emissions. The new technology, dubbed Staged Combustion with Nitrogen-Enriched Air, could help power plants comply with strict federal requirements for decreasing plant emissions.

New Species ... Studies of a California insect, *Timema cristinae*, or walking stick, are helping to illuminate the process of evolution of new species. The insect – discovered by **UC Santa Barbara** researcher *Cristina Sandoval*, for whom the insect is named – is found in California's Santa Ynez Mountains on two types of plants. The research indicates that habitat may play a crucial role in the early stages of separation into different species.

Catching Carbon Dioxide ... Los Alamos National Laboratory researchers are developing a new high-temperature polymer membrane to separate and capture carbon dioxide, preventing its escape into the atmosphere. By making a membrane that functions at elevated temperatures, the scientists seek to increase the practicality and economic feasibility of using membranes in industrial settings, leading to a significant reduction in greenhouse-gas emissions.

Satellites and Water ... By using data from NASA satellites, a **UC Irvine** researcher will be able to measure changes in underground aquifer water levels, which may prove vital for water resource management for agriculture and other human water needs. The use of satellite data is a major breakthrough for studying the underground storage levels and water replenishment changes in large aquifer systems throughout the world.

Saving Birds ... The California Energy Commission is asking **UC Santa Cruz's Predatory Bird Research Group** to help solve the problem of bird deaths caused by power lines and other structures used for electricity transmission. Thousands of hawks, eagles, owls, and other birds die each year from electrocution and collisions with power lines and other electric utility structures. In addition to killing birds, electrocutions sometimes cause serious power outages and can start wildfires when birds catch fire and fall to the ground.

Conserving Consumers ... It was California consumers – not mild weather or the cooling economy – who should get credit for avoiding blackouts and keeping the lights on in summer 2001, **Lawrence Berkeley National Laboratory** researchers report. Californians embraced energy efficiency and conservation, reducing their peak demand by 3,000 to 5,500 megawatts. Some amount of the conservation behavior and changes in energy management practices will persist, depending on the continued awareness of energy issues and the sensitivity of customers to the increases in their electricity rates, the researchers say.

Insights on Society

Health Insurance Coverage ... The ***UCLA Center for Health Policy Research*** has completed the most comprehensive investigation of health insurance coverage of Californians ever, showing that a total of 6.2 million non-elderly Californians, or 21 percent, lacked coverage for all or some of the year. The greater San Francisco Bay Area had the lowest uninsured rate among regions in California, with 9 percent. Los Angeles County was the epicenter of the uninsured in California and the nation, at a rate of 20 percent.

Standardized Testing ... ***UC Santa Barbara*** researcher *Rebecca Zwick* argues in a new book that while standardized test scores are useful in assessing scholastic skills and predicting university achievement, they are not the whole picture. In addition, lower scores by minorities and females, she contends, are more correctly attributed to poorer academic preparation in secondary schools than to any innate bias in the tests. Zwick's research focused on the major college entrance tests: the SAT, ACT, GRE, MCAT, LSAT, and GMAT.

Whither European Islam? ... ***UC Berkeley*** researchers *Nezar AlSayyad* and *Manuel Castells* say that whether in French elections or in connection with anti-immigrant nationalism, much of Europe is fiercely debating the increasing Muslim population on that continent and its future. They report that a survey of scholars from Cairo, across Europe and the United States shows that the main issue now is citizenship and what it means to be a citizen of Europe in the 21st century.

Color on TV ... ***UCLA*** researchers report that despite calls for more diversity on prime-time network television, African Americans continued to be overrepresented and concentrated in situation comedies while other ethnic groups remained underrepresented. Latinos were the most underrepresented group in prime-time TV, accounting for 2 percent of all characters, although their national population is 12.5 percent. Asian Americans comprised about 3 percent of all characters, and Native Americans were invisible.

For more information about these research discoveries, or other news from UC campuses and its national laboratories, please visit these links.

UC BERKELEY <http://www.berkeley.edu/news/>

UC DAVIS <http://www.news.ucdavis.edu/>

UC IRVINE <http://today.uci.edu/releases/index.html>

UCLA <http://www.newsroom.ucla.edu/>

UC RIVERSIDE <http://www.info.ucr.edu/cgi-bin/archive.pl>

UC SANTA BARBARA www.ucsb.edu

UC SAN DIEGO <http://ucsdnews.ucsd.edu/>

UC SAN FRANCISCO <http://media.ucsf.edu/ucsf/newsitem.nsf/New+Press+Release?OpenView>

UC SANTA CRUZ http://www.ucsc.edu/news_events/press_releases/01-02/default.asp

LAWRENCE BERKELEY NATIONAL LABORATORY <http://www.lbl.gov/Science-Articles/News-Releases.html>

LAWRENCE LIVERMORE NATIONAL LABORATORY <http://www.llnl.gov/llnl/06news/news.html>

LOS ALAMOS NATIONAL LABORATORY <http://www.lanl.gov/worldview/news/releases/index.shtml>

Tobacco Campaigns ... The tobacco industry's own documents show that most youth smoking prevention programs it has supported are designed to promote industry political and marketing aims, researchers at ***UC San Francisco*** say. The researchers analyzed nearly 500 industry documents and concluded that tobacco industry youth programs do more harm than good at reducing smoking.

Looking to the Future

Superstrong Spider Silk...*UC Santa Barbara* scientists and U.S. Army researchers are making progress in a joint study of spider dragline silk. The researchers report the silk molecules are designed to be pulled, are elastic and very strong – stronger than steel and comparable in strength to Kevlar. The Army is interested in spider silk as material for bulletproof vests, armor and tethers.

Protecting Food Supplies ... Technologies developed by ***Lawrence Livermore National Laboratory*** researchers and other scientists to fight bioterrorism could find another use – detecting naturally occurring pathogens in food. Scientists say the tools they use to develop DNA signatures for the detection of bioterrorist agents could search out food-borne pathogens.

Total Communications ... The new ***UCLA Center for Embedded Networked Sensing*** is developing a communications system permeating the physical world. Embedded networked sensing systems will use tiny devices that can be densely distributed within a natural or man-made environment to collect information on such subjects as plankton colonies, endangered species, contaminants in soil and air, and even physiological information about medical patients. Approximately 20 UCLA faculty, as well as faculty from the University of Southern California, ***UC Riverside***, the Jet Propulsion Lab and Caltech, make up the research team.

Cloned Calf ... A second cloned calf has been born at ***UC Davis***. The reddish-brown-and-white female named Rosie is part of an ongoing study aimed at better understanding which types of adult cells are best suited for cloning cows. The researchers hope to improve the cloning technique so that it eventually can be used in animal agriculture to produce more healthful meat and milk products. The first cloned calf was born in August 2001 and died three days from multiple birth defects.

Lateral Casimir Force ... ***UC Riverside*** physicist *Umar Mohideen* has performed the first demonstration of the lateral Casimir force, which has vast implications for micro-machines. The Casimir force has its origins in virtual particles existing in empty space. Mohideen showed that the force's lateral component, by acting tangential to two surfaces, results in a horizontal sliding motion of one surface against the other.


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