

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

New Job . . . Chancellor *Raymond L. Orbach* has been nominated to head the Office of Science in the U.S. Department of Energy after nearly a decade at **UC Riverside**. Orbach, 67, a theoretical physicist who has led the campus since 1992, will assume his new duties upon Senate confirmation. UC President *Richard C. Atkinson* has named Executive Vice Chancellor *David H. Warren* as the interim leader of UCR pending appointment of a permanent chancellor.

Tarter to Step Down . . . **Lawrence Livermore National Laboratory** Director *C. Bruce Tarter* has announced he will leave his position in 2002 after seven years of leadership. Tarter, 61, a theoretical physicist, has served longer than any other predecessor with the exception of *Roger E. Batzel*, director from 1971 to 1988. The **University of California** administers the laboratory for the U.S. Department of Energy.

Scientific Anti-Terrorism . . . *M.R.C. Greenwood*, chancellor of **UC Santa Cruz**, has been named to a committee of distinguished scientists and engineers that will make recommendations on how the world's scientific and technical resources can best be used to respond to the threat of "catastrophic terrorism." The National Academies formed the committee.

Information and People . . . The National Science Foundation has awarded \$2.8 million to the **Center for Research on Information Technology and Organizations** at **UC Irvine** for a first-ever project that evaluates the impacts of information technologies on people and their organizations. The technologies include the Internet, personal computers and hand-held devices.

Supercomputer Open for Business . . . The newest supercomputer at **Lawrence Berkeley National Laboratory** – an IBM RS/6000 SP system – is now open to more than 2,000 researchers at national laboratories and universities nationwide. It's capable of performing five trillion calculations per second – the computing power of more than one million desktop PCs. The machine is named "Seaborg" in honor of Berkeley Lab Nobel laureate Glenn T. Seaborg (chemistry, 1951).

Health and Nutrition

Mirth as Medicine . . . Looking forward to a favorite comedy? Just checking television listings a few days ahead may boost the body's ability to fight disease, a **UC Irvine College of Medicine** study has found. It is the first to show that anticipation of a mirthful event, such as a TV comedy, results in behavior changes known to reduce stress hormone levels and boost the immune system's response to disease.

Wonderbean . . . New research at **UC Berkeley** may add yet another boost to the healthy reputation of the humble soybean. Berkeley researchers have shown that mice with the soy protein lunasin applied to their skin had significantly lower rates of skin cancer than mice without the lunasin treatment.

Controlling Triglycerides . . . Scientists at **Lawrence Berkeley National Laboratory** and colleagues, using information from the Human Genome Project, have identified a new gene, named apoAV, that appears to play a significant role in controlling triglyceride levels in the blood. Triglycerides are one of the two major blood fats, along with cholesterol, that are important risk factors in the development of heart disease.

Non-Invasive Assessment . . . A simple, non-invasive technique that can be performed in a doctor's office has been shown in a **UC San Francisco** study to help assess a woman's risk for breast cancer. Researchers have shown the effectiveness of using a modified breast pump to obtain breast fluid samples, which can then be evaluated for cellular abnormalities.

Obesity Treatment . . . A chemical related to marijuana that exists in the body may provide an effective treatment for obesity and perhaps other eating disorders, a **UC Irvine College of Medicine** study has found. The chemical reduced rats' desire for food and significantly decreased their weight gain, indicating that the chemical eventually could be developed into a drug to treat weight problems.



Breast Examination Anxiety . . . Women who are afraid of what they might find during a self-examination for breast lumps are less likely to perform the exams, possibly due to a fear of being alone when they find a lump, say researchers at **UCLA**. While the study participants – women at higher-than-normal risk of breast cancer – displayed anxiety about all screening tests, their anxiety was highest for breast self-examination. Breast self-examination was the only test where compliance was low enough to suggest that anxiety may be a barrier to cancer screening.

Developments and Discoveries

Stopping Device . . . A mechanical device attached to the back of a tanker truck, designed to stop a stolen or hijacked truck, has been developed by **Lawrence Livermore National Laboratory** engineers *Dave McCallen* and *Bill Wattenburg* for the Governor's Task Force on the Safe Delivery of Fuels. When bumped by a police cruiser from the rear, a blade on the inside of the bumper sheers the air hose to brakes. The brakes on all such trucks are designed to lock in the event of the loss of air pressure.

Parasites and Molecules . . . Tiny parasitic worms that infect 250 million people worldwide and cause the debilitating disease schistosomiasis can thrive undetected in the blood for years. Now, research at **UC San Francisco** shows that the worms not only evade immune defenses, but use molecules of the immune system to grow and reproduce. Clarifying the molecular mechanisms could aid vaccine development.

Planets Discovered . . . An international team of astronomers that includes **UC Santa Cruz's Steven Vogt** has discovered eight new extrasolar planets, including at least two that travel in circular orbits similar to those of Earth and Mars. Planet hunters have now detected nearly 80 planets orbiting nearby stars, but most of them have elongated, or "eccentric," orbits. Vogt says these latest discoveries strengthen the likelihood of finding solar systems analogous to our own.

Estrogen and Cogitation . . . Research from at the **UC Davis Medical Center** and the **Center for Neuroscience** shows for the first time how estrogen can protect brain cells against various insults that cause the mental deterioration seen in many ailments, including Alzheimer's. The researchers found that the hippocampus, a brain structure involved in memory that shrinks in Alzheimer's patients, was larger in postmenopausal women who were taking estrogen replacement therapy.

Underwater Discovery . . . An island submerged for more than 13,000 years has been discovered 300 feet beneath the ocean's surface about halfway between the Santa Barbara coast and one of the existing Santa Barbara Channel Islands. **UC Santa Barbara's Edward A. Keller**, who had been studying high-resolution topological maps of the channel floor to better understand earthquake hazards, made the discovery.

The Cutting Edge

Memory Lapses . . . Ever wonder whether your memory lapses might indicate something more serious? Now a non-invasive medical procedure can help you know for sure. **UCLA** research shows that positron emission tomography (PET) scans of the brain can accurately detect early Alzheimer's disease up to 95 percent of the time – leading to prompt medical treatment for the debilitating disease. The UCLA team's findings also show that PET is sensitive enough to predict whether persons experiencing age-related memory problems will or will not develop dementia.

Stroke Help? . . . Two plant-derived chemicals can reduce the damage from a simulated stroke in cultured mouse brain cells, says a study from **UC San Francisco** and the San Francisco Veterans Affairs Medical Center. The chemicals work by shutting down the enzyme Poly-ADP-Ribose Glycohydrolase, which contributes to cell death in the wake of a stroke. Further research might lead to a new class of stroke drugs, the researchers said.

The First Star . . . New cosmological simulations performed on a supercomputer at **UC San Diego's Supercomputer Center** have provided astrophysicists with the best indication to date of how the first star in the universe formed. The simulations suggest that the first star may have resulted from the gravitational collapse of a cloud of hydrogen and helium some 100 times more massive than the sun.

Cutting Turbulence . . . Adding triangular flaps to the design of aircraft wings dramatically cuts the strength of turbulence generated in a plane's wake, according to research at **UC Berkeley**. Wake turbulence, or wake vortices, may have played a role in the American Airlines Flight 587 crash that killed 265 people on Nov. 12, according to crash investigators. The tail fin of the Airbus A300 jet sheared off after the pilots struggled against the wake turbulence left by a Boeing 747 that had taken off less than two minutes earlier.

Capturing the Sun . . . Three instruments designed and built at **Los Alamos National Laboratory** are aboard NASA's Genesis spacecraft and have started capturing particles from the sun one million miles from Earth. They will help collect samples of the solar wind to reveal the makeup of the cloud that formed the solar system nearly five billion years ago and help scientists understand the origin of the solar system.

Speeding Salmonella Detection . . . Salmonella may soon be identified within hours, rather than as long as a couple of weeks, thanks to a rapid-detection technique developed by **Lawrence Livermore National Laboratory** researchers *Peter Agron* and *Gary Andersen*. The scientists' DNA-based detection technique is expected to cut the time for the detection of salmonella from days to possibly as little as two hours.

Planet and Environment

Crabs Clean . . . Results of a study by researchers at *UC Santa Barbara* suggest that Chinese mitten crabs in the San Francisco Bay estuary are not infected with the dangerous human parasite that has caused deaths in Asia. The researchers analyzed tissue samples from more than 800 mitten crabs collected in the bay, and none were shown to be infected with either Asian or north American lung flukes.

Earth's Outer Core . . . About 1,800 miles beneath the surface, Earth's internal structure changes abruptly where the solid rock of the mantle meets the swirling molten iron of the outer core. Now, by analyzing earthquake waves that bounce off the core-mantle boundary, *UC Santa Cruz* researchers have found evidence of a thin zone where the outermost core is more solid than fluid. The nature of the core-mantle boundary is important because researchers now think it influences phenomena ranging from the behavior of Earth's magnetic field to the massive plumes of hot rock that rise through the mantle and erupt on the surface at volcanic hot spots such as Hawaii.

Fast, Safe, Powerful . . . Researchers from *UC Riverside* have proven that at least one alternative vehicle fuel can be fast, safe and clean-burning. They ran a modified Shelby Cobra roadster on hydrogen fuel illustrating that the clean-burning alternative fuel technology can be safe and produce a credible amount of horsepower. The roadster did a respectable 108.16 mph its best of eight runs – missing the world record for hydrogen-powered vehicles by 0.1 mph.

Stricter Aquaculture Controls . . . Aquaculture, the farming of fish, shellfish and aquatic plants, is a burgeoning industry that should take greater care not to import and spread invasive species, say ecologists at *UC Davis* and Stanford University. The researchers found that exotic species of seaweed, fish and mollusks escape frequently from aquaculture facilities, creating "biological pollution" with unpredictable and irreversible effects on native ecosystems.

Bigger Waves . . . Waves in the North Pacific Ocean – particularly those off Southern California – have increased substantially in size and intensity over the past 50 years, researchers at *UC San Diego's Scripps Institution of Oceanography* report. They say it's the result of stronger winds and storm activity. Also, the approach direction of winter ocean swells, particularly in Southern California, have rotated from more northwesterly to westerly directions.

Insights on Society

Internet Impact . . . *UCLA's* latest report on the impact of the Internet leaves little doubt that going online is now a mainstream activity, continuing to spread among Americans across all age groups, education levels and incomes. But the study also found that enthusiasm for e-commerce is down, broad concerns remain about Internet privacy and security, and television is the primary victim of increasing Internet use.

Economic Forecast . . . *UC Riverside's* forecasting director, *Mike Bazdarich*, sees no recession in California comparable to the rest of the nation, despite volatility in the capital/technology markets. He predicts continued dropping of mortgage rates and modest regional growth from housing, but says U.S. growth will not attain a robust pace until 2003.

Reliable GPA . . . High-school grades are far more reliable than SAT I scores in predicting how well minority students will do in college, according to a new study by *UC Davis* researchers. The researchers – examining the college performance of 1,274 minority students who entered UC Davis as freshmen from 1988 through 1994 – found that high-school GPA was associated with persistence and performance from basic science classes all the way through to graduation.

Looking to the Future

Genome Short Cut . . . A short cut to the information embedded in the human genome comes from *Lawrence Berkeley National Laboratory* researchers and colleagues with completion of a draft sequence of the genome of the Japanese pufferfish *Fugu rubripes*. The *Fugu* genome contains essentially the same genes and regulatory sequences as the human genome. The information can then be used to help identify elements in the human genome.

Tailoring Drugs . . . *UC San Francisco* researchers have confirmed the potential benefits of tailoring drugs to a patient's genetic makeup. The researchers' assessment of the promise of this new approach – known as pharmacogenomics – confirms that many harmful drug reactions previously thought to be non-preventable may now actually be averted using genetic information about patients to select their drug therapies.

Genetic Stability . . . Biologists *Susan Bailey* and *Edwin Goodwin* of the *Los Alamos National Laboratory* have discovered new insights into how two common proteins found in mammalian cells can cause chromosomes to fuse together. Such mutations can destroy cells or give rise to cancer.

New Cartilage . . . UC San Diego scientists have fabricated cartilage tissue that for the first time mimics the multi-layering structure and cellular functions of natural articular cartilage. The tissue, made entirely from biological materials, may someday be used as an implant treatment for people with joint injuries, congenital defects, arthritis or age-related degeneration.

Down's and Alzheimer's . . . People with Down syndrome may reveal a way to treat Alzheimer's disease in its earliest stages, a **UC Irvine College of Medicine** study has found. The study, conducted on patients with Down syndrome who died with Alzheimer's disease, shows the earliest brain changes of Alzheimer's may be seen in childhood and indicates that anti-oxidants might prevent or slow the development of the disease.

Glowing Green Bollworms . . . UC Riverside scientists have developed a technology that causes the pink bollworm to glow green when viewed under fluorescent light. The advance holds out hope of changing the genetic characteristics of the pink bollworm so that they self-destruct. If successful, the technology could reduce the need for pesticides to control an insect that causes growers an estimated \$24.6 million annually in costs related to prevention, control and yield losses.

Next Generation Turbine Blades . . . UC San Diego researchers and colleagues are working on the next generation of carbon composite turbine fan blades that will make jet engines safer, quieter, more efficient and easier to maintain. The composite blades break less frequently than titanium blades, and if they do fail, they crumble into bits, avoiding damage to the plane. Preliminary results show the next-generation turbine blades last 10 to 15 times longer than any existing blades.

Sophisticated Smellers . . . Aquatic creatures like lobsters and crabs depend on smell to find food, a suitable mate or to avoid predators, but how do they pluck these odors from the water swirling around them? Researchers at **UC Berkeley** and Stanford University have detailed the sophisticated way in which spiny lobsters sniff their way around a watery world. Their research may provide strategies for robot builders looking for efficient ways to create odor sensors.

Kudos

Award for Innovation . . . The California **Mathematics, Engineering, Science Achievement (MESA)** program, administered by the **University of California**, has been named one of the five most innovative public programs in the country. MESA, one of 1,200 nominees, won the award following a nationwide competition sponsored by the Ford Foundation, Harvard's Kennedy School of Government and the Council for Excellence in Government. MESA supports more than 32,000 educationally disadvantaged students at pre-college, community college and university levels to excel in math and science and graduate with baccalaureates in math-based fields.

Engineering Medal . . . UC Santa Barbara engineering professor **Herbert Kroemer**, who shared the 2000 Nobel Prize in physics, has been presented the 2002 Medal of Honor by the Institute of Electrical and Electronics Engineers. The medal is awarded for exceptional contributions to the field or an extraordinary career. Kroemer, 73, has been at UCSB since 1976.

Neuroscience Award . . . UC Berkeley neuroscientist **Muming Poo** received the 2001 Ameritex Prize for research that could pave the way for an eventual cure for paralysis. Poo, 53, a professor of molecular and cell biology, will share the \$40,000 award with another researcher. The prize, from the nonprofit Ameritex Foundation of California, recognizes scientists whose research advances the search for a cure for paralysis.

Biologist Honored . . . The Museum of Science and Industry in Tampa, Fla., has honored **Alejandro Acevedo-Gutiérrez**, a research associate at **UC Santa Cruz** and the California Academy of Sciences, as the national Hispanic scientist of the year. A marine biologist, Acevedo-Gutiérrez studies the ecology and behavior of dolphins and whales.

Nuclear Physics Prize . . . Los Alamos National Laboratory scientist **J. David Bowman** has been awarded the Tom W. Bonner Prize in nuclear physics. Granted annually by the American Physical Society, the Bonner Prize is the top American nuclear physics award. Bowman is a fellow of the American Physical Society, a laboratory fellow and the leader of a team of scientists in Los Alamos' neutron science and technology group.

Investing in Education

Catholic Studies Gift . . . Charles R. Schwab, founder and chairman of Charles Schwab & Co. Inc., has contributed \$1 million to the campaign to establish the **Father Virgil Cordano Endowment in Catholic Studies** in UC Santa Barbara's **religious studies department**. The gift marks the beginning of a \$5 million fundraising effort by the campus and the local community to endow the program, named in honor of the Franciscan friar who recently retired as pastor at the Santa Barbara Mission.

Pediatric Gift . . . Jane B. Dunaway has given \$1 million to the Jane B. Dunaway Fund in the **pediatrics department** at **UC San Francisco**. The fund will provide support for research, faculty recruitment and development within the department and the Child Life Program.



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