

# 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

**Prestigious achievement ...** Ten **University of California** researchers have been elected to the National Academy of Sciences, one of the highest honors that can be accorded a scientist or engineer. They were among 72 elected from the U.S. They are: *Carlos J. Bustamante, Charles B. Harris* and *Geoffrey W. Marcy* of **UC Berkeley**; *Richard Easterlin, James McWilliams* and *Gerald Schubert* of **UCLA**; *Michael Goodchild* of **UC Santa Barbara**; *Gail Roberta Martin* of **UC San Francisco**; *Veerabhadran Ramanathan* of **Scripps Institution of Oceanography** at **UC San Diego**; and *Saul Perlmutter* of **Lawrence Berkeley National Laboratory**. With 233 members, UC and the national laboratories it manages has more NAS members than any other university or college.

**More faculty honors ...** Eleven **University of California** faculty have been named recipients of prestigious Guggenheim Fellowships. They are *Sam Davis* and *Michael Lucey* of **UC Berkeley**; *Philip Brett, Kefeng Liu, Adrian Saxe, Daniel Treisman, and Robert Watson* of **UCLA**; *Takashi Fujitani* and *Lev Manovich* of **UC San Diego**; and *John Nathan* and *David Lea* of **UC Santa Barbara**. Guggenheim are awarded for distinguished achievement and exceptional promise for the future.

**Terrorism prevention ...** **UC Riverside's** *Ashok Mulchandani* and *Wilfred Chen* will collaborate with experts from four other institutions to develop an analytical device that would detect agents of terrorism, chemical warfare agents and explosives. The work is being done under a grant of more than \$2.6 million for the next three years from the Oklahoma City National Memorial Institute for the Prevention of Terrorism.

**Earthquake monitor ...** Twenty-five miles off the Monterey coast and 3,000 feet down, a remotely operated vehicle, the *Ventana*, has become the first permanent broadband earthquake monitor on the California seafloor. The instrument will help **UC Berkeley** seismologists and colleagues measure earthquake activity from the ocean side of the fractured fault zone running up and down the coast.

**"Green" building ...** The new Donald Bren Hall at **UC Santa Barbara** has received a platinum award from the U.S. Green Building Council. The \$28 million structure, which is home to UCSB's graduate school for environmental science and management, is the "greenest" building in California. It includes such elements as solar photovoltaic panels that provide almost 10 percent of the building's electricity, natural air cooling using ocean breezes, large windows to harvest the natural light and energy-efficient lamps.

**Outstanding rating ...** **Lawrence Livermore National Laboratory** has achieved an overall rating of "outstanding" from the National Nuclear Security Administration. The annual assessment, covering Oct. 1, 2000, to Sept. 30, 2001, includes appraisals of the laboratory's performance in the areas of institutional management, science and technology, and operations and administration.

## Health and Nutrition

**Brain cancer vaccine ...** An experimental vaccine for brain cancer has shown promising results in preliminary investigations at **UCLA's Jonsson Cancer Center**. The vaccine prevented brain tumor formation in laboratory rats. In contrast, all of the rats that did not receive the vaccine developed very aggressive brain tumors.

**Testosterone and IQ ...** Older men with higher testosterone levels performed better on tests of cognition in a new study from **UC San Francisco** researchers. The study suggests that older men who are prescribed testosterone supplements may reduce their risk of cognitive decline, a precursor state to Alzheimer's disease, the researchers said.

**Huntington's progress ...** A protein developed in the laboratory halts the progression of Huntington's disease in fruit flies, a study by **UC Irvine** and MIT has found. The study is the first to identify a man-made protein that can stop the development of Huntington's, which is a degenerative brain disorder, and it may help researchers find effective ways to use gene therapy to prevent – or halt – the disease.



**Sleep less, live longer?** ... Although it's a common belief that eight hours of sleep is required for optimal health, a six-year study of more than one million adults ages 30 to 102 by researchers at the **UC San Diego School of Medicine** and colleagues shows that people who get only six to seven hours a night have a lower death rate. Individuals who sleep eight hours or more, or less than four hours a night, were shown to have a significantly increased death rate compared with those who averaged six to seven hours.

**Deadly mutation** ... The most common cause of sudden death in young athletes – a heart condition known as hypertrophic cardiomyopathy – can develop from a single genetic mutation that disrupts at least two other genes, interfering with the normal beating of the heart, **UC San Francisco**-led research suggests. All three genes encode contractile proteins that interact in heart muscle. Hypertrophic cardiomyopathy affects one person in 500, and genetic defects are thought to be responsible for at least half of all cases.

## Developments and Discoveries

**Incan mummies** ... An archaeological team lead by **UCLA** graduate student *Guillermo Cock* has found thousands of mummies, most from the Incan culture some 500 years ago, in an ancient cemetery under a busy shantytown on the outskirts of Lima, Peru. Archaeologists think the sprawling, 20-acre site was a central cemetery for the Incan people, a place where as many as 10,000 were buried.

**Cholesterol and brains** ... Higher cholesterol levels are not only bad for the heart and blood vessels, they increase the risk of cognitive impairment, the precursor to Alzheimer's disease, says a study of elderly women by **UC San Francisco** researchers. The higher cholesterol the women had, the worse they did on cognitive testing. But women who used cholesterol-lowering drugs called statins scored higher on basic cognitive tests of memory, attention and language.

**Black bubbles?** ... **Los Alamos National Laboratory** scientists and colleagues have provided a hypothesis that "black holes" in space are not holes at all, but instead are more akin to bubbles. The researchers' explanation redefines black holes not as "holes" in space where matter and light inexplicably disappear into another dimension, but rather as spherical voids surrounded by an extremely durable form of matter never before experienced on Earth. The researchers call the extraordinary objects Gravastars.

**Neutrinos have mass** ... The neutrino has been described as nothing or almost nothing. Until recently, it was considered to be mass-less. But **UC Riverside** researcher *Gordon John VanDalen* and colleagues at **Los Alamos National Laboratory** have now reported further evidence of neutrino mass and oscillation. The scientists found that neutrinos constitute approximately 1 percent of the universe's total mass.

**Chili vs. flavor** ... **UC Davis** researchers have some bad news for spice lovers: Chili reduces your ability to taste other flavors. In a series of experiments, the researchers put capsaicin – the hot chemical from chili peppers – on one side of volunteers' tongues. The volunteers then rinsed with solutions representing the five flavors of salty, sweet, sour, bitter and "umami," the flavor linked to monosodium glutamate. Capsaicin always suppressed sweetness, bitterness and umami. Saltiness and sourness weren't affected.

**Faint fuzzies** ... **UC Santa Cruz** astronomer *Jean Brodie* and colleagues have discovered an entirely new class of objects, unlike anything previously described. Much larger and fainter than typical globular clusters, the new objects were first detected in Hubble Space Telescope images of the lenticular galaxy NGC 1023. They may hold clues to how galaxies of this type form.

## The Cutting Edge

**Radiation detector** ... Scientists from **Lawrence Livermore National Laboratory** and **Lawrence Berkeley National Laboratory** have developed a handheld germanium radiation spectrometer that detects signature gamma-rays from radioactive materials. Researchers say the device would be able to determine the types of radioactive materials no matter where they might be located – at a border crossing, in an airport, or even on a person.

**Factory of life** ... For nearly 50 years, molecular biologists have sought to solve the mystery of how proteins are synthesized and the intricacies of ribosomes, the small particles in cells on which proteins are synthesized. **UCLA** researchers now believe they can show how the "factory of life" works. The research could lead to new antibiotics and insights into how genes are regulated that could produce new medical treatments.

**New solar cells** ... A new generation of solar cells that combines nanotechnology with plastic electronics has been launched with the development of a semiconductor-polymer photovoltaic device by researchers at **Lawrence Berkeley National Laboratory** and **UC Berkeley**. Such hybrid solar cells will be cheaper and easier to make than their semiconductor counterparts, and could be made in the same nearly infinite variety of shapes as pure polymers.

**Micro sensors** ... Tiny, wireless sensors being developed by **UCLA Samueli School of Engineering** researchers could provide the surveillance necessary to root out terrorists hiding in caves or underground bunkers. No larger than a housefly, these micro electro-mechanical systems magnetometers can detect the presence of military equipment – tanks, trucks or even a soldier with a rifle – to depths of 100 feet below ground. *Jack Judy* in the school's electrical engineering department leads the research.

**New superconductor?** ... A potential new high-temperature superconductor has been identified by physicists at **UC Davis**. Calculations by *Helge Rosner*, *Alexander Kitaigorodsky* and *Warren Pickett* predict that lithium borocarbide should have essentially no resistance to electrical current at temperatures up to minus 280 F. Superconductors are used to make very powerful magnets, for example, in medical magnetic resonance imaging machines. But they usually need to be cooled to almost absolute zero (minus 450 F) to work.

## Planet and Environment

**More carbon dioxide** ... Amazon waterways, including streams and flood plains, are releasing much more carbon dioxide than originally thought as a result of decaying plants that fall into the water, **UC Santa Barbara** researchers report. They say their data from the Japanese Earth Resources Satellite shows the importance of linking terrestrial and aquatic systems.

**Earth's changing climate** ... The first analysis of the potential impacts of climate change for an entire country – Mexico – including all species of mammals and birds as well as many species of butterflies, has been reported by a team of researchers at the **San Diego Supercomputer Center at UC San Diego** and colleagues. Over the next 50 years the changing climate is predicted to trigger instability for wildlife, reshuffling ecosystems and throwing new predators and prey together as new diseases and parasites are introduced, say the researchers, who studied some 1,870 species.

**Conservation survey** ... Researchers from **UC Santa Barbara** and colleagues will use a two-person research submarine to determine whether or not marine protected areas will work in California waters. They will survey different species of fish inside and outside the 4,300 square mile Cowcod Conservation Areas, located 20 to 43 miles from the California mainland.

**Corrosion monitoring** ... **Los Alamos National Laboratory** researchers and colleagues are developing a technology for real-time monitoring of corrosion within large, underground stainless and carbon-steel radioactive liquid waste storage tanks. The new monitoring technique, using electrochemical noise, provides real-time corrosion information and significantly reduces the potential for exposing workers to radiation.

**Environmental advance** ... Engineers at **UC Riverside** are developing a way of converting "wet waste," such as sewage sludge and grass clippings, into synthetic diesel fuel and electricity. Their efforts could potentially reduce the need for landfill space and provide a cost-effective alternative to increasingly restricted land application. The research is being overseen by *Colin Hackett*, manager of UCR's Alternative Fuels and Renewable Energy Program.

**Proliferating ants** ... The pesky Argentine ant, which has proliferated throughout the coastal regions of California, invading homes and displacing native species of ants, is also contributing to a sharp decline in the state's population of coastal horned lizards, **UC San Diego** researchers report. They say the invading ants have displaced many of the larger, native ant species on which the lizards fed.

**Historic earthquake** ... California's first recorded earthquake may have raised the Orange County shoreline more than 11 feet in some places, **UC Irvine** researchers say. On July 28, 1769, Spanish explorer Gaspar de Portola and his men lay encamped in what is now north Orange County when they felt a violent earthquake that Portola described in his diary. That temblor may have had a magnitude of 7.3, significantly larger than the 6.7-magnitude Northridge earthquake in 1994. The Spanish said they measured the length of the shaking by the number of Hail Marys they could utter.

**Ice-age mystery** ... **UC Davis** and **UC Santa Barbara** researchers have solved a longstanding mystery – how the Earth's climate can quickly shift between cold and warm modes. The mystery revolves around the source of a rapid change in the geochemistry of oceanic carbon that occurred just as the last ice age ended 16,000 to 20,000 years ago. The scientists suggest that the change occurred because of dramatic shifts in ocean circulation. Some scientists say these changes reflect the types of events that could occur because of global warming caused by human activity.

## Insights on Society

**"Grammar myths"** ... The **UC Santa Cruz** co-author of the first definitive grammar reference book of standard international English in more than 20 years hopes it will debunk "grammar myths" such as split infinitives that have long plagued the world's most widely used language. "We're going into the 21st century carrying grammar books from the 20th century that haven't shaken off grammar myths from the 19th century," says *Geoffrey Pullum*, who created *The Cambridge Grammar of the English Language* with Rodney Huddleston of the University of Queensland in Australia.

**Managed care results** ... Two years after Colorado's Medicaid program switched to a managed care system for its mental health patients, costs for providing care were significantly reduced without negatively affecting patient outcomes, **UC Berkeley** researchers report. They say the results are particularly encouraging since the patients studied were both poor and severely mentally ill, factors many feared would leave them vulnerable to lower quality care in cost reduction settings.

**Think inside the box ...** Managers challenge employees to “think outside the box” in search of innovative solutions, but *Andrew Hargadon* of the **UC Davis Graduate School of Management** says they would do better to use strategies that bring together lots of different “boxes” or sets of experiences and encourage people to discover how ideas from one realm can be used in others. “People don’t think outside of the box,” he says. “They just think in boxes that others can’t see.”

**Go to church, live longer ...** A new study by **UC Berkeley** researchers and colleagues provides more evidence that regular church attendance is linked to a longer, healthier life. The study found that people who attended religious services once a week had significantly lower risks of death compared with those who attended less frequently or never, even after adjusting for age, health behaviors and other risk factors.

## Looking to the Future

**Stripped-down version ...** Chemists at **Lawrence Berkeley National Laboratory** have created a stripped-down analog of a complex natural compound used in biocatalytic reactions. The team’s success, although still in the experimental stage, promises to streamline a sometimes-expensive drug production method using enzymes. The result could be less expensive pharmaceutical production.

**Space debris ...** An important and potentially destructive consequence of a space-based missile defense system is a permanent halo of orbiting debris that will interfere with scientific and communication satellites, says **UC Santa Cruz’s** *Joel Primack*. He says roughly 6 million pounds of debris from dead satellites to paint chips already orbit the Earth, while the U.S. Space Command tracks more than 9,000 objects larger than four inches in diameter.

**Supernova explosions ...** Faster computers and better astronomical data will soon make it possible to fully model supernova explosions in 3-D, researchers at the **Lawrence Berkeley National Laboratory** report. The better information is expected to shed more light on the startling announcement in 1998 that the universe is expanding at an accelerating rate – followed not long after by evidence that a mysterious “dark energy” filling the universe is responsible for this acceleration.

**Alzheimer’s and a protein ...** **UC Irvine** researchers have found a novel role for a protein linked to another known protein that causes the brain plaques in Alzheimer’s disease. The protein, called AICD, is involved in regulating calcium signaling, which nerve cells in the brain use to communicate and relay chemical “messages” through a cell. The findings provide a greater understanding of the molecular events that underlie Alzheimer’s and could affect the way researchers look for treatments.

## Kudos

**Heineken Prize ...** *Roger Tsien*, a professor of pharmacology and of chemistry and biochemistry at **UC San Diego**, has won this year’s Dr. H.P. Heineken Prize for Biochemistry and Biophysics. Tsien was awarded the \$150,000 prize by the Royal Netherlands Academy of Arts and Sciences for his contributions “to the development of a series of methods and techniques for measuring visualizing processes within and between cells.”

**California Book Award ...** **UC Riverside’s** *Susan Straight* has won the Gold Medal for Fiction from the San Francisco-based Commonwealth Club for her fifth novel, “Highwire Moon.” Straight, a professor of creative writing who was awarded the Lannan Foundation Award in 1999 and a Guggenheim fellowship in 1997, has written several critically acclaimed novels. The gold medal comes with a \$2,000 prize.

## Investing in Education

**Endowed chair established ...** A \$1 million gift from a private foundation headed by a Santa Barbara entrepreneur will be used to establish an endowed chair in **UC Irvine’s department of earth system science**. The gift from The Kavli Foundation will be used to create the Fred Kavli Chair in Earth System Science.

**Major gift ...** **UC Santa Cruz** has established a new environmental research institute, with the help of alumnus Gordon Ringold and his wife, Tanya Zarucki. They have provided a gift of \$500,000 – the largest outright gift the campus has ever received from an alumnus. The STEPS Institute for Innovation in Environmental Research is designed to encourage an interdisciplinary approach that integrates science, technology, engineering, policy, and society in studying and solving environmental issues.

**Cancer research gift ...** In recognition of the major contribution he is making to the field of basic cancer research, **UC San Francisco Comprehensive Cancer Center** Director *Frank McCormick* has received the 2002 Unrestricted Cancer Research Grant from the Bristol-Myers Squibb Foundation. The \$500,000 award will allow McCormick and his colleagues to carry out a new approach to elucidating all of the genes of key cell pathways regulating cancers.

  
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