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C a l t e c h N e w s

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Anthrax Detectors

June Graduates

and

Visa Blues



Caltech News



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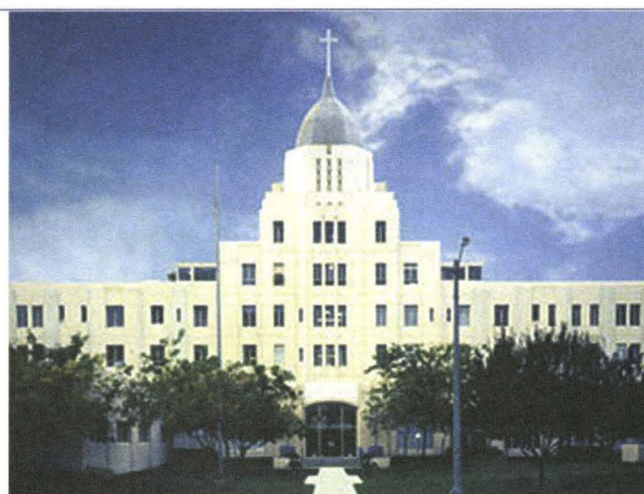
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Up Front

THE INSTITUTE BUYS A HOSPITAL

A small, 2.6 earthquake that rumbled through the Pasadena area on June 26 was subsequently found to have its epicenter directly underneath the venerable St. Luke Medical Center in Pasadena. The main hospital building, topped by its architecturally significant 1930s Art Deco dome, does not seem to have suffered any appreciable damage, but major changes are in store for St. Luke nevertheless, for which the seismic shake-up seems an appropriate harbinger. On July 1 the Institute bought the hospital, finalizing a deal that was first made public earlier this year, when Caltech announced that it had entered into an agreement to purchase the 13-acre, multistructure property from the Tenet Healthcare Corporation.

Located about four miles northeast of campus, St. Luke is a local landmark. Former Caltech students may recall having visited there for health care; at least one current faculty member—



St. Luke Medical Center, in northeast Pasadena, has been purchased by Caltech, which plans to transform it into a research wing of the campus.

Scott Fraser, the Rosen Professor of Biology—was born there. Now the former hospital, which was founded in 1933 by the Sisters of St. Joseph of Orange, and whose buildings include a 33,000-square-foot hospital, a chapel, and a convent, will become a permanent part of the Institute.

"I think about it as functioning a little like a JPL for the rest of campus," says Caltech provost Steve Koonin '72, of Caltech's plans to convert the hospital site, over time, into a multipurpose state-of-the-art research facility. He says the combination of new space and easy access to and from campus will

give the Institute an unparalleled opportunity to expand current research programs and to think about possible new avenues for research.

"It gives us an exciting new opportunity to multiply the capabilities of campus and to pursue new research directions, much as Caltech–JPL collaborations have done."

In becoming part of Caltech, the hospital is of course in line for a substantial makeover, starting with a name change. The current favorite, coined by Koonin, is Caltech Center for Innovative Technologies, or (CIT)².

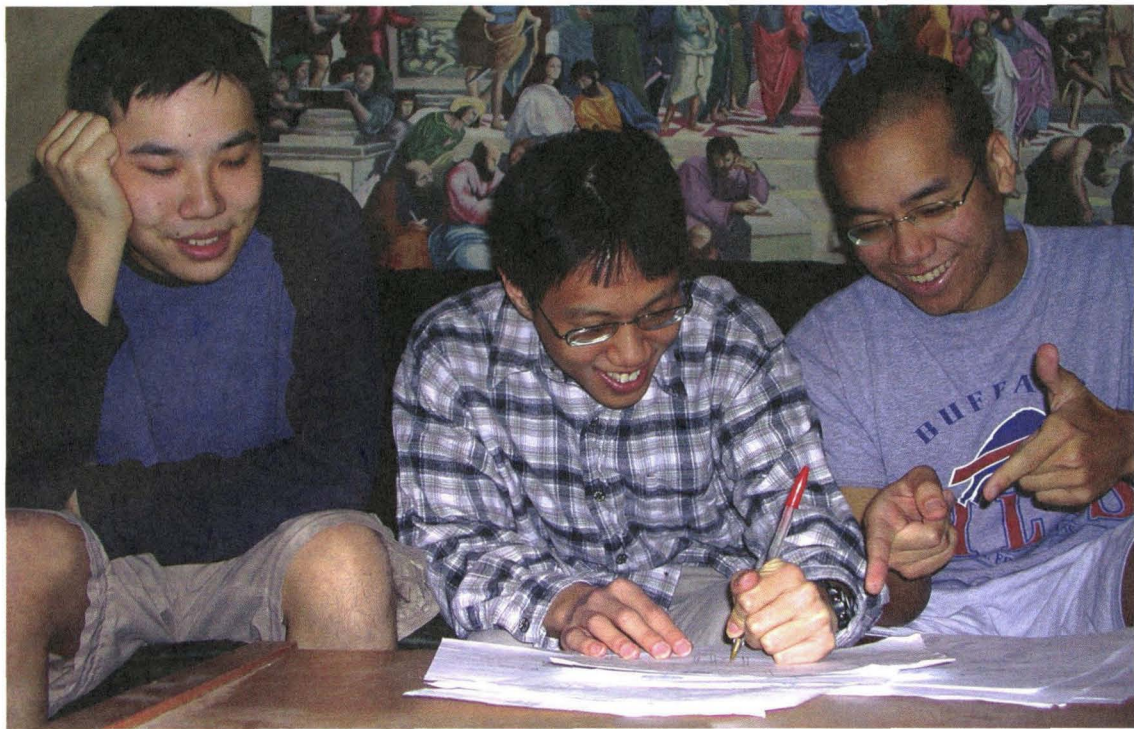
The Institute hopes to establish at

least two substantial research projects at St. Luke over the next several months. First-site candidates include the astrophysics collaboration to build CELT (the California Extremely Large Telescope), headed by Richard Ellis, Caltech's Steele Family Professor of Astronomy and director of Caltech's Optical Observatories. A new research program in nanofabrication—the development and creation of extremely small devices—may also be in place there before the end of the year.

Koonin has appointed a committee made up of division chairs Elliot Meyerowitz (biology), David Tirrell (chemistry and chemical engineering), and Tom Tombrello (physics, math, and astronomy) to consider research programs that can be usefully located at St. Luke. "They will think about initial and potential uses for space, as well as serving as a liaison committee to the rest of campus," says Koonin.

For the foreseeable future, Caltech will continue to lease out building space currently occupied by a medical group and a child-care facility, and to maintain an arrangement that allows portions of the hospital to be used as a

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The creators of the Caltech comic *Crippling Depression*, from left, Ben Lee, Mike Yeh, and Tim Wan, find humor in campus predicaments, including sleepless nights, dateless weekends, domineering mothers, and Ditch Day.



C o m i c R e l i e f

BY RHONDA HILLBERY

For two years in more than 200 comic strips, *Crippling Depression* has followed three cartoon Techers through the travails of campus politics, problem sets, midterms, dating doldrums, and student-government-led doughnut jaunts.

It's an impressive run for a venture that originated over idle talk among friends in early 2001. Although the recent graduation of two of its creators seems to have brought the strip's days to a close, it can still be read on the Web and has been collected into a book. Who would have thought anything that long-lasting could have come from wishful conversations fueled by burgers and fries at Wolfe Burgers on nearby Lake Avenue?

"A lot of times we'd sit around and say, 'Wouldn't it be cool if we had, say, a big screen TV? Wouldn't it be cool if we had a comic strip?'" recalls one of the creators, Tim Wan, a graduating senior in engineering and applied science.

As the notion of a comic strip started to gel for Tim and Ben Lee, a senior in electrical and computer engineering, an obvious problem emerged. Neither could draw. They asked a friend, Mike Yeh, who rooms with Ben, to work up some sketches. Thus began *Crippling Depression*.

Full of politically incorrect refer-

ences and inside jokes about Caltech rituals, even the strip's name has drawn criticism. The authors say they do not take the idea of depression lightly. Instead, the dire-sounding title is meant as a touch of hyperbole. "It's a silly name for a comic strip in an undergraduate publication," Ben says. "It fits in with the desperation students feel but it's not entirely serious. It's for fun."

The setting: Three Tech undergrads deprived of sleep and dates who just happen to have the names Tim, Ben, and Mike. Add to the mix a skeptical female sidekick, Eilene.

In comic-strip style, our heroes' large heads seem to tower over small childlike bodies. Artist Mike, who will be a senior in electrical engineering, calls himself a former high-school doodler who never received formal art instruction.

During an interview in Tim's room, which is littered with the usual student clutter, plus dozens of action figures and Disney icons like the title character from the *Little Mermaid*, and Woody from *Toy Story*, the cartoonists, all residents of Lloyd House, share laughs and frequently finish one another's sentences.

Crippling Depression's debut in the campus student newspaper, the *California Tech*, coincided with Tim and Ben's

digging out from under a slew of completed core-curriculum requirements. "It was sophomore year, right?" Tim says. "We had to do all this physics. I didn't see why I had to learn it. All this math. For me, personally, it was, like, I was taking courses that had nothing to do with my major."

Adds Ben, "I had at least one problem set to do every single night." At two or more hours each, many nights were spent on problem sets instead of sleep. "It wasn't the happiest time."

But rather than wallow in self-pity, they decided to indulge in something more fun. Parody. Of the Institute and of themselves. As Ben describes it, "*Crippling Depression* is kind of based on the observation that funny things happen around here, and, wouldn't it be fun to profit from it?"

He sure isn't speaking in monetary terms. For their labors (they estimate that they spent three to six hours a week on the writing and drawing), Tim, Ben, and Mike each earned all of \$10 each a week; barely enough to cover a modest junk-food run to the campus convenience store.

In the best tradition of satire, the *Crippling Depression* strips tend to exaggerate the everyday difficulties of student life. Almost nothing is immune from a good ribbing—not house life, campus politics, tough professors (Pro-

fessor Doom), or sadistic TAs. President Baltimore appears clutching a sack of cash in each hand in strips parodying student fee increases or other campus controversies.

This being an equal-opportunity endeavor, the cartoonists also delve into lots of self-parody. "Sometimes it's just what's going on in our lives," Tim says.

That includes making fun of Tim's love of toys, superheroes, and Disneyland. The strip also mines dating territory: Mike is depicted as too busy studying to spend time with his girlfriend, and our heroes regularly bemoan the dating challenges at a campus where males outnumber females 3-to-1.

At the same time, underlying the humor is a real vein of angst. "A lot of people here think the stress here is so bad it's gotta be better anywhere else," Ben says. "But I don't know if that's true."

They didn't have to do a hard sell to get the strip into the *California Tech*. Mike says, "The *Tech* is desperate for ideas." What campus paper isn't, especially at a school where spare time is scarce?

There were a few early controversies. On one occasion the cartoonists declined to publish a strip that a *Tech* editor first wanted President Baltimore

Continued on page 8 . . .

Campus Update

PROFESSOR, ALUMNI NAMED TO NAS

Shrinivas Kulkarni, Caltech's MacArthur Professor of Astronomy and Planetary Science, has been elected to the National Academy of Sciences, one of the highest honors that can be accorded an American scientist or engineer. Four Institute alumni have also been named to the NAS.

A leading authority on exotic astrophysical phenomena, Kulkarni has been associated with many of the advances in



Shri Kulkarni

understanding the universe that have been made over the last two decades.

In 1982, along with Don Backer of UC Berkeley, Kulkarni discovered the first millisecond pulsar. These pulsars have turned out to be very precise natural clocks with many applications. In 1995, he led a group that discovered the first "brown dwarf," a cosmic object whose existence had been hypothesized since the sixties. Now thought to be quite abundant, brown dwarfs are "failed stars" with too little mass to ignite the thermonuclear reactions that power stars, but too much mass to be classified as planets. In 1997, Kulkarni and his colleagues demonstrated that gamma-ray bursts were extragalactic in origin, and he has since led investigations that have further probed the nature of the phenomenon.

Kulkarni has also been a prime mover in the development and use of optical interferometry, which exploits the wave nature of light in such a way that light from two or more mirrors can be combined for a more highly detailed image than a single telescope could provide. He is heavily involved in the Keck Interferometer project, and is the interdisciplinary scientist for NASA's Space Interferometry Mission (SIM), slated for launch in 2009. Astronomers hope to use SIM to measure and catalog planets around nearby stars.

Kulkarni earned his master's degree in 1978 from the Indian Institute of Technology and his doctorate from UC Berkeley in 1983. He came to Caltech in 1985 as a research fellow, and was named to the faculty in 1987. He is also a former Presidential Young Inves-

tigator and Sloan Research Fellow, and winner of the Waterman Prize.

Caltech currently has 67 other faculty members and three trustees who are NAS members of the academy. The Institute alumni elected this year are Henry Jay Melosh, PhD '73, professor in the Lunar and Planetary Laboratory of the University of Arizona; Michael Rosbash '65, professor of biology at Brandeis University, and investigator with the Howard Hughes Medical Institute; Paul Schechter, PhD '75, the Burden Professor of Astrophysics at MIT; and Saul Teukolsky, PhD '74, the Bethe Professor of Physics and Astrophysics and director of the Center for Radiophysics and Space Research at Cornell.

Melosh is known for his research on impact-cratering in the early solar system. Rosbash is an authority on the biological and genetic mechanisms that underlie circadian rhythms.

Schechter has carried out studies into the structure and distribution of matter in the universe, focusing on galaxies, galactic clusters, and dark matter. Teukolsky, a theorist, works in the areas of general relativity, relativistic astrophysics, and computational astrophysics—research that will be applied to interpreting future data from the LIGO project for the detection of gravitational waves.

CALTECH '44 FOOTBALLERS NAMED TO HALL OF FAME

Caltech's entire 1944 football team has been elected to the International Scholar-Athlete Hall of Fame, which is administered by the Institute for International Sport and located at the University of Rhode Island. The team's induction took place on the weekend of June 21–22 in Rhode Island.

Established to "honor those individuals who exemplify the scholar-athlete ideal" and "foster and spread the scholar-athlete ideal globally," the hall of fame chooses inductees "based on their distinguished athletic, academic, and humanitarian achievements." The induction committee said of the 1944 Caltech squad that it "embodies the excellence and integrity we seek in inductees." The committee was also very impressed with the way these men went on to lead their lives.

For an online list of the honored Techers, go to http://pr.caltech.edu/media/Press_Releases/PR12408.html. A list of this year's honorees can be found at <http://virginiports.ocsn.com/sports/w-baskbl/spec-rel/061903aaa.html>.



For pioneering research into the structure and dynamics of the cosmos, UC Berkeley physicist Saul Perlmutter (second from left) and Caltech physicist Andrew Lange (third from left) have been jointly honored as California Scientists of the Year for 2003. Joining them at the May 8 ceremony at the California Science Center are Jeffrey Rudolph, Center president and CEO, and Center trustee chair Sandra Comrie.

COSMIC RESEARCH MAKES ANDREW LANGE CALIFORNIA SCIENTIST OF THE YEAR

For his role in helping to substantiate a provocative theory about the earliest moments of the universe, Andrew Lange, Caltech's Goldberger Professor of Physics, has been named California Scientist of the Year for 2003, an honor he shares with fellow physicist Saul Perlmutter, senior scientist and group leader at the Lawrence Berkeley National Laboratory.

The California Science Center established the California Scientist of the Year Award in recognition of the prominent role California plays in the areas of scientific and technological development. Eleven California Scientists have subsequently gone on to become Nobel laureates. Lange and Perlmutter were recognized during the annual presentation of the California Scientist of the Year and the Amgen Award for Science Teaching Excellence on May 8 at the California Science Center in Exposition Park, Los Angeles.

Lange is the 14th Caltech faculty member to be named Scientist of the Year. He and Perlmutter were honored for experimental efforts that have provided crucial support for a remarkable theory about the very early evolution of the cosmos following the Big Bang, the event that gave birth to the universe. First proposed in 1979 by physicist Alan Guth of MIT, this so-called inflationary theory holds that the universe exponentially increased, or "inflated," in size during the first instants of its existence before settling down to a far less dramatic rate of expansion.

Among other predictions, the inflationary scenario calls for the present-day cosmos to exhibit a geometrical structure that is mathematically "flat." Because Einstein's general theory of relativity places constraints on the amount of mass and energy in a "flat" cosmos, it is actually possible to investigate this prediction empirically, but up to now scientists could not account for the requisite mass and energy. Lange and Perlmutter's achievement is to provide key confirmation of these predictions.

Lange studies fluctuations in the cosmic microwave background (CMB) radiation, or the relic radiation from the Big Bang. This radiation, which today exists at microwave frequencies, and was first detected in 1965 by astronomers Robert Wilson, PhD '62, and Arno Penzias, is thought to offer a clear "snapshot" into the structure of the infant universe long before the formation of stars and galaxies. In general, this radiation reaches Earth uniformly from all directions in the sky, but an intricate pattern of fluctuations is known to exist at the level of 0.003 percent. Using novel detectors developed at JPL and flown on a balloon-borne telescope above Antarctica, Lange and his research group were able to make the first resolved images of these very faint patterns. These images demonstrate that the radiation fluctuates on an angular scale of one degree, which is exactly what scientists would expect from a mathematically flat universe.

Perlmutter's contribution centers on the current rate of cosmic expansion. Scientists have known since the 1930s that galaxies are moving away from one another, and astronomers have generally held that the mutual gravitational attraction of galaxies and other cosmic objects has been slowing the rate of expansion down. However, Perlmutter's group found that the universe is actually expanding at an accelerating rate, as if a precisely opposite force, a "negative pressure," is pushing everything apart. This negative pressure may be the famous cosmological constant, first hypothesized by Albert Einstein in an attempt to prescribe a steady-state (that is, nonexpanding) universe but later rejected by him as "the worst blunder I ever made." Perlmutter's research suggests that Einstein may have had it right the first time, and his estimates of the cosmological constant's magnitude are consistent with Lange's observations pointing to a flat universe.

If Lange's work provides crucial support for the inflationary universe theory by demonstrating that the universe is mathematically flat, Perlmutter's work indicates that the source of astronomical energy giving rise to a flat universe comes from a type of negative gravitational pressure or dark energy permeating the universe. The nature of this dark energy remains a mystery, destined perhaps to be solved by a future California Scientist of the Year.

COMMENCEMENT OFFERS ONE LAST LESSON IN ART, SCIENCE, AND LIFE

It's safe to say that throughout the history of Caltech no commencement speaker has ever handed out a color reproduction of a work of art to guide the audience through his address. That is, no speaker had done it until Harold Varmus showed up.

It was Friday the 13th in June, so perhaps Caltech's 109th annual commencement was due for something different. More likely it was that, unlike many scientists, Varmus—1989 Nobel laureate and the president and chief executive of Memorial Sloan-Kettering Cancer Center in New York—is well-grounded in the humanities, having earned a postgraduate degree in English at Harvard before switching gears to pursue a career in medicine and then biological research.

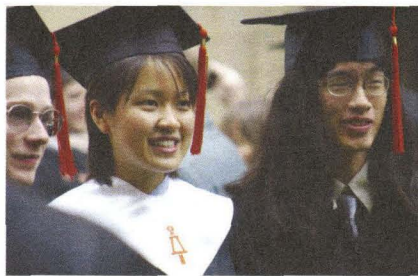
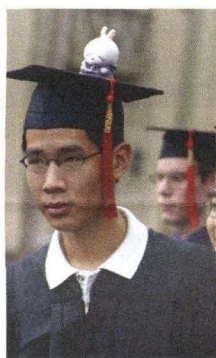
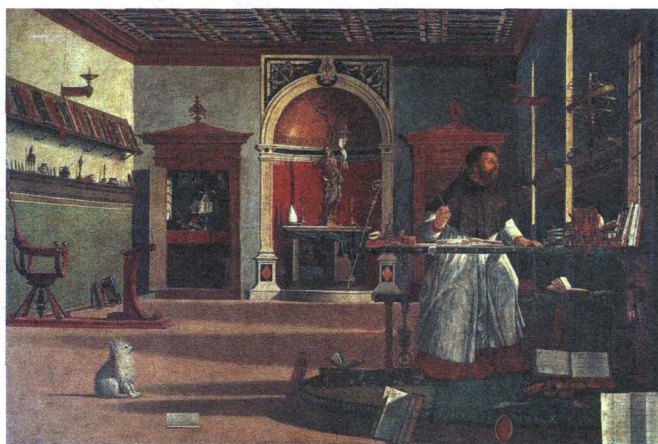
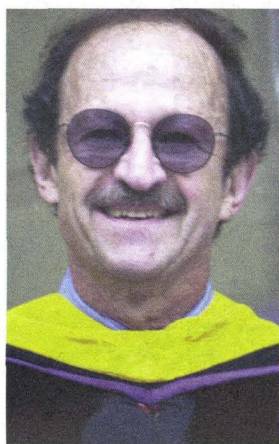
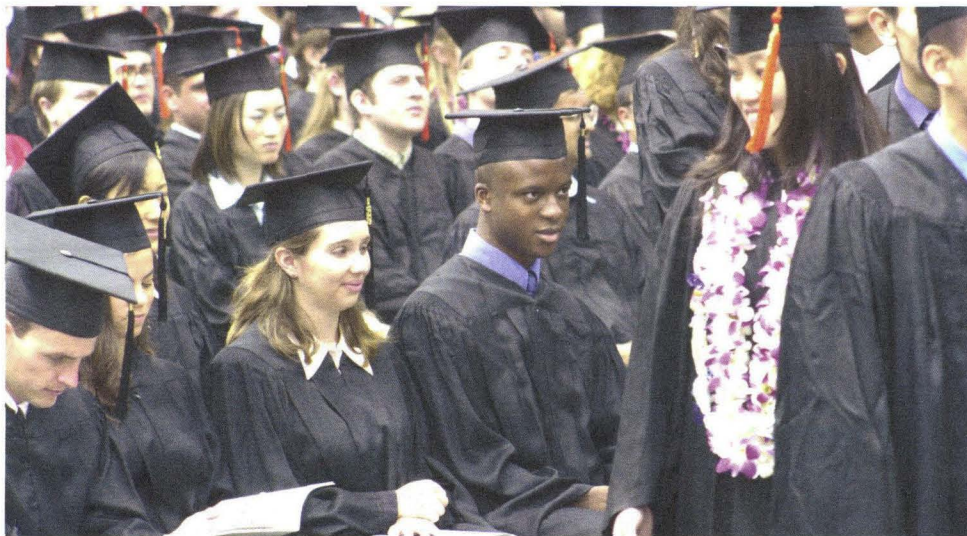
The painting in question was Vittore Carpaccio's *Saint Augustine in His Study*, painted in the early 16th century (see picture, above right). Although the renowned Catholic thinker and philosopher died in the fifth century A.D. and spent most of his life in North Africa, Carpaccio depicted him, quite literally, as a Renaissance man, surrounded by books, musical scores, art, instruments, and a Ptolemaic model of the universe.

Religious objects are also in view, signifying, said Varmus, that the 16th-century Church endorsed this depiction of Augustine's endeavors. "It is both his NIH and his Caltech," said Varmus, who was a corecipient of the Nobel Prize in physiology or medicine for the discovery that normal human and animal cells contain genes capable of becoming cancer genes. "But the ambience is distinctly secular—we are in the presence of an inquiring mind, not blind faith, and the mood is philosophical and pragmatic, not especially spiritual.

"The painting tells us that society, in this case in the form of the Church, was singularly kind to this unusual man," Varmus said. "What did it expect in return . . . Apparently a mixture of intense philosophical thought, broad curiosity about the arts and sciences, and possibly a bit of practical invention."

Speaking on an overcast morning before a capacity crowd on the Beckman Mall, Varmus addressed an audience that included 137 candidates for the doctorate, 111 for the MS degree, and 242 for the BS degree. What lesson could these new-minted graduates glean from a 500-year-old painting? Varmus suggested that it might help them focus on two key questions: How does society view scientists today and how does it serve science?

Varmus knows a thing or two about these issues. From 1993 to 1999, he was director of the National Institutes of Health, fighting budget battles,



A GATHERING OF GRADUATES. Speaking to the class of '03, Harold Varmus (in yellow hood, above left) used a Renaissance painting of St. Augustine to illuminate the ever-evolving and often unpredictable relationship between science and society. Below, right: The future of science? (Kenan Professor and Professor of Physics and Division Chair Tom Tombrello, and Professor of Astronomy Judith Cohen in ritual garb.)

advocating science, and helping fund critical research.

He said that the Carpaccio painting reflects an environment in which scientists of the day were supported by an understanding and appreciative patron, but there is no guarantee, in any era, that such social support will continue indefinitely. Things had become quite different 100 years later when Galileo found himself hauled before the Inquisition. Is contemporary science, for all its success, headed for a similar crisis? Although the public is still fascinated by aspects of scientific research—particularly in such areas as biomedicine—and the government's funding of sci-

ence seems healthy, recent events are clouding the future for science.

"If we are to maintain a beneficial relationship between science and its patrons, we need to recall the Galileos and be sensitive to early signs of potentially damaging change," Varmus cautioned. "Regrettably, despite the generally good health of the enterprise as I've described it, such signs are emerging, in response to economic, political, and social currents in our society. Tax cuts of unprecedented magnitude and a weak economy mean that the nation's funding for research will not continue to increase at recent rates, if it can increase at all.

"A political climate increasingly influenced by fears of terrorism, by war

and instability in distant lands, and by the religious right-wing domestically is unlikely to bring out the best in science," Varmus continued. "In this environment, society's expectations from science can readily shift to short-range necessities at the expense of unfettered inquiry into basic truths."

Yet, even in difficult and challenging times, Varmus reminded his listeners, science will always be an exhilarating vocation. He spoke movingly of two scientists who had continued to pursue their careers with hope and enthusiasm in the face of mortal illness. The first was Canadian astronomer Rebecca Elson, who died in 1999 at age 39 after a decade-long battle against cancer. Although Varmus did not know her personally, he came to appreciate her through a posthumously published collection of her poems and essays, entitled *A Responsibility to Awe*. Reflecting on the amazing images returned by the Hubble Space Telescope, Elson wrote that she felt "privileged indeed to be able to spend my days inside a tent with such a dazzling roof."

Varmus's second example was his personal friend and colleague, UC San Francisco geneticist Ira Herskowitz '67, who died of pancreatic cancer earlier this year at age 56 (See "Obituaries," p.19). Herskowitz was internationally known for his pioneering genetic studies on yeast, work that yielded major insights into the fundamental aspects of cell biology in all organisms. Herskowitz, Varmus recalled, "never lost his simple sense of joy, his 'responsibility to awe,' about a beautiful experiment. And even as he sought therapies to combat his inevitably lethal cancer, he reveled in his laboratory's use of 'the awesome power of yeast genetics' to learn why tumors might become resistant to a chemotherapy he had tried himself."

As glimmers of sunlight started breaking through the cloudy sky, Varmus returned to the Renaissance world for his concluding thoughts. Citing the 16th-century art historian Vasari, Varmus offered the new alumni a final wish: "That our society will treat you well enough that you can devote at least some of your thoughts to 'topics of the highest order and the greatest difficulty.'"



SOUNDING THE ALARM FOR ANTHRAX

BY MICHAEL ROGERS

Over the past couple of years, Adrian Ponce, PhD '00, has been fascinated by the chemistry of spores: primitive life forms whose molecules are so robust that they can lie dormant for hundreds of thousands of years in extreme environments only to spring back to an active life when conditions improve. But he admits that even his mother didn't show much interest in his work until October 2001, when the anthrax attacks left five people dead.

In the months since those incidents introduced the American public to bioterrorism, Ponce has used his knowledge of chemistry to develop the prototype of a device that can detect airborne bacterial spores, including anthrax spores. Caltech has already patented the device, a company has licensed the technology so that it can manufacture anthrax detectors, and Ponce, who shares a tiny office in a nondescript building at JPL, has suddenly found a new purpose to his work.

"This research poses some interesting scientific questions to be answered," says Ponce, who is also a visiting associate in chemistry at the Institute. "But doing something useful always feels good, and I'll feel like I've contributed something useful once it prevents someone from getting sick."

Ponce's introduction to chemical sensors began when he was an undergraduate at Michigan State University in the early 1990s. He was working for Daniel Nocera, PhD '84, then a professor of chemistry at Michigan State and now the W. M. Keck Professor of Energy at MIT. Nocera focuses on the basic mechanisms of energy conversion in biology and chemistry. Ponce helped Nocera develop supramolecular detection schemes for finding long-chain hydrocarbons and other pollutants that might be located at Superfund sites.

At Caltech, Nocera had been a graduate student in a research group led by Harry Gray, Caltech's Beckman Professor of Chemistry. After Ponce graduated from Michigan State in 1993, he followed Nocera's example and went to the Institute to join Gray's group.

As a graduate student, Ponce focused on electron transfer in proteins. The year he got his doctorate, he was hired for a postdoctoral position in chemistry at JPL and a year later he

became a senior member of JPL's technical staff.

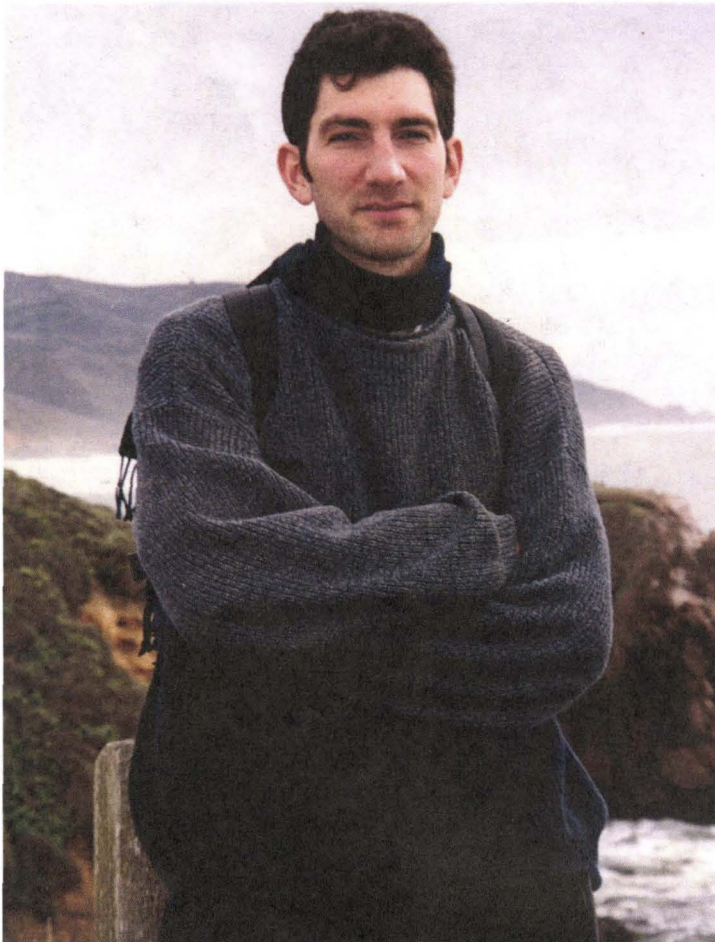
JPL hired Ponce to study how to use vibrational spectroscopy to detect life on Mars. While thinking about biology on the Red Planet, Ponce crossed paths with spores. If you're going to find extraterrestrial life, he figured, it might well be in the form of spores, since they're robust enough to survive under a variety of extreme conditions. And if you're looking for bacterial spores, it helps to know that within the cores of bacterial spores are high concentrations of a molecule called dipicolinic acid, or DPA.

For all known life forms, DPA is unique to bacterial spores and is not found in mold or fungal spores, so its presence can be used to sound an alarm for bacterial spores. When the spores are exposed to microwave radiation, they release DPA, causing a chemical reaction that triggers intense green luminescence when viewed under ultraviolet light.

Ponce was busy investigating the chemistry and detection of spores for space applications when the first anthrax cases appeared in October 2001. The disease was spread in the form of spores, which became toxic once they were inhaled and began germinating inside victims' lungs. Ponce immediately realized that the work he was doing for JPL could be applied to build an anthrax-spore detection device.

Ponce says that while methods for detecting anthrax were already in use, they were cumbersome, partly because they required trained technicians to take samples from a site for analysis in a lab—a costly procedure that also delays detection. Furthermore, pollutants could easily contaminate the samples, leading to inaccurate results. Ponce's own research led him to think in terms of an automated device that he figured he could build. Ideally, it would continuously monitor for bacterial spores in the air, providing a warning system like a smoke alarm.

With a \$30,000 grant from NASA and help from a Baylor University undergraduate named Elizabeth Lester, who participated in Caltech's Minority



"Doing something useful always feels good." In the aftermath of 9/11, Adrian Ponce's basic research into spore chemistry opened the way to the development of a novel technology for detecting anthrax.

Undergraduate Research Fellowships (MURF) Program, Ponce set out to build an anthrax detector last summer.

The machine that he and Lester built involves three components: an aerosol capture device to haul in the anthrax spores, a microwave beam to release the DPA from the spores, and a luminescence spectrometer with a fiber-optic probe that detects the DPA. Over three weeks of testing, in which they used harmless *Bacillus subtilis* spores to simulate anthrax, Ponce and Lester were able to get the device to detect the DPA within 15 minutes of the release of spores.

Ponce talks about two worst-case scenarios in which he predicts that the device will operate effectively. In the first case, a letter containing anthrax is opened, releasing a puff of anthrax powder into the air. Ponce's device should record the contamination within 15 minutes so that the location can be sealed off immediately and persons in the area sent for treatment. The second case would be one in which a low concentration of anthrax powder slowly spreads through an enclosed area. In this scenario, the device could take up to a few hours to sound the alarm, depending upon spore concentration, but it would still be half the time it would take for exposed people to accumulate a lethal dose (about 10,000 spores). Since anthrax is only lethal if left untreated for several days, there would still be plenty of time to seal the area and treat victims.

Timing is the key to treating anthrax, since it usually takes a few days for symptoms to show up. "If you can take antibiotics before the symptoms show up, it's a safe bet that you will survive," says Ponce.

Ponce was investigating the chemistry and detection of spores for space applications when the first anthrax cases appeared in October 2001. He immediately realized that the work he was doing for JPL could be applied to build an anthrax-spore detection device.

One downside to Ponce's detector is that it is susceptible to false positives, since a bacterial spore that doesn't cause anthrax could trigger the alarm. But Ponce maintains that the cost involved in shutting down a facility for the time it takes first-responders to determine whether or not the detected spores are harmful is a small price to pay compared to the illnesses and deaths that could result from an attack that goes undetected for days.

"Since we're monitoring changes in spore concentration, I can't imagine many cases of false positives, other than those that are deliberate hoaxes, and one would want to know about those anyway," Ponce says. "The fact that this was developed over a summer with an undergraduate demonstrates that this is simple and robust technology."

Asked to identify the biggest challenge of the project, Ponce says that there really weren't any, since he had already done the basic research into spore chemistry. He says that it was just a matter of marrying the science to off-the-shelf technology—coupling detection with an aerosol-collecting device. So why hadn't anyone thought of such a device before? Ponce figures that his chemistry background combined with the related work he was doing at JPL provided the serendipitous spark.

Ponce hopes to have a second, more sensitive prototype ready this August. It will incorporate aerosol-sampling equipment from Universal Detection Technology, the Beverly Hills company that licensed Ponce's idea and is also funding the second prototype. Jacques

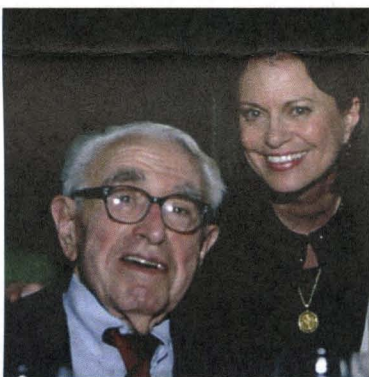
F r i e n d s

Tizabi, the firm's CEO, says that a commercial anthrax detector could be available sometime later this year. "It will probably cost around \$50,000, so the first customers will likely be large commercial operations, such as hotels, convention centers, and airports," he said. "In a few years, we should be able to get the cost down."

Although the cost clearly makes it impractical for residential use, Ponce points out that automated monitoring of aerosolized bacterial spores would also be helpful in mail-sorting facilities, office buildings, sports arenas, and other public locations. Besides anthrax, the detector could also monitor for other spore-forming organisms, such as those that cause tetanus, botulism, and gas gangrene, which could prove helpful in food preparation facilities and hospitals.

Not to forget JPL, which initiated Ponce's anthrax adventure in the first place, the detector also has applications for space research. It could be used to quantify the concentration of bacterial spores in spacecraft assembly facilities, thus avoiding or at least reducing the possibility of contaminating other planets with microbes from Earth. Ponce is also seeking funding for an experiment to build an instrument that would search for spores in the martian polar ice cap or permafrost. For the moment, though, he's feeling pretty good about the thought that his biodetector could be used to save lives on Earth.

"Like other government agencies, JPL has a responsibility to contribute to the homeland defense," he says. "It's nice to work on something that has a strong chance of making a useful contribution to society. In research, there's always a balance between fundamental work and work that has practical applications. I like to do a little of both, and this allows me to do that."



ASSOCIATES EAST. Caltech alumni, friends, and supporters gathered at the Explorers Club in New York City to launch an East Coast branch of the Institute support group. Clockwise from above: Elaine Fleming, director of the Caltech East Coast Regional Office shares a moment with investment banker, science advisor, and philanthropist William Golden, chair emeritus of the American Museum of Natural History and recipient of the 1996 Public Welfare Medal from the National Academy of Sciences. Golden, a longtime friend of Caltech's former president Lee DuBridge and a friend since boyhood of Caltech astronomer Jesse Greenstein, is a member of the Caltech East Coast Associates Committee. Faculty Associate in Biology Alice Huang chats with William Carey, chairman and CEO of W. P. Carey & Co. Inc., who established the W. P. Carey Prize in Applied Mathematics at Caltech. The Club's polar bear mascot greets arriving guests. Provost Steve "Don't Shoot the Piano Player" Koonin entertains the crowd with a selection of Beatles tunes, among other favorites. David Baltimore talks with Susanna Bedell, Of Counsel, with Van DeWater & Van DeWater, and a founding member of the new East Coast Associates.



ASSOCIATES GET TOGETHER ON EAST COAST CHAPTER

The sight of a polar bear and the sounds of Caltech's provost, Steve Koonin '72, on the piano enlivened the scene on May 7 at the Explorers Club in New York City when the Institute launched a new East Coast chapter of the Caltech Associates. Those on hand for the event included Caltech president David Baltimore, board chair Ben Rosen '54, and professor of biology David Anderson, who spoke on "Stem Cells: Biology, Medicine, and Politics." Also among the more than a hundred Associates, alumni, and friends were trustee Phil Neches '73, PhD '83, and his wife, Ellen, who will cochair the new chapter's membership committee, and Associates president Marge Richards, who flew in from Pasadena for the occasion.

All alumni and friends of Caltech are welcome to apply for membership in the Caltech Associates, east or west. In addition to dinner-and-lecture programs, the many privileges of membership include participation in the Associates' domestic and international travel programs.

Upcoming events for the new East Coast Associates chapter include a fall dinner in New York City on November 5, 2003, with guest speaker and professor of electrical engineering Yu-Chong Tai, who will give a talk on current research in microtechnology and nanotechnology. A second event, scheduled for spring 2004, will feature JPL director Charles Elachi, PhD '71, who will present an illustrated lecture on the latest developments in Mars exploration.

For information on joining the East Coast Caltech Associates and on upcoming events and travel, please contact Krissy Sudano in Caltech's East Coast Regional Office at 212/899-5472 or at orksudano@dar.caltech.edu.



Meanwhile, back in the west, or out in the Pacific, to be more exact, about 30 Associates took part in a spring program on the Big Island of Hawaii. Led by Caltech geology professor Jason Saleeby and astronomy professor George Djorgovski, the group visited numerous attractions, including Hawaii Volcano National Park, Kalopa Rain Forest Park, Akaka Falls State Park, the Tsunami Monument, and of course the telescopes on the summit of Mauna Kea. From left, Associates vice president Janet Rogers and Associates Priscilla McClure and Shirley Jagels, pause for a photo at the W. M. Keck Observatory.

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THE CAMPAIGN

Many exciting developments have taken shape in the months since Caltech had its campaign launch in October 2002. To keep you informed about our gaining momentum, monthly updates with the latest news and progress of the Institute's fundraising activities can be found on Caltech's campaign website news page at <http://one.caltech.edu/news.html>. Visit us today!

SHEDDING LIGHT ON THE CREATIVE PROCESS

The creative output of Alan Lightman, PhD '74, spans universes. As a novelist he has probed character and emotion, as an essayist he has explored the human dimensions of science, and as a theoretical physicist he has parsed the mysteries of black holes.

During some of his best creative moments in science and writing, he loses all sense of time. "I also lose all sense of my body, my ego, my surroundings," he wrote in an essay published in *New Scientist*. "I forget who I am and where I am. I dissolve into the imagined world. I become pure spirit." The expected and the unexpected somehow merge.

This 21st-century Renaissance man recently spent a week at Caltech as writer in residence, sharing his views about the magic and mystery of the creative process.

Shortly after wrapping up an intensive flurry of writing-related activities at Caltech the week of April 7, Lightman returned on May 17 to receive Caltech's Distinguished Alumni Award (see page 13, this issue). Now serving as adjunct professor of humanities at MIT, Lightman is the author of more than a dozen books, including *Einstein's Dreams*, *Good Benito*, and *The Diagnosis*. His fourth novel, *Reunion*, has just been published.

Lightman's week in residence was sponsored by the Institute's "Words Matter" project, and was tailored to offer students the chance to make close contact with accomplished writers and to appreciate the value of good writing.

As a scientist and writer, Lightman told students, he has seen the puzzle from both sides. "Scientists tend to ask questions that have definite answers, even though it may take you ten years to get the answer. To an artist, the question might be more interesting than the answer."

The author also talked about the differences in approach between writing fiction and nonfiction. "In fiction you are going for the reader's heart and stomach first and not their brain first. I think that in general in nonfiction writing you are going first to the brain."

Lightman was a graduate student at the Institute when the first black hole candidate, Cygnus X-1, was discovered, making it a very exciting time to be studying physics. "The feeling of doing research is completely different than doing homework. You feel like an explorer in an uncharted land." It was exhilarating to be surrounded by "very, very smart people also doing original research. That was the environment I found at Caltech." His advisor was Kip Thorne '62, today the Feynman Professor of Theoretical Physics.

"When I was a grad student at Caltech, most all of us couldn't imagine doing anything besides physics for the rest of our lives. We were living physics 24 hours a day, which was a wonderful, intensive experience."

For all of his bliss, Lightman knew there was a chance he would branch into the humanities. After all, he grew up loving science *and* writing poetry in

Memphis, where his father owned a movie theater and his mother taught dance. And even during his Caltech days, he managed to squeeze in a few philosophy courses. "They were there, they were available, and they were interesting to me."

After receiving his PhD, he taught astronomy and physics at Harvard and during the early 1980s began publishing essays about science, the human side of science, and the "mind of science" in publications that included *Smithsonian Magazine* and the *New Yorker*.

Moving on to MIT, where he was appointed professor of science and writing and senior lecturer in physics in 1989, Lightman helped create a new communications program that is considered a national model for how to elevate writing at schools where the world of numbers overshadows that of letters.

During his week on campus, Lightman, who stayed at Avery House, found graduate and undergrad students eager to ask him about his career. "We talked about science writing and what it was like to make a career in science writing, which is not something they are being trained to do at Caltech." Lightman said that he found Caltech students to be "very bright, as I expected. I also had the sense that they were enormously busy and were under a lot of pressure."

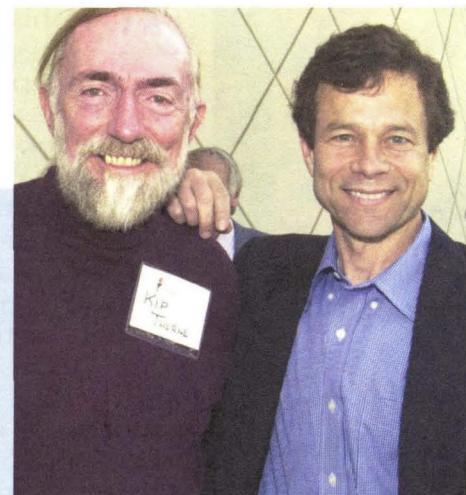
One of the key challenges facing today's young scholars is the relentless pressure to work hard and specialize early, he said, adding that he believes much of this pressure is self-imposed. "They are working so hard and so fast that they don't have time to stand back and reflect on what is really important."

Yet just as MIT is promoting the whole-brain approach to university scholarship, says Lightman, so is Caltech. "I have the impression that the humanities effort is growing at Caltech, but is still a very small part of what Caltech does."

He stresses that having experiences in liberal arts courses helps students learn their core values, as well as more about what it means to be human. In the same way, science "is ultimately not just about the physical world around us but also about ourselves. Our world view changes when we study science."

For his part, Lightman said he feels fortunate to have worked both as a physicist and as a novelist, seemingly disparate worlds that in fact have much in common. As he wrote in *New Scientist*, "I have found that the creative moment feels the same in both professions. Indeed, this particular sensation, one of the deepest and most beautiful of human experiences, provides the basis for a powerful understanding between the scientist and the artist."

RHONDA HILLBERY



Novelist and science writer Alan Lightman (above, right, at Seminar Day with his PhD adviser, Feynman Professor of Theoretical Physics Kip Thorne '62) came back to his alma mater this spring both as a writer in residence and a recipient of the Distinguished Alumni Award.

RECOGNITION

The American Academy of Arts and Sciences has elected three faculty as fellows. They are **Fred Anson** '54, the Gilloon Professor of Chemistry, Emeritus; **Joseph Kirschvink**, professor of geobiology; and **Colin Camerer**, the Axline Professor of Business Economics. They join a 2003 class of 187 fellows and 29 foreign honorary members that includes UN Secretary General Kofi Annan; longtime CBS "Evening News" anchor and renowned journalist Walter Cronkite; and Nobel Prize-winning physicist (and Caltech alum) Donald Glaser, PhD '50.

Founded in 1780 by John Adams, John Hancock, and other scholar-patriots, the Academy has had among its Fellows George Washington, Benjamin Franklin, Daniel Webster, Ralph Waldo Emerson, and Albert Einstein.

Six Caltech professors have received Alfred P. Sloan Research Fellowships for 2003. They are assistant professor of geology and geochemistry **Paul**

Asimow, assistant professors of chemistry **Linda Hsieh-Wilson**, **Jonas Peters**, and **Brian Stoltz**; associate professor of mathematics **Danny Calegari**, and assistant professor of computation and neural systems **Athanassios Siapas**. Each will receive a grant of \$40,000 for a two-year period. The unrestricted Sloan grants are awarded to outstanding young researchers to enable them to pursue diverse fields of inquiry and to establish independent research projects at a pivotal stage in their careers. Fellows are selected for "their exceptional promise to contribute to the advancement of knowledge."

In a separate honor Asimow has also been selected to receive the F. W. Clarke Award, which "is given to a young scientist in recognition of a single outstanding contribution to geochemistry or cosmochemistry, published as a single paper or a series of papers on a single topic."

Jack Beauchamp '64, Ferkel Professor of Chemistry, has been named the recipient of the American Chemical

Society's 2003 Frank H. Field and Joe L. Franklin Award for Outstanding Achievement in Mass Spectrometry. The honor recognizes Beauchamp's development of "innovative ways to analyze molecules, methods that can help track pollutants in the environment, identify compounds in space, and detect explosives."

Pamela Bjorkman, professor of and executive officer for biology and a full investigator with the Howard Hughes Medical Institute, has been awarded the Max Planck Research Prize by the Max Planck Society in Germany, in recognition of her work in determining how the human immune system fights disease at the molecular level. Presented each year to "individual foreign and German researchers who lead their respective fields with regard to outstanding, internationally recognized scientific achievements," the award includes a cash prize of up to approximately \$125,000.

Barry Barish, Linde Professor of Physics and director of the Laser Inter-

ferometer Gravitational-Wave Observatory (LIGO) Laboratory, has been named by President George W. Bush to the National Science Board. In this capacity he will help oversee the National Science Foundation and advise the president and Congress on a broad range of policy issues related to science, engineering, and education.

André DeHon, assistant professor of computer science, and **Babak Hassibi**, assistant professor of electrical engineering, have been awarded research grants by the Okawa Foundation for Information and Telecommunications. The grant to DeHon will further his work in developing "new computational models which enable computational architectures to exploit the large device capacities associated with modern and emerging technologies." Hassibi's foundation-supported work "will address the information-theoretic, coding-theoretic, and signal processing research challenges encountered in multi-antenna communications sys-

Continued on page 13 . . .

A foreign national's ability to be employed or compensated for services in the United States depends on his or her nonimmigrant status and on the regulations that govern his or her visa. Many visa categories allow a person to be employed or compensated by a U.S. employer. In almost every case, however, employment and compensation are restricted to a specific, sponsoring employer or organization for a fixed period of time and for a specific activity.

This chart outlines the numerous nonimmigrant visa categories and the restrictions that limit the visa holder's ability to be employed, receive

Foreign Nationals in Nonimmigrant Status Employed and/or Study in the United States

| Type of Visa | Description |
|-----------------|--|
| A-1, A-2 | Foreign Diplomatic Personnel Individuals in the United States as employees of a foreign government (e.g., ambassador, minister, diplomat, or consul). <i>Dependent of A-1/A-2 Nonimmigrant</i> Immediate family members of foreign government officials. (Dependents also hold A-1/A-2 status.) |
| A-3 | Employee of Foreign Government Official Attendants, servants, or other personal employees of foreign government officials. (Dependents also hold A-3 status.) |
| B-1 | Visitor for Business Individuals in the United States for a short time to engage in business activities such as negotiating contracts for overseas consulting with business associates, attending professional conferences, or conducting independent research. May not engage in employment in the United States. <i>B-1 Domestic or Personal Servant</i> An individual may obtain B-1 status to be employed as a personal or domestic servant by a nonimmigrant in B, F, J, or M status, or by a U.S. citizen who resides permanently abroad and is visiting temporarily in the U.S. |
| B-2 | Visitor for Tourism Individuals in the United States for travel, tourism, or recreation. May not engage in employment in the United States. |
| B-2 | Prospective Student or Prospective Exchange Visitor Under certain circumstances, a consulate can issue a B-2 visa with a "prospective student" or "prospective exchange visitor" notation. Consulate MUST record "prospective" notation on visa stamp, for individual to change to F or J status in the United States. |
| WB, WT | Visa Waiver for Business (WB) and Tourism (WT) Individuals permitted to enter the United States without a visa for a stay limited to 90 days. Available only to citizens of designated countries. Designated by the U.S. State Department to participate in the Visa Waiver Program. |
| C-1, C-2 | Aliens in Transit |

Welcome to Catch 9/11— Caltech International Students and Scholars Encounter New Challenges

BY MICHAEL ROGERS

When Caltech chemistry graduate student Tao Liu went home to China during the last winter break, he went to the U.S. embassy in Beijing expecting little problem securing a visa for his planned return to the United States three weeks later. After all, when he came to Caltech in 2000, it only took a few minutes to get a visa.

But this is the post-9/11 era. At the embassy, Liu was questioned by an official about his research on electron transfer in DNA. Despite Liu's attempts to explain that his work did not pose a security threat, the official said that his documents would have to be evaluated in Washington, and that he should go home and wait for the embassy to call. Home was about 650 miles away in Wuhan, in central China. So he took the 12-hour train ride there and waited. Two and a half months later, he got the call, but by then, he had already missed six weeks at the Institute.

"It really caused me some trouble and delayed my experiments," said Liu. "I had planned to have research results by February. Two of the classes I missed are offered once a year, and another is offered only once every other year, so now I won't be able to take it until 2005. It might delay my getting a PhD by half a year."

For many of Caltech's international students and postdocs, securing a visa to study here has always posed its share of challenges. But since the September 11 attacks on the World Trade Center and the Pentagon, new restrictions on travel to the United States have made the lives of foreign students and scholars more complicated.

While a U.S. State Department spokesman said that the government is not closing the borders to international students and scholars, he did concede that a new rigorous inspection system is drawing out the review process for visa applications. And because of potential national-security issues, students and scholars involved in technology-related areas face even more scrutiny and delays. As a result, many of Caltech's international students and postdocs are canceling trips overseas for fear that they won't be able to return in a timely manner. Caltech administrators and faculty are also waiting to see whether the new regulations will cause international enrollment to decline.

"Post 9/11, a few changes have affected all visa applications, not just student applications," said Stuart Patt, a spokesman for the State Department's Bureau of Consular Affairs. "One change is that we have increased interagency security reviews for visitors from 26 countries around the world where we have heightened security concerns." Not surprisingly, many of these countries are in the Middle East. For the seven countries that the State Department classifies as state sponsors of international terrorism—Cuba, Iran, Libya, North Korea, Syria, Sudan, and, for the moment, Iraq—the visa review process is even more rigorous. It can take two to three months for someone from one of these countries to get or renew a visa, Patt said.

Since well before 9/11, the State Department has also been authorizing special visa security reviews for investigators engaged in work that involves technology transfer. Patt said that this seemed to apply to many students from China, further complicating their ability to obtain visas. While Patt said that most interagency checking is completed in two to three weeks, some Caltech students say that they have had a different experience.

Like Liu, other students from China faced visa problems when they tried to return to campus after winter break. One was held up in China for three months and another student is still stranded in Guangzhou Province. And several transfer students from China were not able to get a visa at all.

According to Caltech's International Student Programs (ISP) office, four transfer students were held up last summer when visa officers questioned why they would leave three years into their studies at top university programs in China. Despite help from Caltech's congressional representatives and from President Baltimore, ISP was still not able to get the decisions reversed. While there had been visa denials before, Caltech had always been able to get those decisions reversed.

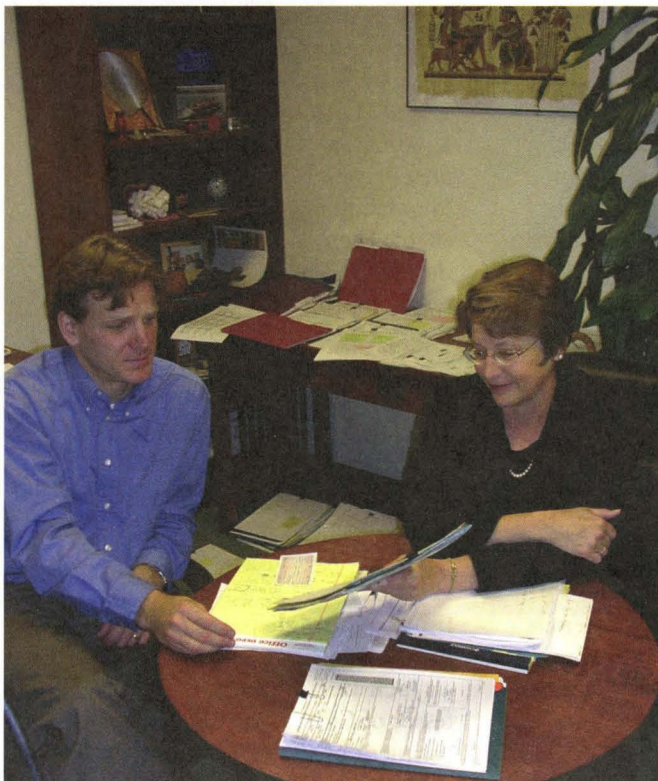
Caltech has more than 550 international students from 68 countries, about 25 percent of its total student population. Of the Institute's 552 postdoctoral scholars, 312 are foreign nationals. The countries with the highest student representation at Caltech are China, India, Canada, South Korea, and Romania. For postdocs, China, Japan, Germany, Canada, and South Korea are the countries with the highest representation. In addition, there are many other foreign visitors who are working at Caltech at any given time.

"We've had people terribly inconvenienced" as they waited in other countries trying to get a visa to come to the United States, said Marjory Gooding, director of Caltech's international scholar services, which provides the documents that enable foreign postdocs and visitors to work at the Institute. "At any one time, we have two or three people stranded outside the country. Until now, we've always been successful at getting people in. We've never failed, but I won't say we never will."

It used to take no more than one month for consular officials to hear back from investigating agencies in the case of a visa application that required special review. If they didn't hear back by that time, they'd usually go ahead and issue a visa anyway,

Gooding said. Now that officials are waiting for an answer no matter how long it takes, a bureaucratic logjam has developed. "Nobody wants to be the next guy who lets in a hijacker," Gooding said. "It is not surprising that consular officers are increasingly tentative in visa issuance."

Nikoo Saber, a postdoctoral scholar in



Jim Endrizzi, assistant director of International Student Programs, and Marjory Gooding, director of International Scholar Services, fill out a steady stream of documents to help foreign students and scholars get to Caltech.

Immigrant Visa Classifications Who May Be Lawfully Employed in the United States *with Certain Restrictions*

| | Study Restrictions | Employment Restrictions |
|---|--|---|
| Principal A-1 or A-2 nonimmigrant may be employed only by the foreign government entity. | May engage in incidental study while maintaining valid A status. | |
| | May engage in part- or full-time study. | Spouses and certain dependent children of a foreign government official may apply to INS for an EAD. To apply for an EAD, they must first have Form I-566 endorsed by both their diplomatic mission and the U.S. State Department. EAD is required. |
| | May engage in incidental study while maintaining valid A status. | May be employed only by the foreign government official. 240 day rule applies (see Legend). |
| B-1 visitors for business are not permitted to be employed in the United States, but may generally accept reimbursements for expenses. Since October 21, 1998, institutions of higher education and nonprofit or Governmental research organizations may also pay B-1 visitors "an honorarium payment and associated incidental expenses for a usual academic activity or activities (lasting not longer than 9 days at any single institution), as defined by the Attorney General in consultation with the Secretary of Education, if such payment is offered by an institution or organization described in subsection (p) (1) [of the INA] and is made for services conducted for the benefit of that institution or entity and if the alien has not accepted such payment or expenses from more than 5 institutions or organizations in the previous 6-month period." [Interpreted directly from INA Sec. 212(q); INS regulations not written at publication.] | May engage in incidental study while maintaining valid B-1 status. | |
| INS regulations require B-1 domestic or personal servants to obtain an EAD from INS. Employment is limited to the specific employer through whom the individual obtained B-1 status. | May engage in incidental study while maintaining B-1 status. | |
| B-2 visitors for tourism are not permitted to be employed in the United States, and generally cannot receive even reimbursements for expenses. Effective October 21, 1998, however, B-2 visitors are eligible to receive "academic honorarium" payments just as are B-1 visitors. (see employment restrictions under "B-1 visitors for business" for details.) [Academic honorarium provision is interpreted directly from INA Sec. 212(q); INS regulations not written at the time of publication.] | Generally may not engage in study. May be possible to engage in short-term, part-time study incidental to visit—e.g., a short-term English conversation course. | |
| Not eligible to be employed at the academic institution until INS approves the change to F-1 or J-1 status. Employment restrictions for the B-2 prospective student or scholar are the same as the B-2 visitor for tourism, above. | May engage in full-time study but must apply for change of status to F-1 or J-1 immediately after entry. Full-time study is permitted while change of status is pending. | |
| Individuals entering the United States under the Visa Waiver Program are not permitted to extend the length of stay or change visa status from within the United States. | See B-1/B-2 visa. | Individuals entering the United States under the Visa Waiver Program are not permitted to extend the length of stay or change visa status from within the United States. |
| | No study allowed. | Not permitted to be employed in the United States. C-2 and C-3 foreign government officials may be employed only by the foreign government. |

Enter a Grave New World

“We’ve had people terribly inconvenienced At any one time, we have two or three people stranded outside the country. Until now, we’ve always been successful at getting people in. We’ve never failed, but I won’t say we never will.”

aeronautics and bioengineering, comes from Iran, but while she hasn’t lived there in nearly eight years—having gotten her PhD from the Imperial College of Science, Technology, and Medicine in London—she has had to cancel several overseas trips out of concern that she might not be allowed back into the United States.

“I missed my graduation ceremony in England last year, and have had to skip three international conferences,” she said. Compounding her problem is the fact that Iranians are issued only single-entry visas. “Each time you leave the country, you’re required to get a new visa. I’d either face delays or immigration officials might not grant me reentry to the United States. If you’re midway through your research or a collaborative project, you can’t just leave for a long period of time.”

Since Iran does not have a U.S. embassy or consulate, Arash Kheradvar—a graduate student in bioengineering from Tehran—had to travel last year to the nearest consulate in the United Arab Emirates to apply for a visa. But it took three trips to the Emirates before the visa was approved so that he could come to Caltech. The delays held up his arrival by more than two months.

After his experience in China last winter, Liu said that he won’t risk returning home again until after he gets his PhD, which likely won’t happen until 2005. “I’m an only child,” he said. “It’s hard for my parents to be separated from me for a long time. I’m angry. Students in science and technical areas are having a problem. But we’re not terrorists.”

“It feels strange not to be able to go back and forth easily,” said Juliette Artru, a postdoctoral scholar in geophysics, who plans on returning to her native France for an extended period of time this summer while she waits for a new visa. But as a credentialed scientist, she pointed out, she probably has more options than the average graduate student in a similar position. “I can always go back to the lab where I got my PhD, borrow some office space and a computer, and work from there while waiting for my visa,” she said.

Those who work closely with international students say that the visa problems are not only affecting students’ peace of mind, but their work as well. “It will impact students if they cannot go home to see their families,” said Mory Gharib, the Liepmann Professor of Aeronautics and Bioengineering and chairman of the international students committee of the faculty board. Gharib said that there are about 45 students at Caltech who are restricted to single-entry visas, adding that President Baltimore has encouraged the faculty to reach out to these students.

As for the longer-range impact, Gharib notes that young scientists and engineers who feel that they can’t risk leaving the United States to attend international conferences are missing out on a valuable aspect of the research experience, and one that could be vital to their postgraduate careers. “When you’re a graduate student or postdoc, it’s important to have contact with peers at other institutions” by going to and networking at conferences, said Gharib. “That’s how you make contacts and tell people what you’re doing.”

BUTTING HEADS WITH SEVIS

In January of this year, after several years of preparation, the Immigration and Naturalization Service—now the Bureau of Citizenship and Immigration Services—

unveiled the Student and Exchange Visitor Information System (SEVIS)—a national database for tracking foreign students. Colleges and universities nationwide have been advised that data for the more than 500,000 foreign students and scholars enrolled in their institutions must be entered into the system by August. But a Justice Department investigation recently revealed that technical flaws are creating a backlog of visa applications.

Under the previous system, the government passed along much of the responsibility for handling international student documents to the schools. The government issued forms to universities, which would then evaluate students’ academic and financial records and enter the data on the forms. The students themselves would be responsible for taking the documents to the U.S. consulate in their home countries to get their visa. With SEVIS, the government is directly involved in the entire process, but the system seems to be fraught with bugs. The media has reported that documents often get lost electronically. Sometimes they end up at the wrong schools.

“Although Caltech has not experienced the problem,” said Gooding, “several other institutions did find that their immigration documents got sent in error to other institutions in the early days of SEVIS implementation.”

As they scramble to deal with the post-9/11 world of heightened student and scholar oversight, Caltech officials also worry about the impact that new rules and regulations will have on foreign enrollment. If international students know that coming to the Institute means that they may be unable to travel outside the country during the entire period of their studies, they may think twice about coming to the United States.

Sharp Professor of Geology Kerry Sieh, who works with many foreign students, said, “My opinion is that the United States is targeting the wrong group of foreigners and is doing enormous damage to the country’s science infrastructure. Talented foreign scientists are going to other developed countries.”

Whether that scenario will be limited to a few cases this year or be widespread and play out over the longer term is hard to predict. “These are very adventurous people who are willing to do many things to pursue science,” Gooding said. “But we have heard from people who have said that it isn’t worth coming here” in part because of the visa problems.

The visa backlog could also affect visitors. Since some research scholars only come to the Institute for a few weeks, the projects on which they were planning to contribute could be finished by the time they get their visas. Last October, the National Academy of Sciences had to cancel its Chinese-American Frontiers of Science program when visas could not be obtained in time for the 40 young scientists selected to attend by the Chinese Academy of Sciences. The NAS recently established with the Center for Strategic and International Studies a Roundtable on Scientific Communication and National Security, in part to address the visa issue. The cochairs are Caltech president David Baltimore and former Institute president and secretary of defense Harold Brown.

Faculty members are also affected by the visa issue, since their research programs could be compromised if a postdoc or graduate student involved in a project is delayed in returning to Caltech or can’t make it back at all. For students or scholars doing theoretical work, being away from Caltech is not a big issue, since they can

Continued on page 15

Alumni Update

TAKE ADVANTAGE OF ALUMNI ACTIVITIES, OPPORTUNITIES, URGES ASSOCIATION PRESIDENT

For the first couple of decades after I left Caltech, I thought the Alumni Association was somewhat like a child away at college—it called home periodically to ask for money. Since then, I have learned firsthand that is not at all what the Association is about. While the Institute certainly does need alumni support in order to maintain its status at the forefront of research and education (and you hear about those needs via the Alumni Fund), the Association is about reaching out to fellow alumni and to current students (our prealumni), and even to prospective students.

The Association reaches out in many ways. The most apparent is through events. Nearly 1500 alumni and families attended Seminar Day and reunions this past May. Additionally the Association sponsored social mixers this year in Chicago, Silicon Valley, and San Francisco. Several more are planned over the next few months. There were also career management events, local field trips (including Bill Deverell's "Religions in the City of Angels"), the annual Rose Parade event, a cooking class at the Athenaeum, and regional events (receptions with President David Baltimore in Washington, D.C., Chicago, and at the Einstein exhibit reception in New York City).

Travel-study programs sponsored by the Association this year have included trips to Hawaii and Alaska. This year's Alumni College featured two days of presentations by our beloved geological and planetary sciences division, as well as field trips to investigate the San Gabriel Mountains' geological history, and earthquake faults under downtown Los Angeles.

We've organized many events where students and alumni have had the opportunity to share experiences. In addition to sponsoring the ME 72 reception, a frosh pizza party, the annual senior barbecue, a new grad student event, and a postdoc lunch and reception, we also hosted nearly a dozen student lunches featuring alumni in different occupations. One was attended by 85 students! The Association provided funding to 21 clubs and campus organizations for student/alumni interactive events, and one-on-one networking assistance to more than 50 undergrads, grad students, and postdocs.

Equally impressive is that over 400

alumni volunteers led information sessions for potential applicants throughout the country, attended 200 college fairs, and visited approximately 100 schools nationwide. A number of alumni families opened their homes for receptions for admitted students. Alumni volunteers contacted nearly all admitted freshmen to congratulate them and answer questions. One of the most important aspects of reaching out is establishing a communications infrastructure. The Alumni Association does that too. We provide alumni with Caltech e-mail addresses, host their Web pages, and communicate through a bimonthly e-mail newsletter (as well



Alumni and seniors-soon-to-be-alumni enjoy themselves at the Association's annual Senior Barbecue, held in May at Alumni House.

as *Caltech News* and *Engineering & Science*). Our website includes an online directory. Over the next year, you can expect a redesigned website with even more information, and expanded features available through the online directory. There will also be a new and improved Connect@Caltech where you can provide mentorship to students.

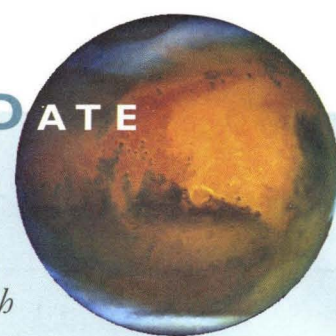
If you have ideas for local programs in your area and would like to be involved in reaching out to your fellow alumni, let us know! The students have asked us to ask you to reach out to them by thinking about them for both summer opportunities and permanent positions.

My term as Association president has ended, and I passed the gavel to Tom Tisch '61 on Friday, June 13. (Tom, I hope you are not superstitious!) I want to thank the staff and all of you who have supported the Association this year and made my time in office so much fun.

Tom Tisch

Newly elected Association president Tom Tisch '61 will take over this column in the next issue of *Caltech News*.

SAVE THE DATE



On January 3, 2004, the Alumni Association will present "Mars in Science & Science Fiction," a symposium on the Caltech campus. Check out the Association website at <http://www.its.caltech.edu/~alumni/> for details on this upcoming event.

E-ASY TO CONNECT

The latest print edition of the *Caltech Alumni Directory* is coming, but first, we need to make sure we've got the latest, most up-to-date information from our alumni. Please take a moment to double-check and, if needed, to update your current contact information at our *secure* online update site at <https://irsecure.caltech.edu/caaupdate.htm>.

Also, with Caltech relying more on electronic communication to get the word out about events, programs, and services for Techers worldwide, we need your current e-mail address. So please visit the Association site—you'll stay well informed via our bimonthly e-mail newsletter and announcements about Caltech happenings in your neck of the woods. And did you know that dues-paying members of the Association will be able to request their free copy of the upcoming directory. Not a member? No worries—just follow the Membership link to renew or join online!

And if you're not online at all, just contact us by phone at 626/395-6592, and we'll update your information over the phone and complete your membership at the same time. It's easy!

BOOKSTORE BONUS

Association members with either a Life Membership or a current Annual Membership can present their CAA membership card at the Caltech bookstore for a 15 percent discount on all merchandise (except for textbooks and Caltech course materials). Joining the Association (or renewing your membership) is easy to do online at www.its.caltech.edu/~alumni. And you can browse the bookstore shelves online as well. Just go to bookstore.caltech.edu.

AIR YOUR VIEWS

The Association is planning to survey a representative sampling of Caltech graduates in the next few months. You may be selected at random to participate. If you are contacted, we hope you will take the few minutes needed to share your views on Caltech and on what the Alumni Association can do for you! Meanwhile, if you'd like to provide feedback about Caltech, alumni activities, or anything else Tech-related, send an e-mail to alumni@caltech.edu! We're listening!

Alumni Activities

August 9—Family Fun at Barton Springs Barbeque, Austin, Texas.

August 10—Reconnect with fellow alumni at an alumni family picnic and minor league baseball game at the new Isotopes Park in Albuquerque, New Mexico.

August 17—Cool off this summer at an alumni family barbeque with water fun at Raging Waters, Palo Alto, California.

September 13—Join fellow Caltech alumni and watch the Cubs play Cincinnati at Chicago's Wrigley Field.

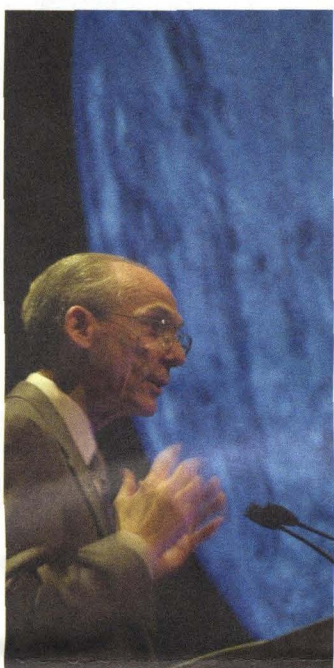
December 13—Holiday Concert (reserved seating) at Disney Hall, Los Angeles, with music performed by Canadian Brass.

January 1, 2004—New Year's Day Parade, followed by lunch at the Caltech Athenaeum.

And stay tuned for these upcoming events: Family Day and behind-the-scenes tour of the California Science Center in Los Angeles; and a fall tour of the Huntington Library and Archives, with Caltech history professor Bill Deverell. For details about these and other activities, visit the Alumni Association website at <http://www.its.caltech.edu/~alumni/> (just click on "Events"), or call the Association office at 626/395-6592.



SEMINAR DAY DISTINGUISHED BY AWARDS, LECTURES, ENTHUSIASTIC TURNOUT



Scenes from a Seminar Day, clockwise from above: Caltech physicist and Voyager Project Scientist Ed Stone presents the day's General Session address on the future of the Voyager mission; returning alumni, family, and friends fan out across campus; the newest members of the Half-Century Club—the Reunion Class of 1953—gather with club alumni of years past for their annual commemorative portrait; Caltech president David Baltimore (center), joins Distinguished Alumni Award recipients (from left) Alan Lightman, PhD '74; Fernando Corbató '50; Michael Hunkapiller, PhD '74; and Michael Malin, PhD '76.

The close to 1500 Insitute alumni who returned to campus for Seminar Day in May were treated to a smorgasbord of activities that included lectures on topics at the frontiers of science, tours of state-of-the-art laboratories, a general session address on the grandest tour in history (Voyagers 1 and 2), and a ceremony honoring the latest recipients of Caltech's highest honor, the Distinguished Alumni Award.

Fernando Corbató '50, professor emeritus in the electrical engineering and computer science department at MIT, was recognized for pioneering work on the design and development of multiple-access computer systems. He led the development of the Multiplexed Information and Computing Service (Multics), the precursor to today's Internet.

Michael Hunkapiller, PhD '74, senior vice president of Applera Corporation and president of Applied Biosystems Group, is an inventor of the DNA Sequencer, the technology that allowed the Human Genome Project to map and sequence the human genome. He has also pioneered the development of automated systems for the analysis, synthesis, and purification of proteins, peptides, and nucleic acids. These are used in more than 10,000 labs worldwide and have played essential roles in

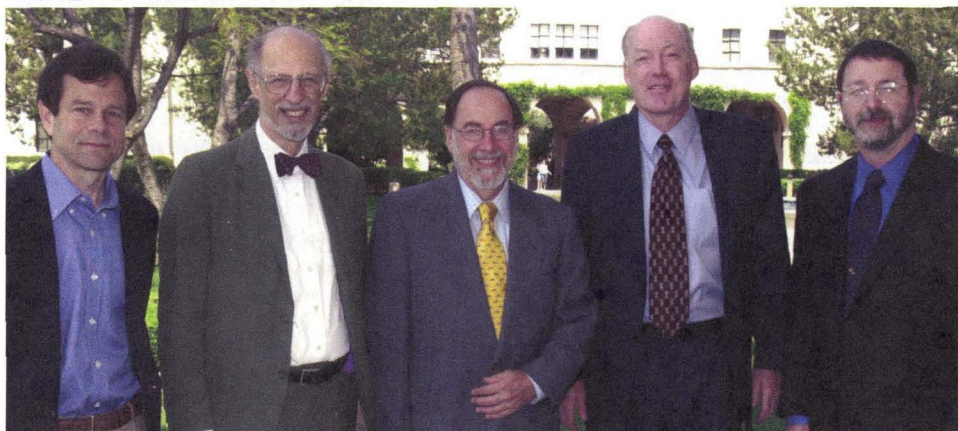
many of the major biomedical discoveries and biotechnology developments in the last decade.

Alan Lightman, PhD '74, physicist, award-winning novelist, and educator, is the author of a dozen books, among them *The Diagnosis*, *Good Benito*, *Einstein's Dreams*, and the just-published *Reunion*. He shared his creative insights with students on campus this spring as a writer-in-residence (see article, page 9).

Michael Malin, PhD '76, is president and chief scientist of Malin Space Science Systems, Inc., of San Diego, and principal investigator on both the Mars Global Surveyor Orbiter Camera and the Mars Color Imager/Context Camera investigation on the Mars

Reconnaissance Orbiter, slated for launch in 2005. He received a MacArthur "genius" Fellowship in 1987, and the NASA Exceptional Scientific Achievement Medal in 2002.

Honored in absentia, James Gunn, PhD '66, the Higgins Professor of Astronomy at Princeton University Observatory, was a deputy principal investigator on the Wide Field/Planetary Camera on the Hubble Space Telescope, a project scientist and technical director for the Sloan Digital Sky Survey, and associate director of the Apache Point Observatory. His other honors include the Royal Astronomical Society's Gold Medal and the MacArthur "genius" Fellowship.



ASSOCIATION THANKS VOLUNTEER HOSTS

In April, Caltech alumni across the country hosted receptions for admitted students and their parents. This provided a wonderful opportunity for students to meet local alumni and find out more about the Institute. Many thanks to these alumni and their spouses for opening their homes for these events: Garritt Foote '92 and Maha Zewail Foote '94, *Austin, Texas*; Henry De Witt '68 and Marcia De Witt, *Baltimore*; Keith Karasek '74, *Chicago*; Brian Cooper '95 and Yvette Cooper, *Dallas*; Gray Jennings '67 and Arbolina Jennings, *Houston*; Frank Bernstein '80 and Jane Bernstein, *Palo Alto*; Rob Drew '69 and Elaine Drew, *Pleasanton, California*; Carl Scandella '66, *Seattle*; Peter Howell '50 and Gladys Howell, *St. Paul*; Dhiraj Sharma '72 and Shubhra Sharma, *Warren, New Jersey*.

Recognition . . . from page 9

tems, as well as the impact of integrating their solutions into a multi-user wireless network."

Thomas Everhart, professor of electrical engineering and applied physics, emeritus, and Caltech president emeritus, has been awarded the Okawa Prize by the Okawa Foundation for Information and Telecommunications "for distinguished accomplishments in the development of scanning electron microscopy and micro-fabrication technologies; and for outstanding contributions and leadership in the development of science and technology, engineering education and progress of the information industry."

Harry Gray, Beckman Professor of Chemistry and founding director of the Beckman Institute, has received several honors. The American Chemical Society has chosen him to receive the William H. Nichols Medal "for his outstanding contributions to bioorganic chemistry." The University of Chicago, meanwhile, has named him

the recipient of the G. W. Wheland Award; and the School of Pharmacy of the University of Maryland has selected him for the Grollman Lectureship Award "in recognition of his outstanding contributions to chemistry and the life sciences." Finally, the Royal Society of Chemistry has chosen Gray to deliver the third Geoffrey Wilkinson Lecture for 2003–04.

Michael Hoffmann, Irvine Professor of Environmental Science and dean of graduate studies, gave the third annual Harold S. Johnston Lecture at UC Berkeley on March 18; the title of his lecture was "Photochemistry in Ice: Nitric Acid Photolysis and the Production of NO₂ and NO."

Cathy Jurca, associate professor of literature and master of student houses, has had her book *White Diaspora: The Suburb and the Twentieth-Century American Novel* chosen by *Choice* magazine as one of its Outstanding Academic Titles of the past year. *Choice*, which reviews books, electronic products, and Internet sites for academic libraries, selects as

the "best in scholarly titles" approximately 10 percent of some 6,600 works reviewed each year.

Wolfgang Knauss '52, PhD '56, von Kármán Professor of Aeronautics and Applied Mechanics, has been elected an honorary member of the Society for Experimental Mechanics, as "an individual of widely recognized eminence in the field of experimental mechanics."

Lee Lindblom '72, senior research associate in theoretical astrophysics, has been elected a fellow of the American Physical Society "for his fundamental, groundbreaking analyses of many microscopic aspects of the equilibria, oscillations, stability, evolution and gravitational radiation of relativistic rotating stars."

Yanshun Liu, a postdoctoral scholar in biochemistry and molecular biophysics, has been selected to receive a Damon Runyon postdoctoral fellowship, one of 20 awarded by the scientific advisory committee of the Damon

Continued on page 18 . . .

C l a s s
N o t e s

1949
Hugh C. Carter
hcarte1@cox.net

Are you counting the days yet? In just 10 months, we will have our 55th reunion, **Joe Dobrowski** told me when we talked recently. Joe has retired from both his active fieldwork and from the Air Force as a lieutenant colonel. American Concrete Institute International (ACI) has awarded him an Honorary Membership, its highest citation. The citation takes note of his other ACI honors—the Delmar L. Bloem Award and the Henry Kennedy Award—and notes that Joe served as the general chairman of the ACI Convention in Los Angeles in the mid-1990s, has contributed much to the committees and journals dealing with reinforced concrete, and authored a number of chapters in McGraw Hill’s *Concrete Construction Handbook, Fourth Edition*. Joe, who has two sons, a daughter, two grandsons, and a great-granddaughter, continues to live in Altadena.

I had breakfast with **Carlos Beeck** in December, visiting him in Oregon. He lives in the Oatfield Estates retirement home, nestled among the pines in Portland. His wife, Vera, died in 2002, which was a great loss to him. He has turned his energies to his retirement community, creating a nursery where crops from “any climate” can be grown at “any time.” He is also in charge of Oatfield Estates’ adaptive services, and recently won a design contest for the chapel to be built there, with a design based on the arrangement of the carbon atom.

Roger Johnson “is still working full time as an environmental engineer for Eaton Corp. in Belmont, Indiana, and recently was elected to the Belmont-Klemme Board of Education as a write-in candidate.” Congratulations! Roger has

eight grandchildren: the oldest is at the University of Iowa, and the youngest is in second grade. **Naomi Kashiwabara** has been traveling abroad on a Grand European tour. He recently won a prize in a local newspaper for providing correct answers in sports and rock music. **Roy Gould** was honored at the Gould Symposium in December, on the occasion of his 75th birthday. Fifteen speakers, including Roy, gave talks on subjects in his field of plasma physics, including “Plasma Wave Echoes”; “A Summer Project for Roy”; and “Thirty Years of Help from My Thesis Adviser.”

Wayne Herzog has sold his mechanical construction business to a partner and is involved only to the extent of an occasional lunch. He plays tennis twice a week, and he and Bev are active with their family and grandchildren. **Dave Warren’s** career in fire-protection management included forming a consulting business, which he sold to his partner, and then he went on to produce an information service in the fire-protection field, being one of the first to charge for access to his website. This professional service was sold in later years. His most interesting avocation has been playing the cornet in the Bohemian Club band, for the last 29 years. The club’s summer camp-outs at the famous Bohemian Grove have been a great joy to Dave, who has heard presidents, kings, educators, industrialists, comedians, and other celebrities speak there. He recently put recordings of “The Dabney House Quartet” on a CD, soon to be available in the Caltech Bookstore. (Don’t hold your breath).

Fred Eimer and his wife, Gretchen, reside in Honolulu and San Diego. He has been retired from the government for about ten years, but then spent time “in D.C. after retiring, helping my bureau, particularly during the two years that the Clinton Administration failed to appoint someone to replace me. I took the long trip from Hawaii to D.C. six times during one

twelve-month period.” He still gets weekly activity reports that are kept under lock and key. Top-secret stuff! After dozens of years, we (the Carters) and the Eimers had dinner in San Diego and resumed our friendship. When the class of 1949 gathers next May for Seminar Day, please choose a new class agent, as this is my final edition. It’s been great fun having a chance to talk to classmates and gather up interesting information. Thanks to all who participated. Cheers!

1950
Dwight Schroeder
dwightcsch@aol.com

Paul Clark reports from Buena Park, California, that he retired from the State Department of Health Services several years ago. He has done volunteer work at the U.S. Veterans Hospital in Long Beach. **William Lansdown** has retired from Crossroads, a residence for international students, and moved into a condo. **Ed Reinecke** is enjoying retirement in the Rancho Mirage area of the desert, and also maintains a place to get away to in Solvang when the desert is too hot.

1960
Peter R. Rony
rony@vt.edu

Tom Bjorklund (tbjorklund@uh.edu) reported on August 7, 2002: “I finally got my PhD in geology from the University of Houston on May 11 as the oldest member of the 2002 graduating class. I have now joined the ranks of all those other graduates who are beating the bushes for funding to continue research for the betterment of mankind. In my case, that research would be to save Los Angeles from the perils of earthquakes. Failing in that, I may just have to turn my attention to the undiscovered oil and gas resources of the Los Angeles basin (NOTE: This should not be interpreted by anyone as a threat).”

Gary Goodman (goodman@ez2.net) brings us up to date with this: “Besides my regular job in software development at Haas Automation, Inc., I am teaching astronomy at Oxnard College (community college).”

Peter Oettinger (peter.oettinger@rcn.com) sends the following: “A year ago I founded (with a partner) my second manufacturing company (x-ray equipment), called Inpho, Inc. The first one, founded in 1989, is a publicly traded medical-device company called Photoelectron, Inc. From the Internet: “‘Photoelectron Corporation is a medical device and technology company dedicated to developing, manufacturing and marketing innovative miniature x-ray technologies for the medical and industrial markets.’”

Your class agent, **Peter Rony**, on January 1, 2003, embarked on the mother of all sabbaticals, namely, retirement from his position as professor of chemical engineering at Virginia Tech.

1981
Eric Korevaar
ekorevaar@mrvc.com

Thank you for the additional notes I received since the last deadline. Please keep them coming!

John Faughnan writes, “www.faughnan.com tells something about my hobbies these days, and http://www.faughnan.com/privalbum.html has family photos (of interest primarily to my mother). Our household is now one old dog and two boys, and I’m doing something with clinical software for McKesson.”

Jim Angel tells us that “I have entered that

‘boring’ but fun stage of middle age. I am still having fun as a finance professor at Georgetown University, where I study the microstructure of securities markets. My lovely wife, Amy, and I are home-schooling our five children, ages ten, eight, six, three, and one. Our two youngest are moderately deaf, with bilateral sensorineural hearing losses in the 45dB range.”

Jill (Ibers) and **Korak Mitra** write, “Not much to update. Our daughter didn’t even apply to Caltech. If she had, and she had elected to go there, she would have been the third generation to do so (on Jill’s side). However, she is currently halfway through her freshman year at Princeton and loving it. It isn’t clear science isn’t in her genes, though—she’s planning to major in molecular biology, with a minor in neuroscience. Jill is still enjoying substitute teaching at the middle-school level, and Korak has gone from start-up company to consulting in this rather volatile Silicon Valley. All is generally well.”

John McCluskey sends the following: “John McCluskey, Dabney, worked at JPL from ’78 to ’88. Married a Canadian medical student in ’85, and moved to Quebec in ’88 when wife’s visa expired. We’ve got two boys: John IV was born in ’91 and has autistic spectrum disorder, followed by Charles in ’94. Got a master’s engineering degree at McGill University in ’95, and now work for Xilinx, flogging the finest FPGAs on the planet. My goal now is to live long enough to get my brain matter replaced by a solid-state equivalent, after which I plan to retire and tour the galaxy. How’s that?” Well, John, I like the last idea and wish you the best of luck with it.

Steve Schneider and **Lyn Brown Schneider** write that they “have been married since 1985 and are living in West Lafayette

EVEN MORE LEGENDS
OF CALTECH

Caltech has witnessed an extraordinary variety of pranks (and other escapades) over the years. Many of these were collected in *Legends of Caltech* and *More Legends of Caltech*, but the pranks didn’t stop there! Several more recent incidents have become legends in their own right, and the stories behind them deserve more publicity. So we’re collecting stories from Caltech’s “modern era” so that we can write a new *Legends* book, and show that Caltech students haven’t lost their touch!

If you were involved in any cool pranks, escapades, Alley challenges, House traditions, or other activities that should be included, please e-mail the story to our two volunteer project coordinators, **Mason Porter** ’98 and **Autumn Looijen** ’99. Make sure to let them know who was involved so that we can fill in all the details. As we collect your stories, we will post them online at <http://www.legendsofcaltech.com>.

We look forward to reading all your stories and to publishing *Even More Legends of Caltech*, highlighting all the cool stuff that’s been done over the past 25 years!

Send your materials and stories to **Mason Porter** (mason@math.gatech.edu); **Autumn Looijen** (autumn@ugcs.caltech.edu.).

CLASS NOTES CUTOUT COUPON

If you’re a Caltech undergrad with a class agent, please take a moment to update us on what you’ve been doing, and we’ll be sure to send that info on to your class agent. Return this coupon and any additional materials to Caltech Alumni Association, 1-97, Pasadena, CA 91125. If you would prefer to e-mail your news directly to your agent, you can find your agent’s name and e-mail address on the Web at http://www.its.caltech.edu/~alumni/class_notes.htm.

And if your class doesn’t yet have an agent, please fill out and mail the Personals Coupon in the *Personals* section.

Name _____

Option and Degree Year _____ New address? _____

Address _____

Day Phone _____ E-mail _____

NEWS _____



A graceful abstraction resembling a couple embracing, the fiberglass sculpture *Affection* was part of a 50-year retrospective of the artwork of Robert Metzner '38 (pictured above, left) that took place on campus over Seminar Day and Alumni Reunion weekend in May. The outdoor exhibit coincided with the 65th reunion of Metzner's graduating class, attended by 11 alumni. The artist displayed eight sculptures on campus representing different periods of his artistic career, which began in the early 1950s when his wife, Esther, encouraged him to take a sculpture class in Hollywood.

Metzner spent much of his life after Caltech running two companies: Roberts Electronics, which manufactured tape recorders; and Califone, which produced sound equipment for schools. He also co-founded a company called Hybricon that built a hybrid car called the Centaur in the late 1970s. But art became his passion, and in 1981 he left his business interests to devote himself full-time to his avocation. Now 86, Metzner is still an active sculptor, saying, "It keeps me young." Metzner's work can be seen in Bradley Hall on the UCLA campus and also in the sculpture garden at his home in Beverly Hills. He says that he often makes the garden available for museum- and charity-group tours.

Indiana. Steve (PhD '89) teaches in the School of Aeronautics and Astronautics at Purdue, and works on hypersonic boundary-layer transition. Lyn is presently teaching high school biology (including honors and AP). They have two children (Ariel, born in 1990, and Katie, born in 1993), and always enjoy hearing from their old friends." Steve and Lyn can be reached at steves@ecn.purdue.edu.

Finally, Gary Tornquist lets us know that "My wife, Patti, and I have gone through a long period of unemployment after recently getting our MBAs from Emory University here in Atlanta. We've kept ourselves amused by working in our yard, raising a litter of nine, count 'em nine, Australian puppies by our bitch Sydney (I've always wanted to use that word in a politically correct manner). Mainly we've spent a lot of quality time with our two-year-old, Scott Andrew. He is a wonderful little person already. In January we both landed some contracting work, and I have a job lead that may get us back to California. Schools in Georgia rank 51st in the nation (if you count the District of Columbia), so it would be good to get out before Scott starts school. Meanwhile we'd love to have visitors if anyone gets out to Atlanta." Gary can be reached at garyt@alumni.caltech.edu.

1988

Jason Beresford
j.beresford@worldnet.att.net

I married Cynthia Zielinski on May 10, 2002, in the Yosemite Chapel at Yosemite National Park. Techers who attended were best man **Kenneth Wheeler** '90, with his wife, Dalia, and son, Ricky; **Joseph Beckenbach**, with his wife, Daisy, and daughter, Jessica, who was the flower girl; **Leland Brown**; **Mark**

Dubinsky; and **Raymond Moberly**. Also in attendance were the parents of Jason Beresford, Kenneth Wheeler, and Mark Dubinsky. Joe Beckenbach, representing Cynthia's deceased father, gave away the bride.

More news about Kenneth, Dalia, and Ricky Wheeler: new baby Suzanne Lourdes joined the family in January 2003.

Linda Schlueter Cordes and **John Cordes** '89 write that they are very happy to announce the birth of their first child, Kari Elin Cordes, in August 2002. John, Linda, and Kari continue to reside in San Mateo, California, and would love to hear from old friends. You can reach them at jvcordes@yahoo.com or at lschlue@yahoo.com. Pictures of the new family can be found at http://photos.yahoo.com/kari_cordes.

1995

Bridget Mattingly
bridge@alumni.caltech.edu

Ginger Garcia and **Schuyler Cullen** were married in May 2002. They currently reside in Palo Alto. **Magnus Hedlund** and **Heather (Gibble) Hedlund** would like to announce the birth of their first child, Elise Marie, in December 2002.

Jen Niessink and **Brian Trotter** were married in June 2001. Jen received her doctorate in organic chemistry from the University of Colorado at Boulder in December 2000. **Mark Nelson** received a second master's degree, in electrical engineering, in May 2002 from New Mexico State University and continues to work as an electro-optical engineer for the Army at White Sands Missile Range in New Mexico.

St. Luke . . . from page 2

filming location by TV and movie companies. The long-running NBC series *ER* has filmed there regularly. "These are revenue-generating activities that we would like to preserve," says Koonin.

Caltech is also looking ahead to renovating the property over the next several years, starting with extensive retrofitting to meet current seismic-code standards. "Overall, the development of the facility is going to be gradual and it's going to be thoughtful in response to how our needs evolve," says Al Horvath, the Institute's vice president for business and finance.

St. Luke went on the market in 2002 after Tenet closed the hospital for financial reasons. After making several walk-throughs of the facility, holding numerous discussions among faculty, administration, and trustees, and gathering input from campus community focus groups, Caltech decided to make a purchase offer this past spring.

Although there was some concern about the Institute's making such a financial commitment during tough economic times, "the consensus was that this was too good an opportunity to pass up," says Horvath. "We strongly felt that even if the facility didn't work out for any of the uses that we envision—and that is highly unlikely—the value of the property itself represented a sound investment."

Adds Koonin, "Caltech is an institution that has always prospered by looking forward, and this represented an unprecedented opportunity to so."

Now that St. Luke has become part of Caltech, a question or two has been raised about the fate of the cross that surmounts the hospital dome, but which, unlike the building itself, is not on the register of historic structures. Caltech will be taking the cross down, confirms Koonin, and is in the process of identifying a new and appropriate home for it. For the time that it remains, the Institute could probably do worse than to recall an anecdote about its late mathematics professor, the famously eccentric E.T. Bell. The story goes that the resolutely agnostic Bell and his son were walking past a church when the boy said, "Dad, what is that plus sign doing on the top of that building?"

The facility's other religious structures are likely to remain part of the landscape, although adapted to new purposes. Looking forward, perhaps, to the decorum and sense of peace that cool dark houses of worship often inspire, Koonin says he can easily envision holding Caltech meetings in the St. Luke chapel. He also points with pride to the artistry and craftsmanship displayed in the chapel's 14 stained-glass windows illustrating the stations of the cross.

Caltech's provost says he is thinking of assigning two windows apiece to each of the Institute's six division chairs. That would leave two for the Caltech administration.

Catch 9/11 . . . from page 11

work and stay in contact with the Institute via computer. But for people doing laboratory or field work, being stranded thousands of miles away becomes a big problem. Gharib said that some faculty might not want these students in their research groups in the first place if they expect problems getting them into the country.

"The situation is so much in flux, no one really knows how to deal with it in an intelligent, rational fashion," said George Rossman, professor of mineralogy and academic officer in charge of graduate admissions for the Division of Geological and Planetary Sciences. "Life has gotten very bureaucratic. We're trying to help and don't want to abandon students, but if I have an NSF grant that's providing support for a student who is stuck for four months in India, should I continue supporting that student during that time? The bottom line is that you want to support the student, but at a certain point, if they're away from the lab or the field, it puts stress on the system. We don't have a disaster on our hands, but it's a situation that demands more attention."

Gooding said that for most foreign students or scholars who have a multiple-entry visa, there should be no problem returning to the United States after a trip. She added that the situation seems to be settling down.

"Getting a visa is taking longer, but at least there's some predictability," she said. "You can't have an upset like 9/11 and expect things to come back quickly to the status quo. Overall, people are getting their visas." She added that several national organizations are lobbying Washington to try to improve the situation. Gooding sits on a committee of the National Association of Foreign Student Affairs, which she said has formed a working group that is addressing the visa issue and which has already been in contact with the State Department.

"The key is knowledge; getting people to understand what particular areas of science are really about," Gooding said. "And that isn't easy."

In the meantime, Gooding advised any international student or scholar planning a trip outside the United States to check with her office or the International Student Programs office first. She added that they will continue to work hard to solve visa problems for students and postdocs. "We're pretty tenacious," said Gooding.

The illustration on pages 10–11 of the newly revised "Immigration Classifications and Legal Employment of Foreign Nationals in the United States," is part of a poster published and distributed by NAFSA: Association of International Educators. Reprinted with permission.

Personals

1932
William Pickering, MS '33, PhD '36, recently returned to his native New Zealand to receive an honorary doctorate of engineering from the University of Canterbury, where he studied for a year before transferring to Caltech. A Caltech professor of electrical engineering, emeritus, and director of the Jet Propulsion Laboratory from 1954 to 1976, he became a central figure in America's space race with the Soviet Union. During his tenure at JPL the Lab developed a series of U.S. successes: Explorer I, the first U.S. satellite; Pioneer IV, the first successful U.S. circumlunar probe; the Mariner flights to Venus and Mars; the Ranger photographic missions to the moon; and the Surveyor lunar landings.

1948
William S. Johnson, MS, of Montgomery, Alabama, reports that he has been retired from the aerospace industry for over 15 years, but still enjoys keeping abreast of developments. He was recently awarded a 50-year continuous-membership certificate by the American Institute of Aeronautics and Astronautics, in which he is an associate fellow. "I travel frequently with the senior educational programs of Elderhostel and keep my hand in aerospace by building and flying my radio-controlled model airplanes."

Paul MacCready, MS, PhD '52, the chairman and founder of AeroVironment, Inc., has received the Franklin Institute's 2003 Bower Award and Prize for Achievement in Science, as well as the accompanying \$250,000 cash prize. MacCready, according to the citation, "in the spirit of the Wright Brothers, has created a series of innovations in the fields of soaring, meteorology, human and solar powered flight,

upper atmospheric research, and unoccupied and miniature aircraft. For half a century, his exceptional contributions have expanded the frontiers of the science and technology of aeronautics, aeronautical materials, structures, energy conservation and utilization, and autonomous and automatic flight." The awards presentation and dinner in honor of the 2003 Franklin Institute laureates took place April 24.

1950
Donald A. Glaser, PhD, Nobel laureate in physics and Professor of the Graduate School in the departments of molecular and cell biology and of physics at UC Berkeley, has been elected a fellow of the American Academy of Arts and Sciences. Founded in 1780 by John Adams, James Bowdoin, John Hancock, and other scholar-patriots "to cultivate every art and science which may tend to advance the interest, honor, dignity, and happiness of a free, independent, and virtuous people," the AAAS has this year elected 187 new fellows and 29 foreign honorary members. The induction ceremony will take place at the academy's headquarters in Cambridge, Massachusetts, in October.

1953
Gordon P. Eaton, MS, PhD '57, who from 1986 to 1990 served as Iowa State University's 12th president, has had the school's newest residence hall dedicated in his name. The official naming ceremony of Gordon P. Eaton Hall took place April 11. "During his tenure," according to the citation, "Dr. Eaton provided leadership in strengthening the excellence of the university through strategic planning, expanding research support, funding several major international research centers, improving the university's undergraduate programs and implementing a number of programs to improve the recruitment and hiring of women and ethnic minority administrators." Eaton left Iowa State

Benoit Mandelbrot, MS, Eng '49, Sterling Professor of Mathematical Sciences at Yale University, has been awarded the Japan Prize by the Science and Technology Foundation of Japan. The international prize recognizes "original and outstanding achievements that contribute to the progress of science and technology and the promotion of peace and prosperity of mankind." The award ceremony took place April 25 in the presence of the emperor of Japan. Known as the "father of fractals," Mandelbrot coined the term *fractal* and created mathematic tools for analyzing fractals—the curves or shapes that occur in phenomena such as coastlines, clouds, tree branches, blood vessels, clusters of objects ranging from galaxies to physical particles, and even fluctuations in the stock market, and that reoccur at any level examined.



in 1990 to take the position of director of the Lamont-Doherty Geological Observatory at Columbia University. In 1997 he retired from his final position as director of the U.S. Geological Survey.

1959
Joseph M. Colucci, MS, who received his BS in mechanical engineering from Michigan State University in 1958, was presented with MSU's Claud R. Erickson Distinguished Alumnus Award on May 4 at the College of Engineering's spring commencement ceremony. Each year the college selects a recipient "for attaining the highest level of professional accomplishment, for providing distinguished and meritorious service to the College of Engineering and the engineering profession, and for engaging in voluntary service at the local, state, national, and international levels." Widely recognized for his work improving commercial fuels for better vehicle performance and reduced emissions, Colucci early in his career helped develop the catalytic converter and unleaded gasoline at the General Motors Research Laboratories, and in 1989 proposed a way to further reduce emissions by making gasoline "cleaner" through changes in its chemical composition and physical properties. He was elected to the National Academy of Engineering last year.

1960
Peter G. Simpkins, MS, was recently honored at a campus ceremony for being named University Professor at Syracuse University. Affiliated with the department of mechanical, aerospace and manufacturing engineering in the L. C. Smith College of Engineering and Computer Science, Simpkins joined the Syracuse faculty as University Professor last year. Previously he had worked for more than 25 years at Bell Laboratories, Murray Hill, in the physical science and engineering research division, where his work in fiber optics resulted in numerous patents and accolades, including the Bell Laboratories Distinguished Technical Staff Award in 1983. He was elected to the National Academy of Engineering in 1999. His other memberships include the American Physical Society, the New York Academy of Sciences, and the American Association for the Advancement of Science. He was named a fellow of the American Society of Mechanical Engineers in 1993. For the past decade, Simpkins has served as an adjunct professor of chemical engineering at Lehigh University, and he has published more than 70 articles and holds nine U.S. patents. He earned his first degree in aeronautical engineering at London University in 1957, and after receiving his MS from Caltech he returned to England for a diploma (DIC) and PhD in aeronautics from the Imperial College of Science and Technology in London.

1964
Tomifumi Godai, MS, writes that he has been appointed to the Space Activities Commission of Japan.

1970
Uma Chowdhry, MS, DuPont vice president of central research and development (CR&D), has been named a fellow of the American Academy of Arts and Sciences, joining Secretary General of the United Nations Kofi Annan, journalist Walter Cronkite, three Nobel Prize winners, and four Pulitzer Prize winners, in the class of 187 fellows and 29 foreign honorary members elected this year to the AAAS. Honored for her accomplishments in the field of engineering sciences and technologies as well as for being "a mentor and role model for women in technical positions," Chowdhry has been with DuPont since 1977. She worked for 11 years in research and management roles in CR&D and from 1988 to 1999 held various business and technology leadership positions in electronics and chemical-solutions businesses. She has also served as director of engineering technologies. Founded in 1780, the AAAS has counted George Washington, Benjamin Franklin, Daniel Webster, Ralph Waldo Emerson, Albert Einstein, and Winston Churchill among its members.

Harry Shipman, MS, PhD '71, Annie Jump Cannon Professor of Astronomy at the University of Delaware, has received a National Science Foundation Director's Award for Distinguished Teaching Scholars. Presented to professors who excel at both undergraduate teaching and scholarship, the award was established to encourage scholars to continue such dual efforts and to explore and experiment with ways to integrate research and education; it also recognizes institutions that promote and commit resources to support faculty who contribute effectively to both research and education. One of six university and college faculty members nationwide selected for the award, Shipman has been honored specifically for "his research investigating white dwarf stars and, more recently, brown dwarf stars and as an innovative and creative science educator, who explores new methods of teaching science, especially to nonscience majors." Shipman plans to use the \$300,000 grant over four years to carry out a proposal entitled "STARS—Science Teaching and Astronomy Research Synthesized." He has been a member of the University of Delaware's faculty since 1975.

1974
Philippe J. Lebrun, MS, writes that since January he has been leading the Accelerator Technology Division of CERN, the European Organization for Nuclear Research in Geneva, Switzerland. "Our main task is to build the major systems of the Large Hadron Collider

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T e c h T a l k

(LHC), a 27 km circumference high-energy proton and ion accelerator based on several thousand high-field superconducting magnets operated in superfluid helium below 2 K." A \$2 billion project, it is being primarily funded by the 20 European member states of CERN, with additional contributions, in kind or cash, from the United States, Canada, Japan, Russia, and India, "thus making it a truly global project. When completed in 2007, this unique research tool will serve the world's high-energy physics community for the next decades." Lebrun adds that he is also vice-chairman of the International Cryogenic Engineering Committee and president of the Cryophysics and Cryoengineering Commission of the International Institute of Refrigeration, which will hold its 21st congress this coming August in Washington, D.C.

1979

William D. Jones, PhD, of Rochester, New York, has been honored by the American Chemical Society with its 2003 Award in Organometallic Chemistry. A chemistry professor at the University of Rochester, Jones was chosen for the award in recognition of "his discoveries about the early steps in turning petroleum into products such as plastic." Petroleum provides the basis of nearly all the plastics that make up bottles, bags, credit cards, sports clothing, carpets, and myriad other products, and Jones hopes to make the process of forming plastics more efficient by activating hydrocarbons directly with small, extremely reactive metals, rather than by breaking oil's long hydrocarbons into two-carbon pieces and then stitching them back together, as is done now. According to Jones, "I often tell people that petroleum is too valuable a material just to burn."

1983

Keith Echelmeyer, PhD, along with fellow faculty members Rainer Newberry and Kathleen Butler-Hopkins, who, like him, have been at the University of Alaska Fairbanks (UAF) for more than 20 years, has received one of the 2003 Emil Usibelli Distinguished Teaching, Research and Public Service awards. Each winner receives a \$10,000 cash prize. While Newberry has received the teaching award and Butler-Hopkins the public service award, Echelmeyer, a professor at UAF's Geophysical Institute, specifically has received the award for research. Noted for combining the theoretical with field work, Echelmeyer most recently used a laser device to map and measure more than 100 Alaskan glaciers from the Brooks Range to southeast Alaska and concluded that Alaskan glaciers are melting dramatically. His findings were published in the journal *Science*. Echelmeyer also teaches an introductory course in geoscience for nonscience majors, regularly contributes to the Geophysical Institute's public lecture series, and speaks at local schools.

1994

James Buntine, PhD, writes that since leaving Caltech he and his family have moved from Seattle, Washington, to Sydney, Australia, and then on to Melbourne. "We are in the midst of a further move to London as I have taken a position as Head Actuary (Europe) with Liberty International Underwriters. We hope to settle in Kent by August 2003. With all the changes of address, we have lost contact with some of our old Caltech friends. If any lost souls would like to contact us, please e-mail Jim.Buntine@LibertyIU.com or home e-mail wildmtnz@yahoo.com."

EXPLORING SPACE

Dear Editor:

In *Caltech News*, Vol 36, No. 4, you solicited alumni thoughts on space travel in connection with the feature article (by JPL scientist Don Yoemans) "Space Travel is Utter Bilge."

Some years ago I wrote a brief essay entitled "Humanity's Launch Window," which was published in my local newspaper's "Opinions" section. In it, I observed that it has taken (to the best of our knowledge) over four billion years for a species to appear on our planet which is capable of expanding off of it; that our "launch window" just opened less than half-a-century ago; that it takes a large number of people cooperating peacefully and with relatively inexpensive resources available to overcome the "energy barrier" to space colonization; that our launch window is fragile and could close at any time for many reasons; and that once it closes, it might be difficult to ever open it again. I wrote this essay hoping to inspire support for space exploration as a high priority. However, the feedback I received was mostly, "you are too pessimistic." All I can sadly say is, "I sure HOPE SO . . ."

—Alan Silverstein '77

COMMUNICATING SCIENCE

I was so pleased to learn [in *Caltech News*, Vol 37, No 1] that Jeff Hecht is a Caltech graduate. I have read his work in the laser magazines for years and find his insights interesting and useful.

My own most significant experience with writing has been as an expert witness, particularly in patent litigation. I have discovered that, at least when being litigated, patents are not about science (or, in my own case, engineering). They are about the English language and how she is wrote. Cases are won on the basis of a comma here and a parallel construction there, on what the meaning of "is" is.

I look forward to your magazine.

—Sam Phillips '56, MS '57

"Bridges to the non-scientific public" was a very inclusive way to state the theme for the current, very interesting issue of *Caltech News* on the theme of science communication. Mostly because of wanting to live in a wider world than that of research, while at Caltech, I moved from science to engineering and then beyond. My own version of communication included first a very intense three years as a TA in "History of Science/Science for Non-Scientists" while in Harvard Graduate School. Teaching nonscientists is not

"IT'S NOT WHAT YOU DON'T KNOW"

"I hope that this was just a typing error," wrote our sixth-grade reader Kelsey Parsons, of Tracy, California, after pointing out that the computer-screen text on the cover of the *Caltech News* "Communicating Science" issue contained "a small but important mistake." The reference in the text to Newton's Second Law of Motion, Parsons adroitly noted, should be to "Newton's Third Law: For every action there is an equal and opposite reaction."

"I am in 6th grade," the law-flaw-finder continued, "and learned this in school. My brother and I homeschool. When I am in college, I want to go to Caltech. . . ."

Never a publication to shirk responsibility, *Caltech News* lost no time in squawking to Joshua Roth, PhD '94, who, as we prudently noted inside our issue's front cover, had at our request provided us with the text in question, from a 1998 article that appeared in *Sky & Telescope* magazine. (Roth is one of three Caltech grads at the magazine.) Our cover graphic coupled the text with a computer keyboard that boasted all the equivalent equations, which Josh scrupulously and, we trust, accurately (since we didn't hear about it from Kelsey) derived for us.

As for the corruption of Sir Isaac, "Indeed you are correct," Roth, who is senior editor with *Sky & Telescope*, acknowledged in a letter to Kelsey. "Why did this error see print in an article that two award-winning astronomers wrote for an award-winning astronomy magazine? For better or worse we long ago disposed of the incriminating evidence. . . . Thus all I can say is: 'It's not what you don't know that gets you into trouble, it's what you do know that ain't so.'"

"You can never take your understanding of a subject for granted, especially when you've been out of school for many years. Your letter has inspired me to read my favorite astronomy textbook for 15 minutes each day when I come to work."

Kelsey can look forward to a future bright with astrophysics fact-checking opportunities, since *Sky & Telescope* has enrolled the sixth-grader for a complimentary one-year subscription. Evidently, Kelsey's already got a supplier for *Caltech News*.

routine! (Caltech's approach to history and literature was a constant support as I did this migration.)

Then, after actually being an engineer for about a decade, I began to volunteer for the Sierra Club here in Seattle, working on freeway (or more exactly nonfreeway), wilderness, and energy policy issues. When the City of Seattle and its municipal electric utility chose a future based on conservation instead of nuclear power, I moved into working for city government. I led the writing of a building code for energy efficiency, and then moved into what was essentially a lobbying job working on Seattle City Light's relations with Northwest utilities on energy conservation issues. ("Working on relations with" of course often meant "working against"! All of this involved an interesting blend of technology and persuasion.

While front-line research is absolutely vital and should be the subject of most of your reporting, the many ways science gets communicated to others is also important, complicated, and fascinating. I wonder if you will get more letters from graduates whose main work was in the many forms of communication. You may have another four or five issues worth!

Thanks for a great read.

—Dick Fiddler '58

REMEMBERING WHEELER NORTH

Great story on Dr. Wheeler North in the last issue!

One bit of news for the file: He was a great springboard diver. He was my diving coach on the Caltech Swimming Team, 1949–50. We used the Pasadena JC pool, as Tech had no pool back then. Wheeler was a wonderful, cheerful, optimistic guy. He dived with Dr. Sammy Lee (an Olympic diver, who taught at Occidental College).

—Ed Reinecke '50

Caltech News welcomes letters from readers, while reserving the right to select and edit them for publication. Please write to *Caltech News*, 1-71, Pasadena, CA 91125, or send e-mail to hja@caltech.edu

O b i t u a r i e s

Recognition . . . from page 13

Runyon Cancer Research Foundation. The three-year fellowships are awarded to “outstanding young scientists conducting theoretical and experimental research that is relevant to the study of cancer.”

Rudy Marcus, 1992 Nobel laureate in chemistry and Noyes Professor of Chemistry, has received an honorary doctor of science degree from the University of Waterloo in Canada.

The McKnight Endowment Fund for Neuroscience will award \$300,000 over three years to Caltech Professor of Biology **Paul Patterson** for his research, using a mouse model, into the relationship between maternal infection and defects in fetal brain development, focusing particularly on a possible link between influenza and the disorders autism or schizophrenia. Patterson is one of seven researchers nationally who are receiving Neuroscience of Brain Disorders Awards to further their studies in diagnosing, preventing, and treating injuries or diseases affecting the brain and spinal cord. First given in 2001, the awards were created to help translate basic laboratory discoveries in neuroscience into clinical benefits for patients.

William Pickering '32, PhD '36, professor of electrical engineering, emeritus, and former director of JPL, recently returned to his native New Zealand to receive an honorary doctorate of engineering from the University of Canterbury. He had studied there for a year before transferring to Caltech. Pickering also unveiled a memorial honoring fellow scientist Ernest Rutherford and himself in the town of Havelock, where both men attended primary school.

Ares Rosakis, professor of aeronautics and mechanical engineering, has been selected to receive the 2003 M. M. Frocht Award, which is given annually by the Society for Experimental Mechanics Honors Committee to honor “outstanding achievement as an educator in the field of experimental mechanics.”

Anneila Sargent, PhD '77, professor of astronomy and director of both the Owens Valley Radio Observatory and the Interferometry Science Center, has been named to the United Kingdom's Particle Physics and Astronomy Research Council (PPARC). Sargent, who has been president of the American Astronomical Society and chair of NASA's Space Science Advisory Committee, is expected to provide an international perspective to PPARC. Her appointment is for four years.

Athanassios Siapas, assistant professor of computation and neural systems, has been named a Bren Scholar.

Kip Thorne '62, Feynman Professor of Theoretical Physics, has been awarded the Robinson Prize in Cosmology by the University of Newcastle, England. He has also received the honorary degree of doctor of humane letters from Claremont Graduate University.

1927

Robert Brainerd Vaile Jr., PhD '36, on July 31, 2001; he was 94. A 50-year resident of Palo Alto and Atherton, California, he was associated for many years with the Stanford Research Institute, retiring as head of physics. After receiving his doctorate from Caltech, he taught at Iowa State University and at the University of Missouri. At the outbreak of World War II he joined the Naval Ordnance Laboratory in Washington, D.C., and at the war's end moved to the Armour Research Institute in Chicago and then, in 1950, to the Stanford Research Institute. Following his retirement he contributed to various projects at the Electric Power Research Institute in Palo Alto. For recreation he enjoyed climbing and skiing in the Sierra Nevada, the Tetons, and the Wind River and Cascade Ranges, among others. Predeceased by his first wife, Margaret, Vaile is survived by his wife, Kathleen; a daughter, Susan; a son, David; and four grandchildren and five great-grandchildren.

1929

John L. Dickinson, Ex, of San Jacinto, California, on July 12, 1992.

True W. Robinson, on June 8, 1989.

Frederick R. Wilson, of North Hollywood, California, on April 12, 1994.

1936

Robert D. Kent, of Long Beach, California, on November 11, 2002; he was 88. He went to work for Texaco's Wilmington, California, refinery in 1943 as a process engineer, and in 1960 transferred to Texaco's engineering office in Houston. Retiring in 1978, he worked as a consultant for two more years. He is survived by Doreen, his wife of 56 years; three sons and a daughter; and six grandchildren. “When we attended his 50th reunion in 1986 Bob had the distinction of having the youngest child among those who attended the banquet. We had a wonderful time the three days the reunion was held.”

Walter Frederick Rodee, MS, of San Pedro, California, on January 1; he was 98. A retired rear admiral, he graduated from the U.S. Naval Academy in 1926 and received his wings as a naval aviator in 1929. After receiving his master's degree from Caltech, Rodee served both on aircraft carriers and on shore, and he assumed command of the carrier *Hornet*'s air group early in World War II. He participated in the battles of Midway, Guadalcanal, and Santa Cruz, at which the *Hornet* was sunk in October 1942; he received the Distinguished Flying Cross and the Navy Cross for his service at Midway and Santa Cruz. After assignments in the Pacific as executive officer aboard the *Pybus*; and the *Independence*, Rodee moved to the Office of Chief of Naval Operations in 1944 and took command of the *Puget Sound* in 1946. He later became Bureau of Aeronautics representative at the Consolidated-Vultee Aircraft Corporation in San Diego. In 1950 he joined the staff of the commander, Carrier Division 3, as chief of staff and aide, and in 1952 he assumed command of the *Essex*, during the Korean conflict. From 1952 to 1954 he was commanding officer, North Island Naval Air Station, San Diego, after which he commanded Carrier Division 15. He was chief of staff and aide to the commander, Naval Forces Far East, from 1955 to 1957 and commander, Naval Forces Continental Air Defense, from 1957 to 1960. After serving as commander, Fleet Air, San Diego, with the

additional duty of commander, Naval Air Bases, 11th Naval District, Rodee retired in 1961. As a civilian he worked for Air Logistics Corporation in Pasadena for five years, and in retirement he traveled extensively with his wife, Virginia, to whom he was married for 61 years, until her death. Rodee is survived by four daughters, Mary Metzger, Carolyn Carlson, Virginia Rodee, and Catherine Brennan; three sons, Walter Jr., Donald, and John; and 21 grandchildren and 19 great-grandchildren.

1942

Vernon W. Hughes, MS, of New Haven, Connecticut, on March 25; he was 81. Recipient of a Caltech 1999 Distinguished Alumni Award, he retired from Yale in 1991 as Sterling Professor of Physics, though he continued as a senior research scientist. During World War II he worked on radar at the MIT Radiation Lab, then earned his PhD in physics from Columbia University in 1950. After serving in faculty positions at Columbia and the University of Pennsylvania, he joined Yale in 1954, where he helped introduce the use of polarized beams in high-energy accelerators. As leader of a research team at CERN, the European particle-physics laboratory outside Geneva, he contributed to new insights into the structure of the proton, and in 1960 he began his study of muons, which are rare and relatively heavy cousins of electrons, and for which he developed increasingly precise measuring techniques. His work continued into the 2000s, and he ultimately demonstrated that muons can move in unexpected ways, suggesting that other, unknown particles exist in the subatomic world and, according to some physicists, offering support for the theory known as supersymmetry, which assumes for each known particle the existence of new particles called supersymmetric partners. A member of the National Academy of Sciences and a fellow of the American Physical Society, the American Academy of Arts and Sciences, and the American Association for the Advancement of Science, Hughes was the recipient of numerous honors, including the First Prize of the Gravity Research Foundation, the Alexander von Humboldt “Senior U.S. Scientist Award,” and the Davisson-Germer Prize and Tom W. Bonner Prize, both from the American Physical Society. He served as councillor-at-large of the American Physical Society, as chairman of APS's Division of Atomic Physics, and as a trustee of Associated Universities, Inc., as well as editor of *Comments on Atomic and Molecular Physics*. Predeceased by his first wife, Inge, Hughes is survived by his wife, Miriam; two sons, Gareth and Emlyn, a professor of physics at Caltech; and four grandchildren.

1943

Robert A. Browne, CAVU, MS '52, of Missoula, Montana, on January 30, 2000. One of a number of students who during World War II received certification after completing an accelerated training program in meteorology, and who referred to themselves as Ceiling and Visibility Unlimited, he was in 1997 retroactively awarded a master's degree in meteorology, dated 1952. He is survived by his wife, Eileen. “Robert attended his 50th year of reunion and enjoyed seeing and visiting with a few of his good friends.”

1944

Henry O. Wheeler, CAVU, of La Jolla, California, on October 12, 2001; he was 77. One of a number of students who during World War II

received certification after completing an accelerated training program in meteorology, and who referred to themselves as Ceiling and Visibility Unlimited, he served in the U.S. Army Air Forces from 1943 to 1946. He went on to earn his MD from Harvard Medical School, completing his training at Presbyterian Hospital in New York. He began his academic career at the College of Physicians and Surgeons at Columbia University, and during 1961–62 was a Guggenheim Foundation Fellow and Fulbright Research Scholar at the University of Copenhagen. He continued to hold appointments at Presbyterian Hospital and Columbia University, where he was appointed a Markle Scholar and Professor of Medicine. In 1968 he was recruited to UC San Diego's new School of Medicine as its first chief of the Division of Gastroenterology. His research interests lay in the physiology of the liver and liver disease, and his seminal contributions included fundamental observations regarding biliary secretion, bile flow, and basic transport physiology. In 1982, Wheeler left the Division of Gastroenterology to become head of the new Division of General Internal Medicine, where his developments included strong programs in medical teaching and in geriatrics. He retired in 1988. During his career, Wheeler also served as an advisor and reviewer for journals and for the National Institutes of Health. A photographer as well, with his work noted for its craftsmanship and its humanity, his images have appeared in scientific publications, and many of his photographs are exhibited in the UCSD Faculty Club and UCSD Medical Centers at La Jolla and Hillcrest. He was an advisory director of the San Diego Opera and a member of the University Art Gallery, and for many years he served on the board of Good Samaritan Hospital in Los Angeles. Wheeler is survived by Isabel, his wife of 54 years; two daughters, Mary and Charlotte; and a sister, Katharine Meserve.

1945

Dudley B. Smith, of Redwood City, California, on June 19, 2000. He is survived by a son, Michael.

1948

Robert Swank, MS, in Lancaster, California, on March 4; he was 84. During World War II, Swank was a research assistant on the Manhattan Project in Chicago. After receiving his master's from Caltech, he spent a decade as a scientist at Argonne National Laboratory, and in 1962 he received a PhD in physics from the University of Illinois. He then worked in research and development at General Electric until 1977, where he was recipient or corecipient of five patents. He retired to Colorado Springs, where he pursued his hobbies as an artist, a pilot, and a designer and builder of experimental aircraft, then spent his final three years in Lancaster. Predeceased by Sue, his wife of 57 years, he is survived by a daughter, Bobbi; a son, Larry; a sister, Louise; a brother, Ray; and two grandchildren.

1949

Charles H. “Buck” Arrington Jr., PhD, of Westover Hills, Delaware, on August 28, 2000; he was 79. He spent his career with the DuPont Company, where he became director of research for Central Research and Development and general director of research and planning for Photosystems and Electronic Products. In his retirement he was an active member of the Academy of Lifelong Learning. Predeceased by his son Charles H. III, he is survived by his wife, Elsie; his son Roger; and five granddaughters.

Donald W. Chapin, MS, of Scottsdale, Arizona, on December 7, 1999.

1957

Walter A. Petersen, of Portland, Oregon, on September 29, 2001; he was 65. A computer engineer for Tektronix and computer manager for Oregon Health & Science University, Petersen founded an engineering consulting firm in the 1990s. He was disabled in an automobile accident in 1996. Predeceased by his son, Anthony, Petersen is survived by his wife, Evelyn; four daughters, Anne Petersen, Barbara Petersen-Lynch, Carol Romano, and Diana Rosvall; three sisters, Jean Wirtz, Doris Nyland, and Mary Miller; and five grandchildren.

1960

Lawrence E. "Larry" Curfman III, of Tiburon, California, on December 11, 2002; he was 63. After receiving his law degree from Harvard in 1963, Curfman returned to the Bay Area, where he practiced law for the next 39 years, spending about 23 years on defense litigation, eight years on plaintiff litigation, and eight years as a mediator/arbitrator. His longtime friend Peter Rony '60 writes that he attended Curfman's memorial service on January 25, 2003, at the Olympic Club in San Francisco. Speaking at the service, Curfman's former law partner said, "It was remarkable that he could be such a good lawyer, and still be a nice guy . . . The qualities of kindness, sensitivity, generosity, honesty, sincerity—that was why he was a successful trial lawyer. That is the type of guy that I have always admired." Another speaker, Court-of-Appeals Judge Jim Marchiano, said, "There are two qualities that stood out in the 30 years that I knew Larry: The first was a devotion to family . . . The second quality was in his role as a mediator and peacemaker in the last eight–nine years of his life. He loved . . . doing trial work. He enjoyed . . . doing plaintiff's work and some defense work on the other side. But he felt that something was missing . . . In 1992, he came by and we talked. He said, 'I am thinking of going into mediation, I have a couple of cases given to me in Marin County, but I am also responsible for supporting Betty and Lars, and I am not sure if I can do it.' I encouraged him to do it. Larry became highly regarded as a mediator, accepted by plaintiff attorneys because they had respect for him, and by defense attorneys because of his character and because they respected what he was doing. In essence, he was a peacemaker, and that was what he enjoyed." Curfman is survived by his wife, Betty, and his son, Lars, who can be contacted at curflaw@attbi.com. Rony adds that a 1.5-hour videotape of the service was produced and mailed to attendees. "I have converted this video into a 315.5 MB Windows Moviemaker file on a CD-ROM, and am willing to send a copy to Larry's classmates. Please contact me by e-mail with your postal mailing address."

1963

John M. Caywood, MS '64, PhD '69, of Sunnyvale, California, on October 21, 2002. An independent consultant and researcher into semiconductor technology, he held 15 patents in the field and was widely published in technical journals and highly respected among his peers. After receiving his doctorate, he first joined the Institute of Applied Physics at the University of Basel in Switzerland, then returned as a research fellow to Caltech, where he contributed to the first demonstration of solid-state epitaxy. In 1972 he joined Texas Instruments, where he contributed to the development of CCD signal-processing technology and improved CMOS processes, then moved to Fairchild Semiconductor, where he continued to work on CCD memory processes. During a three-year stint at Intel, he was responsible for pseudostatic RAMs, then took over responsibility for the reliability of a wide range of memory products. In 1980 he joined Xicor, where, as

vice president, he initially founded the reliability and quality-assurance department, then assumed responsibility for technology development as well. During his tenure there he sequentially developed 2 μm , 1.2 μm and 0.8 μm technologies. His final corporate stint was in 1991 with Paradigm Technology, where he established the reliability and quality-assurance functions. In his spare time, John was an expert woodworker and ardent hiker. He is survived by his wife, Pamela; two daughters, Lisa and Carolyn; and a grandson, Evan.

1966

Robert Gordon, PhD, of Philadelphia, on June 23, 2001; he was 66. A mathematics professor at Temple University, he was noted for his work in abstract algebra and published and lectured widely. Besides mathematics, his enthusiasms included music, computers, and gardening. He is survived by Muriel, his wife of 37 years, and by his daughters, Justine Elisa Gordon and Stephanie Ftouh.

1967

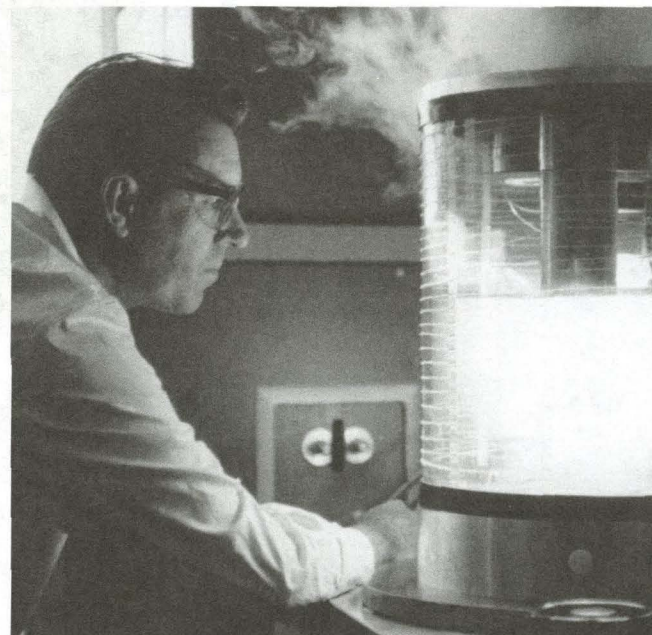
Ira Herskowitz, of Santa Rosa, California, on April 28; he was 56. A geneticist whose research into yeast cells is considered to have greatly influenced modern cell biology, he was also noted for his tongue-in-cheek folk songs satirizing scientific life. After receiving his PhD in microbiology from MIT in 1971, Herskowitz joined the faculty of the University of Oregon, where he worked with the yeast *Saccharomyces cerevisiae*, taking advantage of the organism's simplicity to explore basic questions of cell biology. He made several key discoveries, including how yeast cells could reshuffle their DNA to shift from one mating type to another (an example of "differentiation," the phenomenon of cells differing even though they contain the same genetic information); how genes are switched on and off at different stages of the organism's life cycle; and how yeast cells use hormones to communicate. At the time of his death his focus was on how genes affect the responses of human beings to drugs. A member of UC San Francisco's faculty since 1982, Herskowitz was the Hertzstein Professor of Genetics and codirector of UCSF's program in human genetics. He was also known as a generous mentor and a masterful lecturer. A former president of the Genetics Society of America (GSA) and a member of the National Academy of Sciences and the Institute of Medicine, Herskowitz received many honors, including the GSA's Thomas Hunt Morgan Award, a MacArthur Fellowship, and the 2003 Lewis S. Rosenstiel Award for Distinguished Work in Basic Medical Research. His love of music, meanwhile, led him to teach himself to play guitar and to perform songs at scientific meetings, including pastiches composed by him—such as "I've Been Working on the Genome" and "Nights in the Cold Room"—as well as "Double Talking Helix Blues," which was written by his identical twin brother, Joel, a Boston neurologist. Besides Joel, Herskowitz is survived by his parents, Reida and Irwin; a sister, Mara; and a brother, Alan.

1969

Frederick D. Elston, of Ormond Beach, Florida, on May 28, 2000; he was 53. The recipient of a PhD in physics from the University of South Carolina, he was a professor of physics for 20 years at Embry-Riddle Aeronautical University, Daytona Beach, Florida. He is survived by his mother, Rose; a brother, Charles; and a sister, Debra Paton.

GILBERT McCANN 1912–2003

Gilbert McCann '34, PhD '39, professor of applied science, emeritus, and one of the computer revolution's early pioneers, died on April 9 at the age of 91. Starting with the invention of the Institute's first analog computer in 1946, he was a driving force behind computing science at Caltech for more than 25 years.



Gilbert McCann in his Caltech lab in the 1950s.

A California native, McCann went to work for Westinghouse in Pittsburgh after receiving his Caltech doctorate. He initially studied natural lightning phenomena there, but soon became involved in war-related research. A technique that he devised for quickly doing complex engineering calculations that otherwise would have taken years became the basis of his analog computer. McCann used it to design a system to improve the tracking accuracy of anti-aircraft guns, and this system enabled the Allies to preemptively shoot down many of the V-1 "buzz bomb" rockets that the Nazis lobbed into Britain in the final months of World War II.

After the war, McCann returned to Caltech as an associate professor of electrical engineering and set up an analysis laboratory to make a larger, more sophisticated version of his analog computer (the Caltech Electric Analog Computer). Weighing in at 33,000 pounds, and a world-class instrument for its time, the computer was able to tackle an array of both civilian and defense-related aerospace problems—ranging from guided-missile analysis to the design of aircraft—that no machine had been able to tackle before. Aircraft companies throughout the United States and Europe lined up to use it, and the analysis lab was eventually spun off into a commercial company, Computer Engineering Associates.

Promoted to professor in 1947, McCann went on to investigate approaches to miniaturizing electronic components for computers. He also became keenly interested in the application of computer technology to biology, particularly the fundamental process of how the brain registers and interprets visual signals. Over the years he worked closely with Institute biologists to study the brains of houseflies, honeybees, fruit flies, earthworms, fish, and humans.

In 1966, McCann was named professor of applied science and appointed director of Caltech's new computing center, which became known as the Willis H. Booth Computing Center; he remained director until 1971. His later research involved applying combined X-ray and computer techniques to fields such as archaeology and locating brain tumors.

A fellow of the Institute of Electrical and Electronics Engineers and a member of several other technical societies, McCann received the Eta Kappa Nu Award for Outstanding Engineer in 1942. He was also a member of the Caltech Associates as well as the Pasadena Rotary Club and the Twilight Club.

After retiring to emeritus status in 1980, he continued to pursue his passions for raising Arabian horses and for gardening. Predeceased last year by his wife, Betty, McCann is survived by a daughter, Janice; a son, Norman; and a brother, Louis. The family requests that donations in his memory be sent to the Caltech Development Office 105-40, Pasadena 91125.

PICTURE PERFECT

The dense, green lawn of the Beckman Mall received its annual trampling on June 13, as most of the 490 students from the class of 2003 (shown on the back page poster) filed into their seats while the procession of faculty and dignitaries made their final approach to the stage. Making an unscheduled appearance at the podium that misty Friday morning was one of Caltech's resident campus squirrels, who seemed poised to address the audience before reconsidering and making a speedy exit. For more on Caltech's commencement and the actual commencement speaker, see p. 5.

