

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

Inauguration in Merced ... The **University of California** formally broke ground for **UC Merced** with an inauguration Oct. 25 of Chancellor **Carol Tomlinson-Keasey**. UC's 10th campus is scheduled to open in fall 2004 with 1,000 students. It will be the first UC campus built since 1965.

New pharmacy school ... The **UC San Diego School of Pharmacy and Pharmaceutical Sciences** has opened. It is the first public pharmacy school in Southern California, and only the second public pharmacy school in California. It joins its sister school at **UC San Francisco**, which previously had been California's only state-supported institution offering a doctor of pharmacy, the minimum degree required for a licensed pharmacist to work.

Math award ... The California Mathematics Council has bestowed its prestigious Edward Begle Memorial Award upon **Elizabeth Stage**, director of **UC's Mathematics Professional Development Institutes**. The award honors an outstanding educator who has a track record of improving California mathematics. During her tenure at UC, Stage has served as the executive director of the California Science Project and as director of mathematics and computer education at Lawrence Hall of Science and of the Bay Area Mathematics Project.

Newest MacArthur fellow ... **George Lewis**, a professor of music at **UC San Diego**, is one of 24 persons nationwide to win a 2002 MacArthur Fellowship, often called "the genius award." Lewis, 50, a composer, performer, teacher, theorist and historian, will receive a five-year, \$500,000 tax-free grant. About 50 UC faculty and researchers have won MacArthur grants since the program started 21 years ago.

Fundraising milestone ... Even in uncertain economic times, **UCLA** has achieved its most successful fundraising performance in campus history. "Campaign UCLA" set a record for the University of California system by receiving more than \$509.4 million in private gifts and grants during the past fiscal year. Campaign UCLA is the most ambitious fundraising effort ever undertaken by a public university campus.

Major gift for new lab ... UC Santa Cruz has received a grant of \$9.1 million from the Gordon and Betty Moore Foundation to help establish a **Laboratory for Adaptive Optics**. Adaptive optics sharpen the vision of ground-based telescopes by removing the blurring effects of turbulence in the Earth's atmosphere. The grant is the largest contribution from a private foundation in the history of the campus. Moore, a UC alumnus, co-founded Intel Corp. in 1968.

Health and Nutrition

Autism rise real ... California's unprecedented increase in autism is real and cannot be explained away by artificial factors such as misclassification and criteria changes, according to the results of a large statewide epidemiological study led by **Robert Byrd** of the **UC Davis Medical Center**. The study also showed that some children diagnosed with mental retardation are, in fact, autistic.

Arguments and your heart ... Still mulling over last night's argument? It could affect your heart. Just thinking about the fight appears to lead to high blood pressure and later health problems, says a study from **UC Irvine** and **UC San Diego**. Researchers found that when asked to remember tasks associated with emotionally driven increases in blood pressure, students' blood pressure rose and stayed high. Thinking back to unemotional, merely physical tasks did not have the same effect.

Benefits of red wine ... UC Davis researchers have found that catechin, a potent antioxidant in red wine, delays tumor formation when fed to mice that are predisposed to developing tumors. Catechin is one of a group of compounds called polyphenols found in some plant-based foods. Polyphenols are thought to protect against cardiovascular disease and cancer by preventing oxidation, a process linked to narrowing of the arteries, blood-clot formation and tumor growth.

Noninvasive cancer ... One in five cancers detected by mammography are non-invasive, contained within the walls of the breast duct where they were found, **UC San Francisco** researchers report. The non-invasive tumors, called ductal carcinoma in situ, are more likely to be found with age. Approximately one in every 1,300 screening mammograms results in discovery of the non-invasive tumors.



Developments and Discoveries

Viking farmhouse ... A **UCLA**-led team of archaeologists has discovered a 1,000-year-old Viking Age farmhouse in north Iceland that may have belonged to Snorri Thorfinnsson, the first European born in the New World. The main structure, built of turf and buried by windblown soil, is at least 95 feet long with an internal roofed area of about 175 square yards. A thin volcanic ash layer from the 1104 eruption of Mount Hekla covers some of the remains, confirming that the structure was occupied between 1000 and 1100.

Crucial protein ... Researchers at **Lawrence Berkeley National Laboratory's Life Sciences Division** have demonstrated that SATB1, a protein crucial to the development of the immune system, works by forming a network in the cell nucleus. They report the protein attaches chromatin to the network structure at specific sites and orchestrates remodeling of the chromatin over long distances to regulate gene expression.

Easing anxiety ... The trouble with most anti-anxiety drugs is that they tend to sedate, not just relax. A research team led by scientists at **UC San Francisco's Ernest Gallo Clinic and Research Center** has shown that de-activating a common enzyme in neurons reduces anxiety without inducing sedation. The study in mice suggests a new route to treat anxiety while avoiding sedating and possibly addictive effects.

Dating our ancestors ... Burrows, trails and tracks left behind by ancient animals may hold the key to determining when macroscopic bilaterians first appeared, reports **UC Riverside** geologist *Mary Droser*. Bilaterian animals are symmetric about a central axis, and the category includes worms, ants and humans. The study suggests that bilaterian animals did not appear until approximately 555 million years ago.

Hopeful trial ... A national clinical trial with 80 Parkinson's disease patients has shown that high dosages of a naturally occurring compound, coenzyme Q₁₀, slowed by 44 percent the progressive deterioration in function that occurs in the disease, **UC San Diego** researchers report. The greatest benefit was seen in everyday activities such as feeding, dressing, bathing and walking.

Intergalactic oxygen ... **UC Santa Barbara's Crystal Martin** and colleagues have discovered that a nearby dwarf galaxy is spewing oxygen and other "heavy" elements into intergalactic space. Scientists have speculated that heavy elements escaping from dwarf galaxies in the early universe could play a dominant role in enriching the intergalactic gas from which other galaxies form.

Soy and hyperactivity ... A **UC Irvine**-led study has discovered that manganese, a mineral found in high levels in soy milk, appears to be linked to behavioral problems. The study in rats, one of the first scientific inquiries of soy milk and the hyperactivity disorder, also indicates that manganese exposure resulted in lowered levels of the neurotransmitter dopamine, which plays a key role in inhibiting behavior seen in cases of the disorder.

The Cutting Edge

Molecule movies ... Working with a unique scanning tunneling microscope, **Lawrence Berkeley National Laboratory** scientists have produced the first-ever action movies starring individual water molecules on a metal surface. Their research may have implications for developing waterproofing materials that won't stain, mildew, rust or suffer any of the other damages caused when something gets wet. The research is also important to many biological processes.

Detecting prions ... **UC San Francisco**-led researchers have developed a sensitive, automated test for detecting prions. They report it improves the accuracy and speed of detecting the various forms of the infectious agent that causes a set of neurodegenerative diseases in cattle, sheep, deer and elk. Because the test is automated, it could be used for high-throughput testing of brain samples of cattle with "mad cow" disease, as well as deer and elk with chronic wasting disease.

New black hole type ... Researchers from **UCLA** and their colleagues have developed the strongest evidence yet for the existence of an intermediate-sized class of black holes. The findings about the previously undiscovered black holes promise a better understanding of how galaxies and globular clusters first formed billions of years ago. Globular star clusters contain the oldest stars in the universe.

Refined resolution ... Scientists from **Lawrence Livermore National Laboratory** have performed the first global climate simulations with spatial resolutions of roughly 30 miles. Typical global climate simulations use spatial resolutions of about 186 miles, which limits their ability to simulate climate and climate change on a regional scale. The new capability will be used to assess climate change and its societal impacts.

Paralysis reversal ... **UC Irvine** researchers and colleagues report that paralysis from spinal cord injury was significantly reversed by adding tiny nerves from the rib cage and mixing them with a powerful growth inducer found in most nerve cells. The study, conducted in rats, suggests that nerve cells can be inserted and stimulated to grow through damaged areas of the spinal cord, perhaps leading to better treatments for spinal cord injury.

Cancer cell trick ... *UC Berkeley* researchers report a difference between the way normal and cancerous cells handle the enzyme telomerase. The enzyme maintains the telomeres that cap the ends of chromosomes, keeping them long enough to allow DNA replication and cell division. Telomerase is normally released only when needed to touch up the telomeres, which shorten somewhat with each cell division. It then returns to its compartment, called the nucleolus, to await the next round of division. The researchers say cancer cells, on the other hand, have found a way to mobilize telomerase continually so they can double and re-double while keeping the telomeres intact.

Powerful laser ... *Lawrence Livermore National Laboratory* scientists have developed the world's most powerful solid-state laser system. The technology offers applications for military defense and industrial processing, including short-range capabilities against rockets, artillery and mortars. Industrial applications could include welding, cutting and heat-treating metals. The laser's quarter-inch beam can penetrate up to 1.5 inches of steel or 3 inches of aluminum.

Planet and Environment

Coral reefs study ... *UC Santa Cruz* scientists and colleagues are studying the impact of global climate changes on some of the most isolated and pristine coral reef habitats in the world – the Northwestern Hawaiian Islands. The islands were selected because they are one of the few places in the world where there are almost no local human impacts that might have affected the climate.

Groundwater software ... Underground water or aquifers are continuous, but the land above them is usually carved up among different owners. Now, *UC Santa Barbara's Hugo Loaiciga* has designed computer software for landowners to determine how much water they can pump without depleting the aquifer they share. The model looks at the number of individuals pumping water out of an aquifer and shows how much each can take out without causing the aquifer or springs to dry up.

Disease spreads ... Scientists from *UC Davis* and *UC Berkeley* have confirmed that two of California's most highly prized trees – coast redwood and Douglas fir – are susceptible to the Sudden Oak Death pathogen. Since 1995, the highly contagious fungus-like disease has killed tens of thousands of oaks and tanoaks along California's northern coast. It is not yet clear how seriously the disease will impact California's coast redwood and Douglas fir trees, which are ecologically and economically vital to the timber, nursery, landscape and construction industries.

Aquatic fertilization ... Researchers at *Lawrence Berkeley National Laboratory* have recorded the first direct observation of wind-blown terrestrial dust fertilizing the growth of aquatic plant life. The finding stems from the spring of 2001, when two robotic Carbon Explorer floats recorded the rapid growth of phytoplankton in the upper layers of the North Pacific Ocean after a passing storm had deposited iron-rich dust from the Gobi Desert.

Backward earthquakes ... The first evidence that earthquake faults move backwards, contrary to conventional observations, has been uncovered by scientists at *UC San Diego's Scripps Institution of Oceanography*. Results of a study of a 7.1 earthquake that ripped through 28 miles of faults in the Mojave Desert three years ago provide a new way to identify potentially active faults, help track when the last earthquake occurred in a fault zone and furnish a better understanding of earthquakes.

Water reclamation ... Southern California's water supply is dwindling and a drought exists in the state, but the public has misperceptions and shows uninterest in water reuse – a potential source of water supplies, according to *UCLA Institute of the Environment* researchers. They say water reclamation, or the reuse of highly treated wastewater, potentially can provide new supplies equal to approximately 50 percent of Southern California's water consumption.

Safe if clean ... A *UC Davis* study shows that if they are properly cleaned, apartments and offices near the collapsed World Trade Center towers are safe for living and working. It also found that the concentration of diesel pollution in lower Manhattan is quite high, which could cause breathing problems for some people. The researchers found little evidence that very fine particles persist in indoor spaces near Ground Zero once the areas were cleaned according to U.S. EPA guidelines.

Insights on Society

Conservative youth ... On some social issues, young people may be the most conservative of all, according to a nationwide survey by *UC Berkeley* researchers. Fifty-nine percent of adults age 27 to 59 want public schools to allow prayer at official school activities, such as commencements; among teenagers, it's 69 percent. Government restrictions on abortion are supported by 34 percent of adults over 26, while about 44 percent of youths age 15 to 22 support such restrictions.

Handgun sales ... *UC Davis* researchers have released a groundbreaking report that provides the first complete description of how more than 200,000 handguns are sold legally in California each year. Among other things, the study shows that more than 157,000 adult Californians purchased a total of 235,875 handguns in 1999. The figure represents about 1 percent of the adults in the state. About one in four bought multiple handguns.

Effects linger ... The psychological impact of Sept. 11 still lingers, and not just in New York City, a study by **UC Irvine** psychologists has found. The study found about 17 percent of the U.S. population living outside New York reported symptoms of post-traumatic stress around Thanksgiving, and 6 percent reported symptoms at six months after the terrorist attacks.

Pain and production ... **UC Riverside** researcher *David Fairris* and colleagues have correlated a significant relationship between worker injury and some modern production techniques. The correlations involved "just in time," total quality and other modern speeded-up manufacturing concepts. It has enormous implications in premiums for workers compensation payouts, quite apart from the human story of hands or joints not working well, Fairris says.

Kids at risk ... A new study of adult drivers and child passengers by the **UC Berkeley Traffic Safety Center** has found that most of the children were not properly restrained in child safety seats and a significant number were not secured at all. Researchers surveyed 515 adults who were leaving a public hospital or clinic in California for the first time with a new baby or who were coming to the hospital or clinic for routine pediatric exams for children ages six and under.

Looking to the Future

Molecular machine ... Researchers at **Los Alamos National Laboratory** have created the first computer model of a key part of the E-coli ribosome, a cellular structure responsible for the creation of proteins. The work has applications in the development of new and powerful antibiotics for use in the treatment of illnesses caused by all pathogens, including bioweapons agents.

Copper from worms ... **UC Santa Barbara** researchers and colleagues report the first detection of a living organism, the marine bloodworm, that makes a copper-containing mineral structure as part of its skeleton. The finding is remarkable because the amount of copper detected in the jaw tip of the creature would normally be toxic to an organism. The discovery could help eventual development of materials that need to be hard, lightweight and durable.

More blackouts? ... California residents may think the electricity crisis of 2000-2001 is behind them, but a **UC Berkeley** researcher warns of more rolling blackouts and price spikes within a few years unless state and federal policy-makers address fundamental causes of the crisis. *Timothy P. Duane* argues that demand will continue to press supply capacity in future years until generators and traders can again take advantage of relative scarcity to exercise market power.

Combating malaria ... **UC Riverside** scientists and colleagues report the sequencing of the complete genome of the major and most efficient vector of human malaria, *Anopheles gambiae*. The researchers say the new data can be used to improve control of malaria in the coming decades.

Restoring native grasslands ... California's native grasslands may only need to be reseeded with native seeds without having to first eradicate invading plants from Europe, say **UC Santa Barbara** researchers. Twenty-three percent of California was invaded by annual plant species introduced from Mediterranean Europe, marking one of the most dramatic plant invasions worldwide. The researchers found that native plants are better competitors than the European ones, but their seed availability is low, probably due to a drought 150 years ago.


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