California Institute of Technology
Pasadena, California 91125

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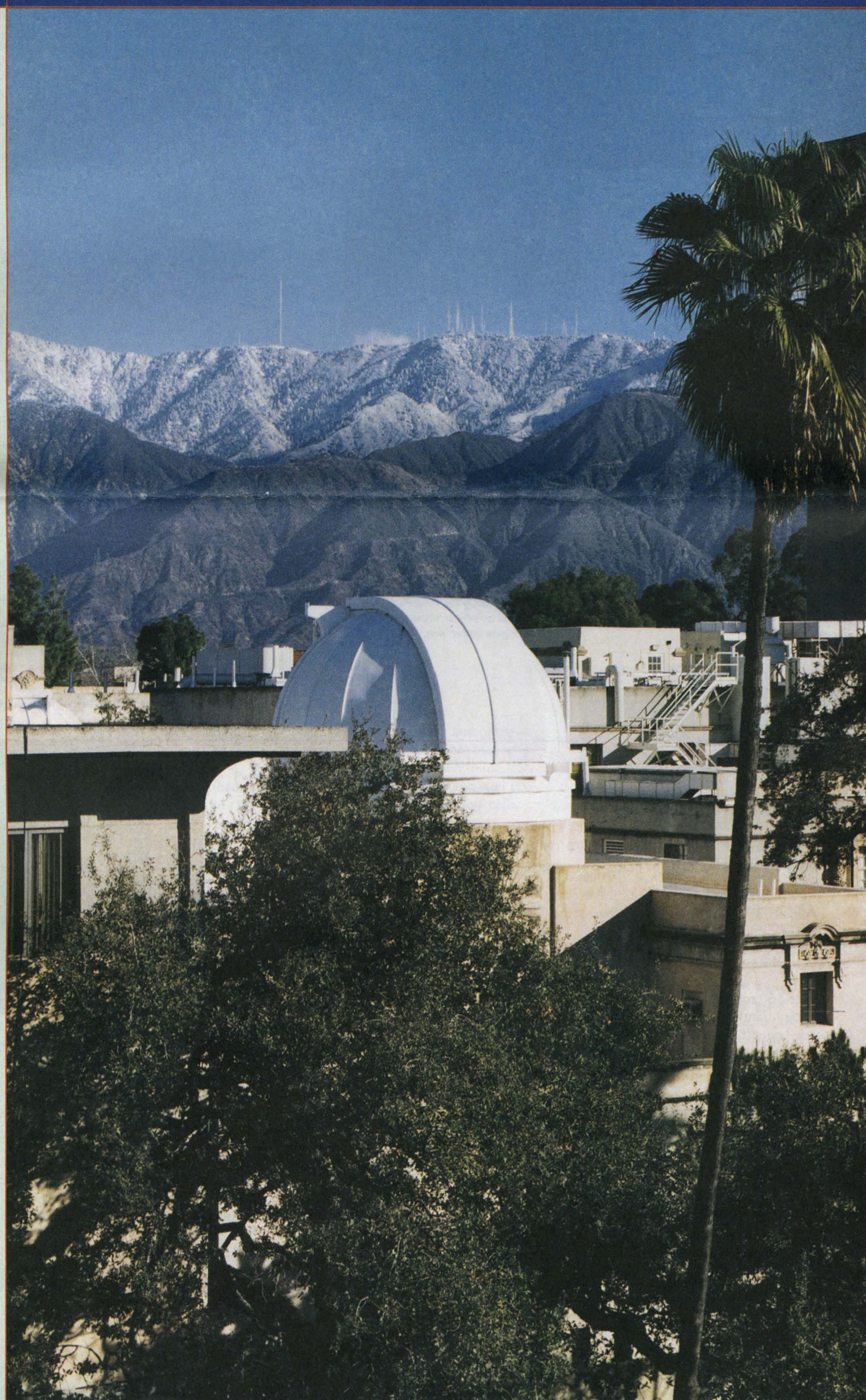
CaltechNews

Volume 33, Number 1
1999

In This Issue



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ON THE COVER: Ah, South California! Snowy peaks, lofty palms, and the white rise of the Robinson Laboratory dome greet returnees to campus as winter break ends and 1999 gets under way.

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Issued four times a year and published by the California Institute of Technology and the Alumni Association, 1200 East California Blvd., Pasadena, California 91125. Third class postage paid at Pasadena, California. *Postmaster: Send address changes to: Caltech News,* Caltech 1-71, Pasadena, CA 91125.

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Up Front

ESTATE OF ALUMNUS AND HIS WIFE AWARDS THE INSTITUTE $60 MILLION FOR STUDENT SUPPORT

The estate of Rea and Lela Axline awarded Caltech the largest single bequest from an individual donor in the Institute's history. The funds are designated for graduate and undergraduate student aid. Rea appears with Lela and in his 1931 Big T photo.

One of the largest-ever gifts in higher education for direct student support has been awarded to the Institute by the estate of Rea and Lela Axline.

The $60 million gift from the San Diego philanthropists is also the largest single bequest from an individual donor in Caltech's 108-year history. The Axline donation is one of three major gifts being announced by the estate, following the December 24 death of Lela Axline.

President David Baltimore says that the student-aid gift could make Caltech the foremost institution in the world in terms of providing educational support for future scientists and technologists.

"Providing sufficient graduate and undergraduate student aid to attract the very best students to Caltech is one of our greatest challenges," Baltimore said. "The Axlines' magnificent endowment for student aid will enable us to make great strides toward addressing these critical needs."

The late Rea and Lela Axline have long been known for their many charitable gifts to such institutions as the Museum of Contemporary Art in San Diego, Scripps Memorial Hospital in La Jolla, the Zoological Society of San Diego, as well as to Caltech. Rea Axline, who died in 1992, graduated from Caltech in 1931 and made his fortune with his process for coating metal alloys onto other metal objects.

Axline patented the coating procedure during the Depression, and the process became especially important after the outbreak of World War II, when the U.S. military began coating submarines, tanks, and other war vehicles. After the war, Axline cofounded Mountain Metallurgic, which was sold to Perkin-Elmer Corp. in 1971.

Lela Axline, who went by "Jackie," was both a teacher and a supporter of art for many decades. A graduate of UC Berkeley and Columbia University, she was a renowned painter whose abstract paintings received much critical attention in the 1950s. She also taught at the Staten Island Academy, and after moving to California with her husband, she became involved in the San Diego Museum of Art.

Through the years, the Axlines have provided other significant gifts to Caltech, including funds to establish the Axline Professorship, currently held by business economist Colin Camerer. Rea and Lela Axline were also life members of the Caltech President's Circle. Rea was a member of the Caltech Associates board of directors, a life member of the Alumni Association, and a member of the visiting committee in the Division of the Humanities and Social Sciences.

Alice Huang in the lab in the early 1970s and joined by her husband, David, and their daughter, Lauren "The Kid" Baltimore, in 1975.

"Don't work with Jonas Salk," said the hotshot virologist. "Work with me, and bring your own money."

Alice Huang: Keeping Science and Life in Focus

By Hillary Bhaskaran

Not all experiments end up the way you plan. Alice Huang, a scientist, wife, mother, educator, dean, and now Caltech's first lady and councilor for external relations, first set out to be a doctor.

Even before she moved from Kiangsi, China, to the United States at the age of nine, she had set her sights on the medical profession. "And my father didn't say I couldn't do it," Huang recalls. In fact, her father had unwittingly inspired her career interest.

Having been orphaned in Anhui, China, at the age of 12, Huang's father, Quentin K. Y. Huang, had been taken in by missionary John Shryock and educated at the University of Pennsylvania and Philadelphia Divinity School. He became a minister and later an Anglican bishop in China, where he married Huang's mother, Grace Betty Soong, the child of a large landholding family from Kiangsi Province.

Grace's life had also been influenced by missionaries. *Her* father felt that conversion was a small favor to grant the missionaries who had come so far to build schools and hospitals. So he allowed every other one of his children, including Grace, to be christened in the church rather than remain Buddhist.

Raised in this Christian family, Huang remembers that her father "would ruefully say, 'It seems if I had the chance to redo my life, I would save bodies and not souls.'

"That stuck," she says. After two years at Wellesley College, Huang enrolled in 1959 in a 2/5 program that brought her to the medical school at Johns Hopkins University. "College was expensive, and I was eager to get on with my life," she says. But along the way she got more interested in the research aspect of medicine and less interested in aspects requiring endless routine and strong stomachs. "I never minded blood," she says, but on the day someone was needed to deal with a drunk on the street who was in danger of gagging on his tongue, Huang found that "I didn't want to go touch him. I realized that's not a good thing for a physician to think."

Huang received a BA in human biology from Johns Hopkins in 1961 and went on to earn an MA and PhD in 1963 and 1966, both in microbiology. As a graduate student, she became an expert virology researcher, purifying and analyzing the components of the vesicular stomatitis virus (VSV), a disease that spreads quickly among cows and horses and causes severe blistering. Her original goal had been to use VSV to produce interferon, an antiviral protein, to better understand how cells fight viruses. But along the way, Huang discovered something more interesting.

While purifying the virus for her studies, she says, "I found two beautiful bands"—one containing long, bullet-shaped particles consisting of the fully infectious virus, and the other containing short bullets, consisting of something that looked like the virus but hadn't been identified. Huang set out to characterize these defective interfering (DI) viral particles and was the first to determine that they inhibit the growth and replication of standard VSV in a cell. This phenomenon has since been identified in almost all other viruses and is being explored for its potential to control viral development, especially in plants.

Enter the "hotshot virologist"

When Huang went to present her first paper at a conference in 1965, she happened to meet David Baltimore through a mutual friend. Then a postdoc at Albert Einstein College of Medicine, Baltimore "was already a well-known hotshot virologist at the time," says Huang. That was that, until Huang started looking for a postdoc position and was considering approaching Jonas Salk, the discoverer of the polio vaccine who had founded the Salk Institute for Biological Studies in San Diego, California. "I realized that David was in Renato Dulbecco's lab there, so I wrote to ask him what the situation was like in Salk's lab."

After gathering a reference on Huang, Baltimore gave the aspiring postdoc this advice: "Don't work with Jonas Salk. Work with me, and bring your own money." This was not the start of their romance, but Huang did decide to join Baltimore's lab in 1967.

Drawing on her VSV expertise, Huang and Baltimore were on the brink of understanding more intriguing processes at work in viral replication. But then "David was off to MIT" within a year of Huang's arrival at the Salk Institute. "I didn't want to go east again," says Huang, but colleagues advised her not to let a good project go. After relocating with Baltimore, she

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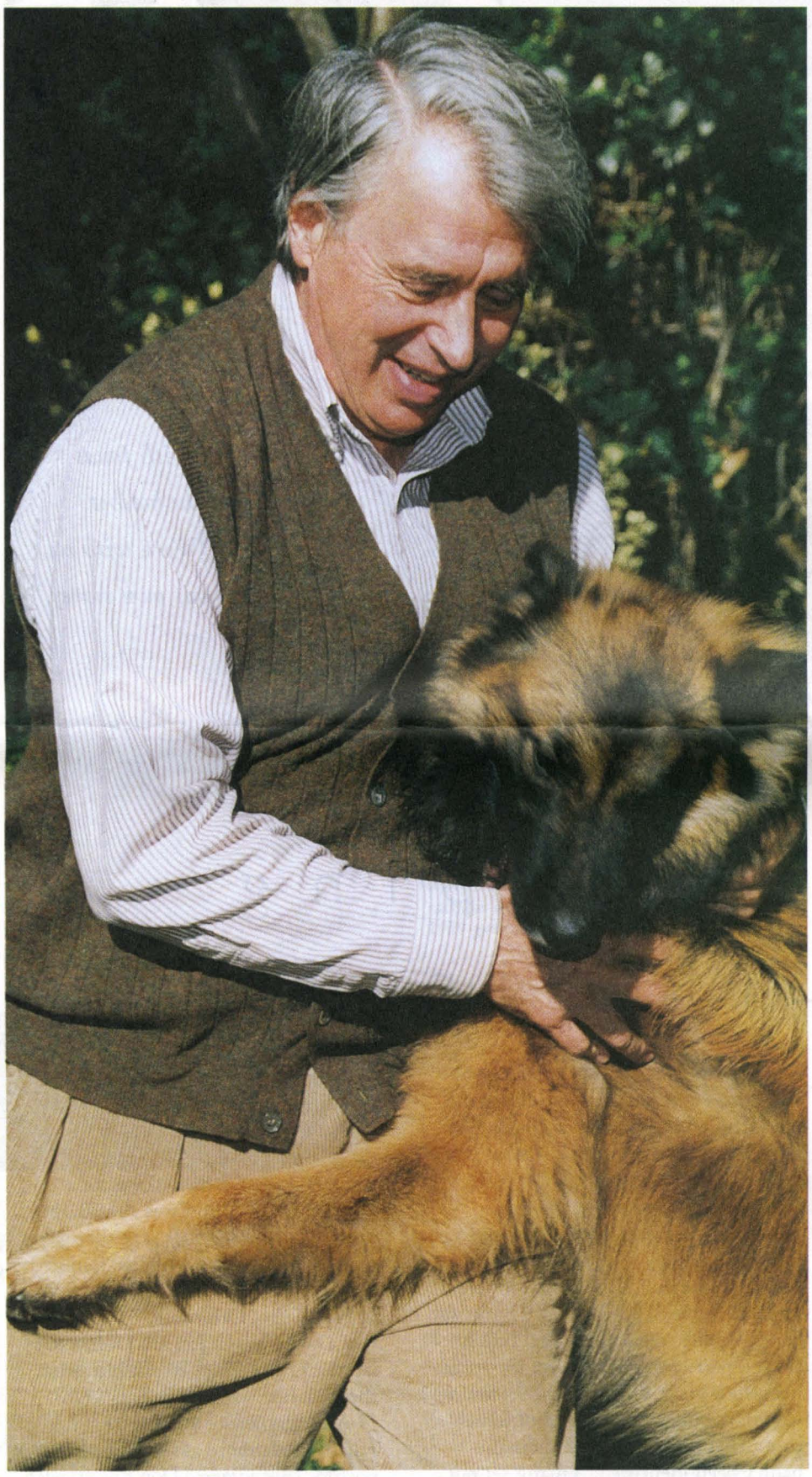


John and Harry: Biologist Allman bonds with his Belgian Sheepdog.

A DOG'S LIFE: SHEDDING NEW LIGHT ON THE ANCIENT ROLE OF MAN'S BEST FRIEND

When early humans first encountered wolves after leaving Africa 140,000 years ago, the two species may have established a partnership that allowed *Homo sapiens* to eventually dominate the entire world, a Caltech biologist says in a new book.

According to John Allman, the Hixon Professor of Psychobiology and professor of biology, recent DNA evidence from both modern dogs and humans suggests that the human departure from Africa occurred at roughly the same time as the domestication of wolves. Though his evidence is circumstantial, Allman writes in his new book *Evolving Brains* (published by Scientific American Library/W. H. Freeman) that the early partnership could have allowed *Homo sapiens* to displace the other competing hominids—the Neanderthals of Europe and *Homo erectus* of Southeast Asia—and proliferate throughout the habitable areas of the world.

"Several things came together," says Allman, who specializes in evolutionary biology. "Recently, Robert Wayne at UCLA has shown through mitochondrial DNA that dogs are basically domesticated wolves, and that their domestication occurred much earlier than previously thought—as much as 135,000 years ago.

"Other DNA evidence also shows that *Homo sapiens* first left Africa about 140,000 years ago," Allman adds. "And since there were no wolves in Africa and no modern humans in Eurasia before this time, I conjecture that the two species got together soon afterward and became remarkably successful hunting partners."

Allman notes that much of Europe was populated by the bigger, heartier Neanderthals when modern humans first left East Africa. The ancestors of Neanderthals also originated in Africa but migrated at a much earlier time, more than a million years ago.

But *Homo sapiens* and Neanderthals apparently were isolated during the next few hundred thousand years, until the former arrived from Africa.

Neanderthals in the meantime had evolved into heavier and more muscular creatures to deal with the harsher climate of Europe, but there is no evidence to suggest that they ever domesticated wolves. Nor is there evidence that Neanderthals ever bred with *Homo sapiens*.

Migrating even earlier from Africa were the hominids known as *Homo erectus*. These people departed from Africa about 2 million years ago, and like their close relatives, the Neanderthals, they continued to evolve when they reached their new habitats. But *Homo erectus* didn't do particularly well outside Africa, and by 140,000 B.C.E. was confined to Southeast Asia. And the possibility of *Homo erectus* domesticating wolves is a moot point, for wolves have never inhabited Southeast Asia.

Allman doesn't go so far as to suggest that the *Homo sapiens*-wolf partnership directly caused the extinction of Neanderthals and *Homo erectus*, but he nonetheless says that such a hunting collaboration would have made the two highly developed species an unbeatable combination. Thus, it could be that the partnership was a significant factor in making life more difficult for the other hominids, regardless of whether direct conflict occurred.

"Wolves and humans are two of the most geographically widespread and successful of all mammals," Allman says. "And wolves have a lot in common with early humans, especially in their tendency to prey on ungulates—that is, big meaty creatures with hooves—the stuff we humans and dogs still like to eat."

Too, wolves and early humans were virtually unique in their tendency to live in extended families, Allman says. In other words, all adult members of the social group participated in caring for offspring.

Even in the modern world, humans and wolves are two of the very few types of mammals that live in extended families in which the impetus exists to look out for the other fellow's welfare. Thus, it was easy for humans and domesticated wolves to accept each other as family/pack members.

As for the partnership itself, Allman says that humans got a good deal in that they were able to contend with the harsh climates of Eurasia after eons of balmy weather in Africa. Being a successful hunter of ungulates meant that humans had access to furs and skins for protection against whatever environments they found in their new habitats. And later, when humans took up agriculture, they again found they had a ready and willing ally to watch over the crops and domesticated livestock.

Allman thinks the DNA evidence for his hypothesis is persuasive, even though the notion of the collaboration could be falsified in several ways. For one, additional work on the DNA of modern dogs might show that the domestication of wolves occurred much sooner or much later than human migration from Africa into Asia.

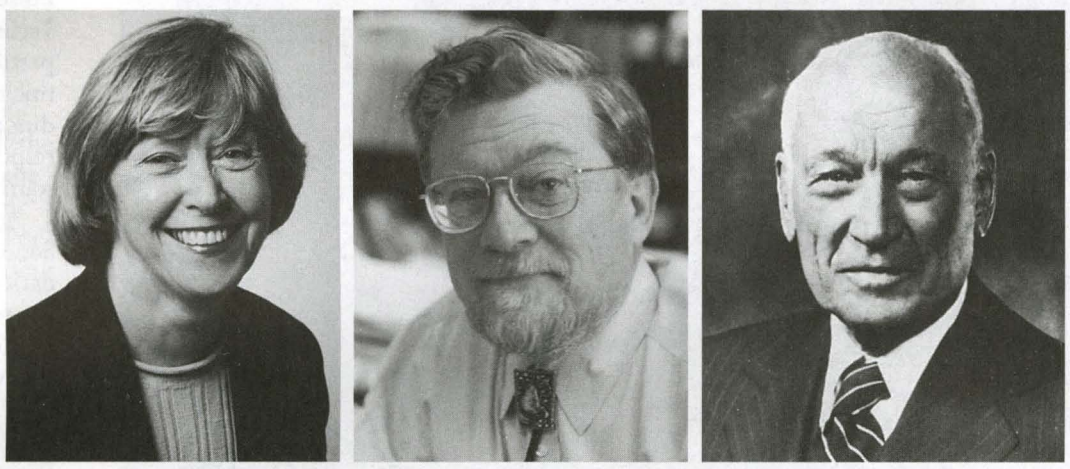
But new DNA work could also strengthen the hypothesis if it shows a more detailed timeline for domestication.

As for the archaeological evidence, any results showing that Neanderthals indeed domesticated dogs would be troublesome. But no such evidence has been uncovered so far.

On the other hand, Allman thinks the best endorsement of the hypothesis would come from new archaeological work in remote regions such as Siberia. The hypothesis would predict that the human alliance with dogs enabled humans to expand into these inhospitable areas and ultimately invade the New World. If evidence of domesticated wolves and dogs were found in *Homo sapiens* living sites some 20 to 50 thousand years old, then the argument would be stronger that humans indeed proliferated throughout the world with the cooperation of wolves.

ROBERT TINDOL

Two professors, one trustee honored with prestigious medals



From left, Caltech medalists Anneila Sargent, Don Anderson, and Arnold Beckman.

Caltech professors Don Anderson and Anneila Sargent, and Trustee Chair Emeritus Arnold Beckman—Institute alumni all—are the recipients of prestigious medals.

Anderson, PhD '62, the Institute's Eleanor and John R. McMillan Professor of Geophysics and a Crafoord Laureate, has been named a recipient of the National Medal of Science—the nation's highest scientific honor, which will be presented by the president later this year.

Anderson and his eight corecipients were cited for "their lifetime of passion, perseverance, and persistence to bring about new knowledge that extends the limits of their fields and drives our nation forward into a new century."

Anderson's specific achievements include leading contributions to understanding the composition, structure, and dynamics of Earth and Earth-like planets, and his influence on the advancement of earth sciences over the past three decades nationally and internationally.

Anneila Sargent, PhD '78, professor of astronomy and director of the Owens Valley Radio Observatory (OVRO), has received the NASA Public Service Medal, the highest award given by NASA to non-NASA people.

Sargent, who was honored late last year, was awarded the medal "in recognition of [her] leadership, dedication, and commitment to NASA as a member of the NASA Advisory Council and as Chair of the Space Science Advisory Committee." Sargent served in these capacities from 1994 to 1998.

Today, Sargent is continuing her studies of the origins of stars and planets at both OVRO and the W. M. Keck Observatory in Mauna Kea, Hawaii.

Life Trustee Arnold Beckman, PhD '28, has been named by the National Academy of Sciences (NAS) as the recipient of the NAS's most prestigious award, the Public Welfare Medal. Beckman was chosen for his leadership in developing analytical instrumentation and for his deep and abiding concern for the vitality of the nation's scientific enterprise.

In the words of Peter Raven, NAS home secretary and chair of the selection committee, "His inventions and philanthropy have contributed to the progress of humankind for most of this century."

Established in 1914, the Public Welfare Medal is presented annually to honor extraordinary use of science for the public good. Previous recipients include Vannevar Bush, C. Everett Koop, and Carl Sagan.

Linus Pauling exhibit opens on campus for Alumni Seminar Day

This spring, Caltech will once again showcase the efforts of one of the most renowned scientists and peace activists of the 20th century: Linus Pauling.

Pauling, who received his PhD in chemistry from the Institute in 1925, and who taught at Caltech for more than 35 years, will be celebrated in an exhibit entitled "Linus Pauling and the Twentieth Century." The display, commemorating the nine decades of Pauling's life, will open in Winnett Center on May 15, the weekend of Alumni Seminar Day.

The only person ever to have won two unshared Nobel Prizes (chemistry in 1954, peace in 1962), Pauling led a life rich in brilliant and varied achievement. These included discovering the nature of the chemical bond; determining the alpha helical structure of the protein molecule; identifying the molecular basis of sickle-cell anemia; advancing the fields of X-ray crystallography, electron diffraction, quantum mechanics, biochemistry, molecular psychiatry, nuclear physics, anesthesia, immunology, and nutrition; and helping to organize the world's scientists to oppose nuclear proliferation and atmospheric testing of nuclear weapons.

The touring exhibit, which opened

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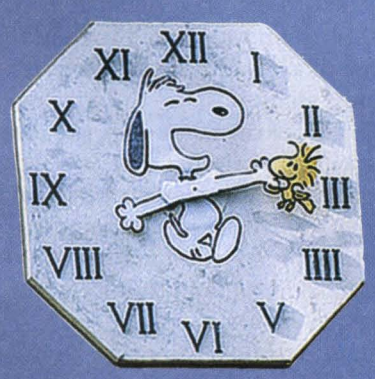

Snoopy and Woodstock get ready to usher in the new millennium—whenever it arrives. Originally part of a Ditch Day stunt, this clock adorned the outside facade of Caltech's Kellogg Radiation Laboratory for many years, before being taken down during a building renovation.

Does anybody *really* know what time it is?

How do we determine when the next millennium truly begins

Now that we've reached the year 1999 on the Gregorian calendar, millennium mania is in full swing. But in order to properly label the mania as millennial, one must first answer the question: Is January 1, 2000, the first day of the last year of the 20th century, or the first day of the 21st century? Caltech's Office of Media Relations sought out the help of Kevin Knox, Ahmanson Postdoctoral Instructor in History, to answer this timely question.

According to such august authorities as the United States Naval Observatory, the final day of the 20th century is December 31, 2000.

Those who argue that January 1, 2001, must be the beginning of the third millennium do so on the grounds that there is no such thing as AD 0. The astronomer Dionysius Exiguus, who devised the Christian calendar in the sixth century, went directly from 1 BC to AD 1. The probable reason that Dionysius did so is that the number zero had yet to be introduced into the Western world from India: at the time, astronomers and others suffered through calculations using Roman numerals.

For this reason, advocates of 2001 contend that since the calendar began at AD 1, and since a millennium is 1,000 years, all millennia begin with a year one.

Yet this declaration can be challenged. Some maintain that the true millennium has already come to pass, arguing that we now know that early Christian mathematicians miscalculated the birth of Jesus. Since Christ was most likely born around 4 BC, the second millennium should have ended in 1997.

The decision of when to celebrate the new millennium is perhaps best described as an aesthetic choice. The length of one year—that is, the time that it takes the earth to complete its orbit around the sun—is subject to extremely precise astronomical measurements. But deciding from when to count those years is, ultimately, arbitrary.

It seems that most people will celebrate the advent of the new millennium on December 31, 1999. Those who insist on adhering to the guidelines of the United States Naval Observatory will probably be in the minority. However, given the predicted shortage of champagne for the end of this year, anyone who waits until 2001 will probably find it easier to secure sufficient quantities of bubbly to make it a festive affair.

JUST GOOD FRIENDS — **Seymour Benzer with a favorite model in the 1970s. The Institute's James G. Boswell Professor of Neuroscience, Emeritus, was awarded the Crafoord Medal by the Royal Swedish Academy of Sciences in 1993 in recognition of his pioneering work in illuminating the relationship between genes and behavior in *Drosophila*.**

FORWARD TO METHUSELAH: MUTATED GENE RETARDS AGING IN FRUIT FLIES

Institute biologists have discovered a gene that increases the life span of fruit flies by one-third when mutated. Coined the "Methuselah gene," after the biblical character in Genesis who lived for 969 years, the gene's discovery was announced late last year in the journal *Science*.

According to the authors, Postdoctoral Research Fellows Yi-Jyun Lin and Laurent Seroude, and Boswell Professor of Neuroscience, Emeritus, Seymour Benzer, who led the group, the research strengthens the view that such a gene or genes might also be found in humans. The work also lends additional credence to the view that the wear and tear of aging can be exacerbated by molecular stresses, such as tissue-damaging free radicals.

"If we mutate the gene, which we can do experimentally, the fruit flies have an increase in life span," says Benzer, who has won the Crafoord Prize of the Royal Swedish Academy of Sciences for his work on the relationship of genes to behavior in the fruit fly *Drosophila melanogaster*. "If we take the gene mutation out again, the life span goes back to normal."

This is not the first time a gene has been found that affects an organism's life span, Benzer says, explaining that the roundworm *Caenorhabditis elegans* can also be given a longer life in the lab through genetic manipulation.

Nor is this the first time that scientists have demonstrated that the life spans of fruit flies are genetically determined. However, the earlier work on *Drosophila* has focused on selective breeding. That is, individual animals that live longer are bred together over many generations to produce a strain with longer life. In selective breeding, even though the effects are obviously genetic in nature, it is difficult to identify precisely which genes control aging and life span.

In contrast, when an individual gene is identified as important to aging, the implications are a promise of eventually being able to manipulate the aging process. The gene can be cloned by molecular methods and its specific function studied.

"Very often indeed, fruit fly genes have human homologues," Benzer says. "The basic idea of our research is to use the fruit fly as a model system and look for human equivalents."

"Now it's inescapable that aging is regulated deliberately by genes," said UC San Francisco molecular geneticist Cynthia Kenyon in a *Science* news brief describing the Benzer group's results. "Since it happens in both worms and fruit flies, you have to be crazy not to think it won't happen in vertebrates."

The Caltech team singled out the Methuselah gene by manipulating a small, transposable piece of DNA that can cause mutations at the gene in which it lands.

The researchers then tracked the mutated flies to their natural deaths. *Drosophila* normally live about 60 to 80 days, but the flies with a mutation at the Methuselah gene lived more than 100 days. These flies were also better able to resist various types of stress that can cause aging in flies or kill them outright.

From the identified sequence of the Methuselah gene DNA, the scientists speculate that it may code for a protein that is part of a signaling pathway that controls how well cells deal with stress. This would explain the fact that the flies with a Methuselah gene mutation can better withstand such external stresses as food deprivation, excessive heat, and exposure to oxidative damage.

Kenyon, who identified the daf-2 gene that increases longevity in roundworms, said in the news review that the Benzer lab results give experts in the field another gene to work with.

"Now," she says, "we have another experimental system to investigate" for understanding how a gene or several genes can affect an organism's life span.

SOUTHERN CALIFORNIA EDISON JOINS CALTECH IN SEISMIC PROGRAM

On January 15, the eve of the fifth anniversary of the devastating Northridge earthquake, Southern California Edison and the California Institute of Technology announced the utility's participation in a state-of-the-art seismic measuring network that will expedite power restoration and emergency response after a major temblor in the southland.

An Edison International company, Southern California Edison is the nation's second largest investor-owned electric utility, serving more than 11 million people in a 50,000-square-mile area within central, coastal, and Southern California.

As a participant in the TriNet Project, SCE will use a portion of its system of nearly 900 electrical substations to augment TriNet's growing network. Seismic sensoring devices, installed at selected substations, will be linked directly to TriNet through SCE's extensive communications net-

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INDUSTRIAL RELATIONS CENTER SPONSORS YOUNG EXECUTIVES

Caltech's Industrial Relations Center (IRC), a nationally prominent center for executive education, is providing two new fellowships to the Division of the Humanities and Social Sciences.

The fellowships will be awarded to graduate and postdoctoral scholars in the social sciences who have interests in business strategy, industrial organization design, management, and related subjects. The H&SS division's PhD program was ranked sixth in the nation in a recent National Research Council study.

As part of the fellowship, the recipients will take selected courses—such as strategy, technology management, organizational and process improvement, and product innovation—at the IRC in addition to pursuing research in management areas.

John Ledyard, chair of the Division of the Humanities and Social Sciences, characterizes the arrangement as an excellent means of increasing the intellectual interaction between the division and the center's programs. IRC Director Nick Nichols calls the fellowships important vehicles for bringing more industrial perspective to student research and for potentially enriching the executive course curriculum.

For 1998–99 the graduate fellowship has been awarded to Anthony Kwasnica, and the postdoctoral fellowship to Julian Jamison from MIT, who earned both a BS and MS in mathematics from Caltech.

Apollo's Odyssey

The latest on Caltech's (favorite?) piece of moving art

Having completed his eventful migration to the southwest corner of campus, Apollo Belvedere once again stands tall amid his many admirers. He enjoyed a hearty dedication ceremony on February 1 as campus community members filled the lobby of the Braun Athletic Center to celebrate the statue's new home there and to honor his 89-year tenure at the Institute. For the scoop on Apollo's history, including his adventures through Caltech's Throop Hall, Dabney Gardens, steam tunnels, and storage facilities, see the previous issue of *Caltech News*.

It seems that "life" has rarely been easy for the Greek god. Even with various appendages recently reconstructed by an art conservator, Apollo's path to glory continues to be paved with slippery stones. His latest encounter was with a wayward forklift during his installation in Braun. On January 29, just after the 1500-pound Carrara marble statue was set upright on the lobby floor, the lift's metal bar slipped down and hit Apollo, leaving him with a chip on his shoulder (as one punster noted). Fortunately no humans were hurt, and, according to art conservator John Griswold, who spoke at the ceremony, such damage can be repaired on site and is minor, especially in comparison to Apollo's past afflictions.

Once in place on his three-foot pedestal, towering ten feet above the crowd, Apollo received nothing but the praise and attention befitting a god of sunlight, prophecy, music, and healing. Robert Rosenstone, history professor and chair of Caltech's art committee, recounted the story of what he termed Apollo's "resurrection." A handful of concerned employees had rescued a

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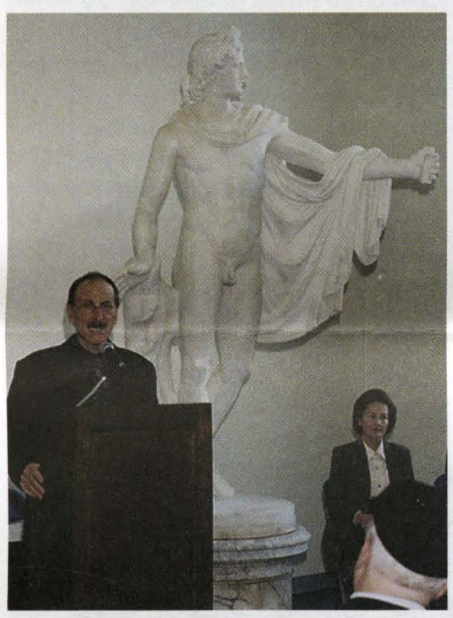

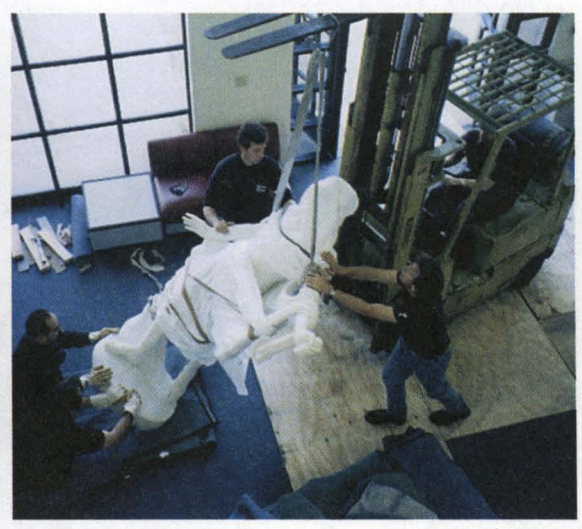

Apollo makes the rounds (clockwise from top right): The digitally challenged yet otherwise intact Greek god is removed from his first Caltech home in 1972 to prepare for Throop Hall's demolition; after serving time in Dabney Gardens, steam tunnels, and storage rooms, he is "resurrected" in the Braun Athletic Center, appearing cloaked with his conservator and decloaked for the dedication led by Robert Rosenstone. Attendees get a good look during the February 1 ceremony.

Honors and Awards

Professor of Chemistry *Jesse Beauchamp* '64 has been chosen as the 1999 recipient of the American Chemical Society's Peter Debye Award in Physical Chemistry, which is sponsored by DuPont.

John Bercaw, the Centennial Professor of Chemistry, will be the recipient of the American Chemical Society's 1999 George A. Olah Award in Hydrocarbon or Petroleum Chemistry.

Roger Blandford, the Richard Chace Tolman Professor of Theoretical Astrophysics, has received the Danni Heineman Prize for Astrophysics, which is awarded jointly by the American Institute of Physics and the American Astronomical Society for "outstanding work in the field of astrophysics."

Peter Dervan, the Bren Professor of Chemistry and chair of the Division of Chemistry and Chemical Engineering, has received a trio of honors. He was named the recipient of the 1998 John Gamble Kirkwood Award from the New Haven Section of the American Chemical Society, and the Yale University Chemistry Department, for "his outstanding contributions in the field of chemistry." He has also been selected to receive the 1997 Remsen Award from the Maryland Section of the American Chemical Society and will, in addition, receive the society's 1999 Alfred Bader Award in Bioinorganic or Bioorganic Chemistry.

Morteza Gharib, PhD '83, professor of aeronautics, has been elected a fellow of the American Physical Society "for his innovative experimental techniques, such as digital particle-image velocimetry and soap film tunnel, and for his fundamental contributions to the study of vorticity dynamics in wakes, free-surface and cardiac flows." Gharib has also been named a Sackler Scholar by the University of Tel Aviv's Institute of Advanced Studies. The Sackler Scholars are chosen for eminence in their respective fields of study.

Petr Horava, Sherman Fairchild Senior Research Fellow in Physics, has been awarded a Junior Prize of the Learned Society of the Czech Republic for outstanding research in theoretical physics.

Professor of Chemistry *Barbara Imperiali* has been awarded the 1998 Richard P. Feynman Prize for Excellence in Teaching, which is awarded annually "to a professor who demonstrates, in the broadest sense, unusual ability, creativity, and innovation in undergraduate and graduate classroom and laboratory teaching." According to the award citation, Professor Imperiali "excels at every level, as a lively lecturer in introductory and upper level chemistry courses and as an inspirational mentor for research students. . . . Students describe her in glowing, admiring terms: 'She is dynamic and intense, and it is impossible not to be drawn into the subject matter by someone who is so obviously excited by the material.' Outside class, Professor Imperiali consistently expresses her concern for the welfare of her students and her respect for them as individuals."

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Stalking Caltech's Wild Winged Set

Alan Cummings, PhD '73, stands stock still, straining to hear the call that will give a name to the nervous rustling in the bush several yards away. Suddenly his frozen stance relaxes. It is an Anna's Hummingbird, not the rarer Rufus-sided Towhee that sometimes appears at the brushy borders of the campus's southeastern edge, near the Health Center. He pauses to record the sighting in his little notebook, then presses on. The lunch hour is short, and the birds, even in the heart of Pasadena, are many.

Cummings, who has worked as a cosmic ray data analyst in Caltech's Space Radiation Lab since receiving his doctorate in physics, has trod the pathways in and around the campus since 1986 as the focal point of a weekly birdwatching walk. "I have 450 species on my lifetime list," he says. Consider that there are 750 species of birds in the United States and you have a hint of the challenge that drives birders to go as far as Alaska's Aleutian Islands in search of strays from Japan to add to their list of North American sightings.

But while he always packs his binoculars and notepad when traveling, Cummings, whose primary work at Caltech is analyzing Voyager cosmic ray data, finds plenty to analyze in the trees, bushes, and fields of Caltech. Since 1986 he has kept careful records, creating a database of Caltech birds and their habits. Along with notations on sightings and frequency, Cummings's database reveals trends that mirror developments in the outside world. His records indicate, for instance, that aggressive crows are crowding out the gentle spotted dove, and that the Institute's increasingly built-up campus is proving progressively less hospitable for certain species of birds. "The campus is prettier now, and I like it," Cummings says. "But there are fewer birds."

Apart from the opportunities they offer for scientific observation, the campus's winged creatures provide a rich mix of history, mystery, and drama. Red-crowned parrots and canary-winged parakeets—the descendants of South American birds imported by smugglers and other entrepreneurs—are an exotic reminder of the species' odyssey from tropical climes to incarceration to freedom. Then there are the true riddles: why are the Costa hummingbirds that abound in the Huntington Gardens a few blocks away never seen at Caltech, while their Huntington colleagues, the red-whiskered bulbuls, are a common sight on campus?

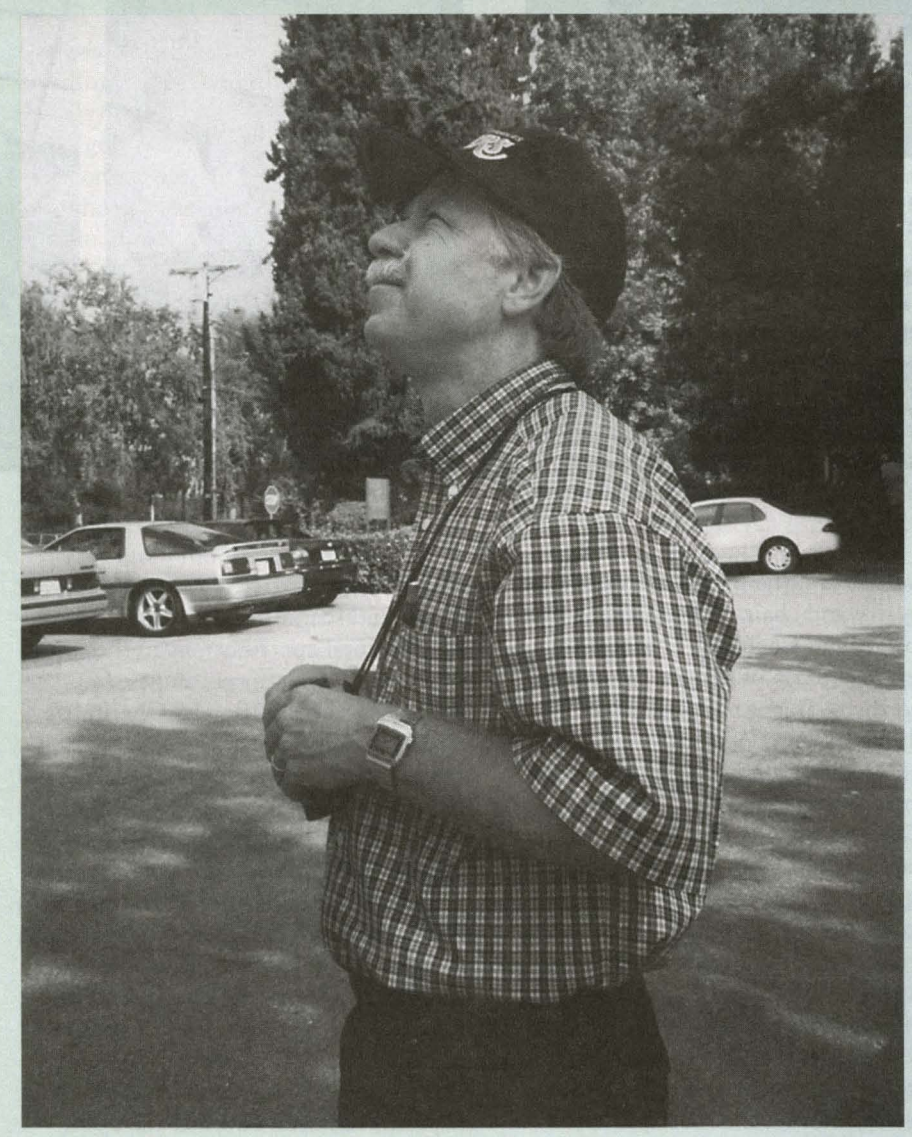
And, for a seemingly serene pastime, birdwatching is not without its moments of primal intensity. Cummings recalls witnessing an aerial combat between two hummingbirds near the Health Center that ended with the victor stabbing its opponent to death. Hawks successfully diving for prey are another common sight.

But in this intimate world, nothing is truly routine. "Birds referred to as 'common' are usually not," says Cummings, who was particularly excited on a recent walk to spy a squadron of western bluebirds on the telephone wires above the Caltech track. One or two species new to the campus appear every year, he says, and occasionally he and his birding companions will hit the visual jackpot when a great blue heron swoops down upon the fish and frogs in the lily pond near Baxter Hall for lunch, or a snowy egret makes a similar stop.

Still, the pleasure of the weekly tour usually rests on the simple greeting of feathered familiars like the goldfinches and cedar waxwings that start returning to the campus in autumn after the summer heat wanes. The number of species sighted weekly on campus increases slowly through the fall and winter and reaches its peak in February or March, when as many as 28 species may be spotted in an hour's walk.

On a recent walk, Cummings listens carefully for an identifying call. Over the drone of leaf blowers and the thrum of car engines, he makes a shishing sound to encourage the unidentified creature rustling the leaves of a densely blooming Brazilian silk-floss tree to speak. "I'm afraid it's a ruby-crowned kinglet," he says regretfully. Perhaps he is disappointed because he had hoped for a rarer specimen, or perhaps he is sad because the hour has, all too quickly, come to an end.

MARCY DREXLER



"Birds referred to as 'common' are usually not," says cosmic ray physicist Alan Cummings, PhD '73, who occasionally spots an uncommon species on campus. For a look at one of his recent sightings, check out this issue's back-page poster.

HHMI GRANTS THE INSTITUTE $2 MILLION FOR UNDERGRADUATE BIOLOGICAL SCIENCES

The Howard Hughes Medical Institute has awarded $2 million to Caltech to support undergraduate programs in the biological sciences.The four-year grant is earmarked for support of student research, development of teaching laboratories and computer-based curricula, and outreach activities for students and teachers from the Pasadena school district.

Among the existing programs Caltech will support with the grant money is the Summer Undergraduate Research Fellowships (SURF) program, which for 20 years has offered undergraduates the opportunity to spend 10 weeks during the summer working on real research projects. The HHMI funds will be used for SURF stipends in the biological and chemical sciences, particularly for women and minority students.

HHMI funds will also be used for the Minority Undergraduate Research Fellowships (MURF) program, which was created in 1991 and has been supported by HHMI since 1992. This program is directed toward giving gifted underrepresented minority undergraduate students from other universities a summer of research on the Caltech campus.

Another program to be supported by the new funding is the Teaching and Interdisciplinary Education (TIDE) program, which brings faculty and students together to develop innovative teaching tools for coursework. The HHMI funds will provide support for five students to work directly with faculty.

Caltech's $2 million award this year is one of 58 HHMI awards going to American colleges and universities for undergraduate programs in the biological sciences. Begun in 1988, the program's awards this year will total $91.1 million.

According to Purnell Chippin, president of the Howard Hughes Medical Institute, the grants program "is having a major impact on how biology and related disciplines are taught at the college level."

Caltech receives major grant from Kenneth T. and Eileen L. Norris Foundation to Support Joint MD/PhD Program

The Kenneth T. and Eileen L. Norris Foundation has awarded the Institute $630,000 to support a joint MD/PhD program with the University of Southern California.

The grant will establish the Norris Foundation MD/PhD Scholars Fund, which will support Caltech PhD candidates from the University of Southern California medical school in the groundbreaking program. The joint MD/PhD program will allow both schools to attract the nation's best graduate students interested in medically related research. It will also enhance the Caltech scientific community by attracting students who have a substantial knowledge of human physiology and disease, and will contribute to society by producing researchers whose discoveries will directly impact and improve human health.

Administered by Caltech in cooperation with USC, the program will accept two students each year. Students will spend their first two years in medical school, taking preclinical science courses, with summers spent at Caltech gaining exposure to the academic research environment. They will then come to Caltech, spending three to five years on their PhDs before returning to their medical school for the final two clinical years.

The program will allow students to take advantage of Caltech's numerous strengths, including its world-class neuroscience group, its top-ranked chemistry and chemical engineering division, and its innovative programs in engineering and in computer and applied science. Caltech's atmosphere of interdisciplinary research, in which scientists from different divisions trade ideas on a regular basis, is also a feature that MD/PhD students will not find elsewhere.

The first two USC students are already at Caltech, having completed their two preclinical years at the medical school. One is working with Professor Paul Sternberg, a molecular biologist who is studying genes that control behavior during cell development, a subject that has significant implications for cancer treatment. The second student will be working with Professor Morteza Gharib, who is an aeronautical engineer. Gharib has established the Cardiovascular Fluid Dynamics Research Laboratory, an interdisciplinary environment for studying blood flow that may lead to the development of better heart valves and coronary artery prostheses.

The Kenneth T. and Eileen L. Norris Foundation was established in 1963 by the late Kenneth T. Norris, the founder of Norris Industries, and his late wife, Eileen L. Norris. Since its inception, the foundation has extended support to a wide variety of cultural, medical, civic, and educational projects in California. Today the Norris Foundation continues to allocate a large portion of its resources to medicine and education but encompasses a broader agenda—one that also includes community and

From left, the members of the Associates Executive Committee for 1999 include President Carel Otte '50, PhD '54; Past President Ilene Marshall; Secretary Janet Rogers; and Vice President Robert Roney, PhD '50. Not pictured are Vice President Tom Tyson '54, PhD '67; and Treasurer Gregory Jenkins.

Associate Mary Johnson gives the Athenaeum a lift

When the Athenaeum first opened its doors in 1930, J. Stanley Johnson was beginning his studies at Caltech. Within a couple of years he would meet and later marry a Scripps student named Mary, who would share her husband's passion for Caltech and continue her association with the Institute after Stan's death in 1994.

Having moved away from Pasadena, Mary Johnson stays at the Athenaeum when visiting campus for such events as meetings of the Associates board, on which she serves. "I love staying at the Ath when I'm in town," she says.

She adds that she still tackles the steep, circular stairway that leads to the guest rooms, but she has recognized the need for a guest elevator as she watches people carry heavy suitcases up and down stairs, and as she advances in age. When she found out that an elevator was on the Athenaeum's wish list as well, she donated funds for construction.

The guest elevator will run from the southeast corner of the Rathskeller Game Room on the lower floor, through the rear of the current lobby reception desk on the main floor, up to the current linen storage room on the second floor, where 28 rooms serve

Mary Johnson, during a recent visit to campus.

Athenaeum members and Caltech guests. A service elevator will continue to run through the kitchen on the north side of the Ath. The first phase of construction got under way this winter, and the guest elevator is expected to be completed by early October, according to Athenaeum Manager Charles Alpers.

"This is something that has been desired for a long time but is an expensive proposition in an old building built with solid concrete beams and trusses," says Professor of Geology and Dean of Graduate Studies Arden Albee, who chairs the Athenaeum House Committee. "It's a magnificent addition to the Athenaeum because it will make the rooms accessible to people with disabilities and to people bringing bags upstairs."

Associates Activities

April 20–24, *President's Circle Trip to Hawaii*—with Professor of Geology Jason Saleeby; Professor of Astronomy and Director of Owens Valley Radio Observatory Annelia Sargent, PhD '78; and Bowen Professor of Astronomy and Director of Palomar Observatory Wallace Sargent.

April 27, *Associates Dinner and Program*—"Materials Simulations at Caltech: Industrial Collaborations and Basic Research from Auto Wear Inhibitors to Cancer Radioimmunotherapy," with William Goddard, PhD '65, Ferkel Professor of Chemistry and Applied Physics.

May 1, *Northern California Dinner and Program at the Fairmont Hotel, San Jose*—"Micromachine Research at Caltech," with Yu-Chong Tai, associate professor of electrical engineering.

May 10, *President's Circle Tour of the Hale Solar Observatory at the home of Associates Jack and Christine Shirley, followed by dinner and program at the Athenaeum*—"Hale to the Stars," with Judith Goodstein, University archivist and faculty associate in history.

June 5, *President's Circle Garden Party at the home of David Baltimore and Alice Huang.*

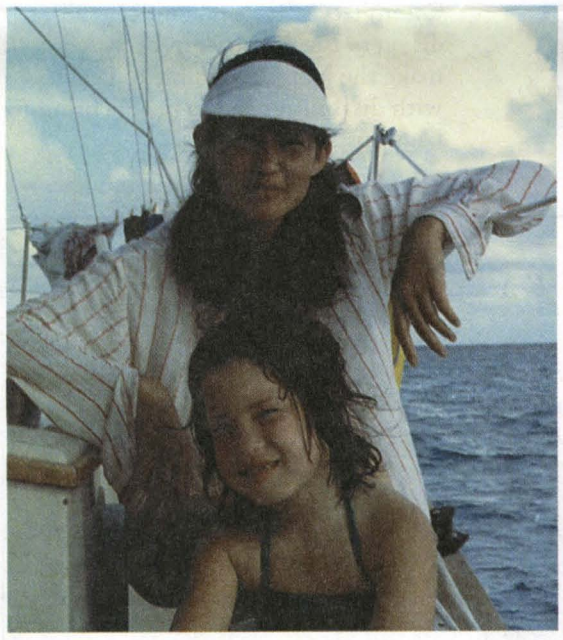
June 15, *Associates Tour, Dinner, and Program at the Jet Propulsion Laboratory.*

June 22-July 3, *President's Circle Trip to Italy*, with Professor of Physics Charles Peck, PhD '64, and Associate Professor of History Alison Winter.

July 28, *Associates Board of Directors Meeting,* with Hans Hornung, Johnson Professor of Aeronautics and director of the Graduate Aeronautical Laboratories.

September 19–24, *President's Circle Return Trip to the Grand Tetons*, with Clarence Allen, PhD '54, professor of geology and geophysics, emeritus.

Alice Huang . . . from page 3



Huang sits with her mother in China in 1948 (top photo) and sails with her daughter in the late 70s (bottom photo). In 1998, she meets freshmen at a reception in the garden of the president's house (righthand photo).

adds, "we got to know each other a lot better." They were married after nine months at MIT, in 1968.

Getting back to viral replication, Huang, Baltimore, and graduate student Martha Stampfer found that VSV entered a host cell as a single *negative* strand of RNA. They knew that a smaller, complementary *positive* strand of RNA was capable of making an enzyme that facilitated the transcription and replication of more RNA. But the incoming negative strand of the virus was not capable of making this enzyme, known as RNA polymerase. This led the team to wonder how the VSV infection could get started since transcription was the very first step. They found that VSV brought its own RNA polymerase into the cell along with the negative RNA strand in order to start the process.

Baltimore would soon discover another distinct class of viruses that bring companion enzymes into a cell, much like VSV with its polymerase tagalong. But this newly discovered enzyme, later named reverse transcriptase, allowed the virus in question to turn viral RNA strands into viral DNA strands. The viruses that fall into this category, later dubbed retroviruses, include HIV, the virus responsible for AIDS.

Where was Huang when her husband, David Baltimore, was taking their early RNA research to a level that would soon win him a Nobel Prize? "I was job hunting," she says. "I called him after giving a seminar at Boston University, and he said, 'It's 50 counts over background,'" referring to the presence of the then-unnamed reverse transcriptase. "'I think it's real.'"

"It was time to get my own job"

Huang learned more than science during her postdoc at MIT. "It was the late sixties, and we realized that women had opportunities. Staying in someone else's lab [could be problematic], especially if you had good ideas and wanted to work on your own." At least one highly respected MIT scientist who had remained in a subordinate research associate position discovered the drawbacks.

"Anna Marie Torriani-Gorini was internationally known. Students and postdocs vied to work with her," says Huang. Content to remain a research associate at MIT, she relied on her affiliation with a professor to support her research team. But when her professor left MIT, Torriani-Gorini was not only ineligible to host students and postdocs, but she also couldn't get grants in her own name. Huang supported her colleague's belated fight to be made a professor, a request later granted to the 55-year-old scientist.

Torriani-Gorini's experience "affected a whole generation of young women in the biological sciences," says Huang. "Women realized this was not the route to go, where you tied your future to someone else's star, perhaps moving your whole family around" to follow that person. Huang realized that "if something happened to David or if we were divorced," she could find herself in a similar situation to that of her colleague.

So she chose a different path, making a name for herself over the next two decades as she climbed the professorial ladder at Harvard Medical School. And she always kept another female mentor's advice in mind.

During her early days at Harvard, Huang visited Polly Bunting, a Johns Hopkins graduate who had become president of Radcliffe College. Bunting urged Huang to "really focus on your career and publish, get tenure and become a professor, and don't get sidetracked by all the committees they'll try to put you on because they want a woman. But once you become a professor, don't forget you're still a woman."

Indeed, says Huang, "I've seen people who have lost their femininity and feminine instincts." Bunting also suggested that Huang keep a shoe box of names of interesting women in science so that when people say "'There's not anyone good I can hire,' you can throw it in their faces." Huang has kept track of people and says, "I've certainly referred a lot of women to jobs."

Once established as a professor of microbiology and molecular genetics, Huang says, "I thought I'd be at Harvard for the rest of my life." But by 1990 Baltimore was off to New York, where he'd been named president of Rockefeller University, and Huang was offered a position as dean for science at New York University. Not knowing whether she'd like full-time administration, she took the job on the condition that she could continue her research while at NYU. It was during this time that she often wondered how much one person could take on, and she learned how to delegate and let go of things (including the research dimension of her job by 1995).

In the world of administration, Huang had already served as a director of the Laboratories of Infectious Diseases at Children's Hospital in Boston. While there, she was the first to demonstrate that HIV, like other enveloped viruses, can alter the proteins of its surrounding membrane or envelope by incorporating those from another virus in order to fool host cells into thinking (chemically speaking) that it is not HIV.

As Huang settled down and set her priorities in New York, Baltimore found himself heading back to MIT after a tumultuous few years at Rockefeller. Embroiled in a scientific fraud case at the time, Baltimore defended a colleague's honesty at considerable expense to his own reputation. (The case has been covered in great depth, most recently in *The Baltimore Case: A Trial of Politics, Science, and Character*, by Caltech professor Dan Kevles.)

"It was a terrible period," says Huang, who nevertheless tries to keep it in perspective by considering the lessons learned and shared from a politicized struggle smacking of McCarthyism. Huang adds that, "as I told Dan, after escaping from the Japanese during World War II and piling our family's belongings into a steam-driven truck with five other families bound for Tibet, I think I've learned how to handle suffering."

With her husband back at MIT, Huang began commuting and telecommuting between Boston and New York City to continue her job at NYU. She scheduled meetings from breakfast through dinner during three-day stints in New York. Flying back to Boston in two hours' time, she took calls that were patched through by her secretary at NYU. "It was an extraordinarily efficient way to work," she says, "and David and I really appreciated getting together. I support that way of working and commuting for duo-career families. Of course we were spoiled, we had housekeepers at both ends." Throughout her career, Huang says she has kept "a focus on the things I enjoy doing," not feeling that she had to have a job. "I've been lucky."

"I certainly didn't plan this"

Was the decision to pack up and move to California a difficult one? "Yes," she says. "I said I never wanted to live in L.A. It's such a desert." But the people on the presidential-search committee, especially Professor Kip Thorne, turned the tide. "They gradually introduced us to Pasadena," asking for no commitment, says Huang. "We didn't know much about Caltech; it was always that other school."

Now that it's their school, and as they settle into the president's house, Huang considers her newest milieu. "I'm in the throes of how best I can use my time. I'm hoping that as councilor—in the first part-time position I've had—I'll have a chance to explore. The board of trustees wanted very much for me to be close to Caltech in its relationship with sister institutions and with agencies in the federal government that fund science research. Those are broad mandates."

As councilor for external relations and a faculty associate in biology, Huang will lend her 20-plus years of experience in medical schools and research universities to Caltech's Biological Sciences Initiative. As she sums it up, "BSI means a lot of energies are going into making biology better than it ever has been, if that is possible, applying interdisciplinary approaches and methodologies toward a particular problem." Cooperation with medical

institutions such as UCLA, USC, City of Hope, and Huntington Memorial Hospital will be key as Caltech develops an MD/PhD program—exposing Caltech students to medical applications in addition to exposing medical students to Caltech research—and as it capitalizes on opportunities for data sharing and research collaborations.

Huang sees herself as an "institutional capacity builder" who gets the right people together "around the right ideas at the right time." Collaborations and programmatic grants, for instance, "are not dictated from the top down," she says. With "long-term capacity building, it may not seem obvious that relationships have been built, but when opportunities come up, you can be perfectly positioned to take advantage of them." Huang says she has the luxury to focus on the long term, since she doesn't have payroll and related administrative responsibilities.

In her "spare time," Huang is serving as a trustee for the Keck Graduate Institute of Applied Life Sciences, a new school that's part of the Claremont Colleges consortium. She was offered that position as soon as word got around that Baltimore was coming to Caltech. Huang has also been invited

to join the Pacific Council on International Policy and the Blue Ribbon, which supports the Music Center's resident companies.

Elsewhere, she chairs the scientific board for the Institute of Molecular Cell Biology in Singapore, succeeding Sydney Brenner, who together with Huang and top Singaporean scientists established this modern research institution. She sits on several boards—Johns Hopkins University, the Keystone Center, the Foundation for Microbiology, the American Association for the Advancement of Science, and the Health Effects Institute—and is a member of the FDA advisory committee for vaccines.

Such a full life suits her and her husband, she says, and it fulfills their shared interest in "being around intelligent people. Basically our philosophy of life is very similar," she adds. "We believe in living life to the fullest, in constantly learning new things, and in using one's brain to benefit the world we live in."

Take them out of their day-to-day setting and Huang finds at least one notable difference between her and Baltimore. "When we go on vacation, I really like to veg, but he likes to tire himself out doing things. Our daughter says, 'Dad really vegges fast.' For instance, when we go to Montana for a long weekend, there is usually a lot of scientific talk with colleagues, [mixed with] a lot of fishing and good eating. In four to five nights we may stay in three to four different places." There's no sitting by the pool, she adds.

Their 24-year-old daughter, Lauren, whose nickname Teak comes from "TK" or "The Kid," has apparently adopted a similar lifestyle. "She seems awfully busy," says Huang. A graduate in psychology from Yale, Teak is starting a company in New York City to design and maintain Web pages, especially for TV series. She has already designed an award-winning Web site for the Generation-X show *Party of Five*.

Huang also has an interest in the entertainment field, both as an educational vehicle and as a way to show the human side of science—"the natural, real-life stories." The main character of a would-be TV series was modeled after her. Called *The Dean*, this brainchild of Nobel Laureate in physics Leon Lederman was scripted by a group of scientists, including Huang. "We've wanted a science program in prime time, like *NYPD Blue* or *ER*, that isn't fantasy like *The X-Files*, that would have comedy, blood, gore, and sex, as well as science," she says. As with scientific research, the next stage of this project awaits funding.

And the sequel to Huang's real-life story? She's looking forward to learning from her experience here and hopes "to leave behind something that will be of value." Beyond that, "I'm always surprised that life holds so many twists and turns," she says. "I've never been good at predicting the future."

TriNet. . . . from page 6

work, which is built to withstand severe earthquakes.

When complete, TriNet will consist of nearly 600 monitoring stations in Southern California with the capability to provide faster information on where the most damaging shaking has occurred when earthquakes strike. SCE will be able to use that information to prioritize the dispatch of repair crews and accelerate service restoration efforts to areas suffering the most damage.

"Following an earthquake, good, accurate information is a precious commodity," said Stephen E. Frank, president and chief operating officer of Southern California Edison. "Good information can save time, money, and—most importantly—lives. We're excited about the potential benefits of TriNet, and as the largest electric utility in the region, we feel Edison is in a unique position to add value to the TriNet effort."

Within 10 minutes of an event, TriNet will produce preliminary map information. Within 30 minutes, more detailed maps showing shaking intensity will be produced. The "shake maps" will give an accurate indication of where utilities and authorities should concentrate recovery efforts.

Dick Rosenblum, SCE senior vice president for transmission & distribution, said TriNet will help the utility assess problems more quickly at the utility's nearly 900 electrical substations spread over a 50,000-square-mile area.

"By getting useful information in a matter of minutes, we can dispatch crews to where we know the greatest shaking and damage has occurred," said Rosenblum. "We knew fairly quickly where the Northridge earthquake was centered, but it was hours before we knew the degree of damage that Santa Monica—miles away and outside the San Fernando Valley—had experienced."

Paul Jennings, Caltech's acting vice president for business and finance, and a professor of civil engineering and applied mechanics, said, "The TriNet Project is a wonderful example of a public/private partnership, where different organizations come together, leverage their resources, and together create a product no one organization could create alone. Edison's investment will significantly move this project forward and help provide Southern California with a state-of-the-art seismic network."

SCE currently has installed TriNet monitoring units at substations in Rosemead, Palmdale, Hesperia, Mira Loma, and White Water. Another 25 substations will have the monitoring equipment installed within the next 18 months.

SCE also announced that it will provide $250,000 over five years for TriNet, with each dollar matched by a $3 contribution from the Federal Emergency Management Administration (FEMA) and the California Office of Emergency Services.

FEMA is funding 75 percent of the nearly $17-million TriNet Project. Caltech's commitment to the effort is being funded by SCE, GTE, Pacific Bell, the Times Mirror Foundation, and others. The U.S. Geological Survey has provided more than $4 million. The California Division of Mines and Geology is another participant.

Apollo's Odyssey . . . from page 7

blue-streaked, handicapped Apollo from storage, found a place on campus where he would be welcomed, and then oversaw the re-creation of his fingers and other fair and sundry features.

Wendell Jack, acting director of athletics, welcomed Apollo to his new home, a place well suited to Greek gods, as one modest athletic-center member had informed Jack. The director also put rumors to rest that the seven-foot resident would be able to (physically) help out the Tech basketball team.

But other speakers alluded to Apollo's inspirational qualities as an athletically inclined chap and perhaps even as a mascot of sorts. Regarding the latter possibility, President Baltimore said, "I don't know what the beaver is going to think, but I'll leave it to them to fight it out."

More hurdles lie ahead: Apollo must be braced for earthquakes, an effort that Caltech alum and Physical Plant engineer Paul Winter '44 will oversee. The statue must also rely on the mercy of students and the supervision of athletic center employees to retain his healthy physique. As Griswold pointed out at the dedication, damage to such a work of art is irreversible. He calls his work "conservation" rather than "restoration," in part because synthetic materials must be used to approximate pure marble. (An upcoming issue of *Engineering & Science* magazine will detail the conservation process.)

Curiosity drew many to the ceremony. Peter Knops-Gerrits, a postdoc from Belgium, said he "came to see a statue in a gym hall."

But "in America, we find no contradiction in that at all," commented Elizabeth Howard, lecturer in art history who spoke at the ceremony.

Knops-Gerrits also said he "would have liked to see Apollo with blue and yellow—a postmodern version of classic art." But another onlooker suggested less radical forms of artistic expression, telling the *Pasadena Star-News*, "I expect students will continue to adorn [the statue] but not damage it."

Readers are invited to send their recollections of Apollo Belvedere, addressed to the Editor, Caltech News *1-71, Pasadena, CA 91125. Letters may be excerpted for future publication.*

"The Caltech mind goes to work on figuring out how to do things better," says M. Blouke Carus '49, but what could be more perfect in its wholesome symmetry than Dick, Jane, and Sally endlessly running, seeing, and looking, as they did for millions of American schoolchildren in the 1950s? Plenty, according to Carus.

"When we saw those textbooks, we just about had a heart attack," he recalled recently, describing the reaction he and his wife, Marianne, had to the school reader their oldest child encountered upon entering first grade in LaSalle, Illinois, in 1959. With their minimalist vocabulary of 300 words (increased by 300 with each successive grade), the Dick and Jane readers presented an irresistible challenge to the Caruses, who feared that the average 6-year-old's interest in reading would wither under such intellectual constraints.

The path of a publisher: Blouke Carus as business manager of the 1949 *Big T* (above, second from left) and president of Open Court Publishing Company (1987). Carus is currently senior publishing consultant for Carus Publishing Company, which publishes *Cricket* and other magazines for children.

See Blouke Carus Run (b

A passion for educational reform led a chemical innovator and industrialist to have a remarkable impact on the education and reading habits of millions of American children. All it took was anger, creativity, persistence, and style.

The logical, if ambitious, solution seemed clear: although Blouke was busy running a chemical manufacturing company, and Marianne was a full-time mother who likewise had little background in education, the Caruses would simply publish their own readers. Thirty-seven years later, Blouke and Marianne Carus have to their credit not only the highly successful Open Court series of phonics-based reading textbooks used by an estimated total of two to three million children since its inception in 1961, but also a publishing company that produces seven award-winning magazines for children and young adults.

For Carus, a passion for educational reform is part of his family background, just like the interest in science that led him to Caltech in the early 1940s. His grandfather and great-grandfather, both German immigrants who settled in Illinois, embraced the reevaluation of Western religion that followed the publication of Darwin's *Origin of Species* in 1859. Carus's great-grandfather, Edward Hegeler, used profits from his successful zinc-manufacturing business to found the Open Court Publishing Company, printing articles that espoused alternative approaches to traditional religious thinking. Hegeler's son-in-law, Paul Carus, expanded the Open Court list to hundreds of titles, including the first American translations of Eastern philosophy and European works on mathematics and science (including the exclusive American edition of Ernst Mach's *The Science of Mechanics*, a frequently cited source in the Millikan, Roller, Watson physics textbook used at Caltech in 1944).

As a child, Blouke Carus knew little of Open Court. (His grandfather had died before he was born, and the publishing company had been kept nominally alive by an aunt.) His father, a PhD in math from the University of Chicago who built up his own successful chemical manufacturing company, encouraged his son to develop interests in science and engineering. Carus's mother, for her part, sought to instill in her children a love of culture, making the eight-hour round-trip drive to Chicago every other weekend for music lessons and visits to museums. In 1939 she took the 11-year-old Blouke and his brother and sister to Germany for a year's study at a *Gymnasium*. Today, Carus retains vivid memories of the Nazi parades and demonstrations that he witnessed before the family left Germany when war broke out later that year, but mostly he recalls the German school he attended, with its rigorous courses in Latin and Greek,

Renowned for its cover art, *Cricket* magazine counts many adults among its loyal fans. "I still have and treasure all 221 issues," wrote a 22-year-old college senior who began subscribing as a nonreading four-year-old.

calculus, physics, biology, geography, music, and art.

Having graduated from Caltech in 1949 with a BS in electrical engineering, Carus joined the family firm in 1951 and gradually brought potassium permanganate processing into the modern era. He holds seven U.S. patents for manufacturing processes of the chemical, which is a prime agent in water purification and wastewater treatment. Carus Chemical, of which Carus is chairman, produces about 50 percent of the potassium permanganate used worldwide.

Carus never lost his early interest in education and, in the spring of 1959, 20 years after he attended school in Freiburg, Germany, he took his own son to Germany to experience the system. André Carus, recalls his father, left the German first grade after one semester reading a hefty textbook with "real stories, plots, ideas, and a real

Irrepressible insects and other cartoon characters enliven the margins of the Cricket Magazine Group publications with colorful commentary. On his 70th birthday, Carus got a "buggy" tribute from artist Omar Rayyan.

t not to Dick and Jane)

By Marcy Drexler

vocabulary." When André entered American first grade that fall, the Caruses saw the mind-numbing repetitions of their son's Dick and Jane books as the all-too-obvious answer to the question: Why Can't Johnny Read? "As a normal, skeptical Caltech engineer, I thought that effective methods and genuine children's folk tales were called for, so we started on a long-term quest to develop a complete reading/language arts system," Carus says. For examples of classic children's literature to include in their prospective school readers, the couple turned to old textbooks dating back to 1850 that they found in the Midwest Interlibrary Center at the University of Chicago. It was a dirty job.

"We went through a dungeon of textbooks, all with a pile of dust on them," Carus says. He and Marianne ventured into unheated buildings, sorting through hundreds of feet of old readers. "We got familiar with what we could do for each grade level, what they had been doing before we got ruined with Dick and Jane." They also consulted with teachers working on new approaches to the teaching of reading, and methodically educated themselves about the basics of book publishing. The readers would feature such classics of children's literature and poetry as Aesop's fables, Mother Goose rhymes, and folk tales such as the story of Dick Whittington and his cat. Carus, working with a few master teachers, got actively involved in developing the reading method, a phonics system based on the work of Mildred McGinnis at the Central Institute for the Deaf in St. Louis, Missouri. It was a hectic time, he recalls. "I was always looking for engineers in management to take over my responsibilities in the chemical company, so that I could spend time with the textbooks. I'd spend the mornings working on the readers and the afternoons at the chemical company." In 1963, using the old family publishing imprint, the Caruses brought out the first Open Court Basic Readers for grades 1–3. Today, the Open Court textbooks, for grades K-6, are part of a resurgence in phonics-based reading instruction, used by 400,000 children in 800 schools across the country. A recent front-page *Los Angeles Times* article credited the textbooks with helping raise reading scores in area public schools.

The Caruses' early research amid the moldy heaps of textbooks at the University of Chicago paid off in another, unexpected way with their discovery of *St. Nicholas* magazine. Published from 1873 to 1937 and for decades edited by Mary Mapes Dodge (author of *Hans Brinker, or The Silver Skates*), *St. Nicholas* is still considered one of the finest children's magazines ever produced. Many of the major writers of the day, including Rudyard Kipling and Louisa May Alcott, were published in its pages. Reading the old issues, the Caruses envisioned a modern equivalent. "We said to ourselves, if we're really interested in literature, the readers would have the classical children's literature and [a] magazine would have contemporary children's literature," Carus recalls. In September 1973, 10 years after the first Open Court Readers were published and following intensive consultations with editors, authors, and illustrators, *Cricket* magazine made its debut.

Named for a character in an Isaac Bashevis Singer book for children, the new monthly magazine promised to provide the best in contemporary children's literature and illustration. Its premiere issue featured stories by Singer and Astrid Lindgren, author of the Pippi Longstocking books, and poetry by Nikki Giovanni, Gwendolyn Brooks, and T. S. Eliot. Other outstanding authors represented in the 25 years since include Langston Hughes, John Ciardi, and Robert Graves. Along with poetry and fiction, *Cricket* regularly publishes folktales, nonfiction articles, and biographical and historical pieces. Readers have plenty of opportunity to get involved, with puzzles, contests, and a colorful letters-to-the-editor section. And like *St. Nicholas*, *Cricket* has a strong visual presence, with striking cover illustrations running continuously across its front and back covers.

Perhaps *Cricket* 's greatest appeal rests with the band of irrepressible insect cartoon characters—the result of absent-minded doodling by illustrator Trina Schart Hyman during planning meetings for the prospective magazine—who crop up in the margins to define exotic vocabulary or merely perpetrate good-natured mayhem among themselves. One of the characters is an ant named "Aunt Marianne."

"We started out with Cricket and Ladybug and George, the worm; the kids feel very close to them," Marianne Carus says. "They all have their different characteristics—for example, Ladybug loves chocolate chip cookies and hates school. So they provide a very necessary ingredient: humor." Readers obviously agree. They often address their letters to "Everybuggy." The magazine's grown-up approval rating has also been consistently high; *Cricket* has received numerous awards and citations, including the Golden Lamp Award for Distinguished Achievement from the Educational Press Association of America.

Cricket remained the Caruses' only magazine venture until the late 1980s, when a French children's book publisher, sensing an untapped market, approached the couple about a magazine for younger children. The birth in 1990 of *Ladybug*, for ages 2 to 6, marked a turning point for the Caruses and their publishing company. With the addition of *Ladybug* to Carus Publishing, Carus says, it became apparent that *Cricket* might finally pay off financially. The magazine had always

Continued on page 14 . . .

Editor-in-Chief Marianne Carus has shaped the magazines' content since 1972, starting with *Cricket*'s first editorial board meeting. Education author and critic Clifton Fadiman was a charter member of the board.

Muse cartoon commentators Kokopelli, Urania, and Chad react to a story by Walter Alvarez in the August 1998 issue about the "big ka-boom" that resulted in the extinction of the dinosaurs.

Carus . . . from page 13

barely broken even—hardly a banker's dream investment, he says. "When we started *Ladybug*, it was easier to sell because *Cricket* was so well known. I don't think we ourselves recognized how valuable a trademark it is. *Cricket* is like apple pie and motherhood. Parents trust *Cricket*."

Ladybug's success led to more magazines to fill the remaining gaps in readership: *Spider* (for ages 6–9) in 1994, *Babybug* (6 months to 2 years) in 1995, and, in 1996, a coproduction with the Smithsonian Institution, *Muse*. The flashiest of the Carus publications, *Muse* (ages 8–14) is a purely nonfiction *Cricket* with a high-tech spin. Based on the work of Smithsonian curators and advisors and populated by its own set of screwball cartoon commentators, *Muse* taps into the adolescent's fascination with nature and culture and supplies plenty of Web sites for further investigation. Although *Muse* is Carus's favorite among the magazines, he's reluctant to admit it. "My bent is toward science and technology," he says. "I still like to read the literary magazines, but I'm really on the lookout for ideas for *Muse*." The newest additions to the Carus publishing family are *Click*, a science-oriented magazine for ages 3 to 7 (1997) and *Cicada*, a literary magazine for young adults that debuted this past September. Carus estimates the combined circulation of the magazines at 500,000, with an actual readership three or four times greater, or roughly two million children and young adults.

These days, Carus spends 10 percent of his time on the chemical business, 20 percent on the magazines and other publishing activities, and the remainder on educational reform, especially the International Baccalaureate program, which brings European-style secondary curricula to American high schools. Although the Open Court readers were sold to SRA/McGraw-Hill in 1996, he continues to monitor the progress of reading instruction in schools across America.

When asked about his most gratifying achievement during his varied 47-year career, Carus acknowledges the popularity of the magazines and the excitement of making new discoveries in the chemical field. But when education reformer M. Blouke Carus visited P.S. 161, an inner-city elementary school in Crown Heights, Brooklyn, last fall and talked with students, it gave him, as he modestly puts it, "a great deal of satisfaction." P.S. 161 student population is mostly poor and black—97 percent qualify for the federal free-lunch program—yet the 1300-pupil school's sixth-grade students score higher in reading than their counterparts in any other New York City school. Competition for membership in the "Principal's Reading Club" is intense. "When you talked to fourth, fifth, and sixth graders, you thought you were talking to adults," Carus recalls with some awe. As it happens, the school's reading program is based on a series of phonics-based, literature-laden textbooks bearing the imprint Open Court.

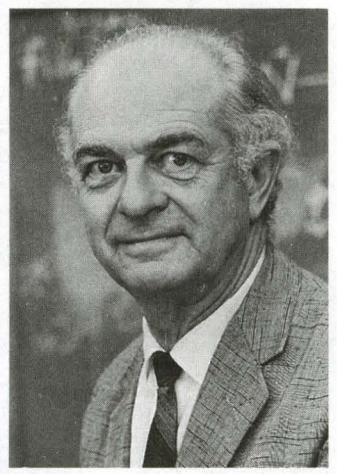
For information about subscriptions, contact The Cricket Magazine Group, 315 Fifth Street, P.O. Box 300, Peru, Illinois 61354-0300, 312/939-1500, e-mail address: www.caruspub.com. Or visit their Web site at www.cricketmag.com.

A sampling of the seven magazines for ages 6 months to young adult put out by the Carus Publishing Company.

Pauling . . . from page 5

in San Francisco last fall, is designed for an audience 12 years and older. It includes notes, diaries, photographs, drawings, molecular models, and other historic artifacts, and aims to educate both young and old on the role of scientists in creating conditions for a secure and peaceful world.

The exhibit's sponsors include Soka Gakkai International (SGI)—an organization that promotes peace, cultural, and educational activities based on the long-standing traditions of Buddhist humanism; Oregon State University (Pauling's undergraduate alma mater), which has loaned the exhibition items from its Special Collections and Ava Helen and Linus Pauling Papers; and the Linus Pauling family.



Linus Pauling

"The exhibition demonstrates how scientific pursuits and efforts to minimize human suffering need not be mutually exclusive," says Linus Pauling, Jr., chairman of the Linus Pauling Exhibition Advisory Committee. "We hope that the legacy of Linus Pauling's courageous work in science, health, and peace will serve as inspiration for new generations to meet humanity's challenges in the 21st century."

The exhibit, which is free and open to the public, will be housed in the two upstairs rooms of the Winnett Center from May 15 through June 19. It will be open three days per week—Saturday, Sunday, and Wednesday—and can accommodate supervised meeting groups of up to 15 people. Viewing on all other days will be by appointment only. For more information, call Caltech's Office of Public Events, at 626/395-3834.

Honors. . . from page 7

Jeff Kimble, the William L. Valentine Professor and professor of physics, has received the 1998 International Award on Quantum Communications from the Fourth International Conference on Quantum Communication, Measurement, and Computing "for his outstanding experimental advances in the areas of quantum measurements, cavity QCD and quantum logic."

Steve Koonin '72, vice president and provost, and professor of theoretical physics, has been named a recipient of this year's E. O. Lawrence Award from the United States Department of Energy in recognition of his achievements in physics. By using state of the art parallel computers and a programming protocol known as the Monte Carlo technique, Koonin has improved the computational models of atomic nuclei for better and more detailed understanding of nuclear processes.

Nobel Laureate *Rudy Marcus*, the Arthur Amos Noyes Professor of Chemistry, has been awarded the title Doctor Scientiarum, Honoris Causa, from the Technion—Israel Institute of Technology.

Gerry Neugebauer, PhD '60, the Robert A. Millikan Professor of Physics, Emeritus, has been awarded the 1998 Herschel Medal by the Council of the Royal Astronomical Society "for his inspiring leadership within the astronomical community."

Wallace Sargent, the Ira S. Bowen Professor of Astronomy and director of the Palomar Observatory, has been elected an associate of the Council of the Royal Astronomical Society in recognition of "his inspiring leadership within the astronomical community and outstanding work in observational astrophysics."

Professor of Physics *Nai-Chang Yeh* has been selected by the Overseas Chinese Physics Association as the winner of the 1998 Outstanding Young Researcher Award "for her outstanding achievements in physics."

Ahmed Zewail, the Linus Pauling Professor of Chemical Physics and professor of physics, has received a variety of honors, including two medals, the E. O. Lawrence Award from the United States Department of Energy (an honor he shares with Provost Steve Koonin, as noted above), election to the American Philosophical Society, and two honorary degrees. Of the medals, the first is the 1998 William H. Nichols Medal, awarded by the American Chemical Society, New York Section, and the Nichols Medal Jury, for Zewail's work in the field of femtochemistry—"contributions [that] have profoundly altered the way we think about the dynamics of chemical and biological change, giving birth to a new era in chemistry." The second is the 1997 Linus Pauling Medal, presented by the Oregon, Portland, and Puget Sound Sections of the American Chemical Society, and also recognizing Zewail's "extraordinary experimental and theoretical work [in] the femtosecond time regime." Sounding a similar note, the Lawrence Award cites Zewail as a central figure in the new and burgeoning field of femtochemistry. Zewail has also been selected to receive the degree of Doctor of the University, Honoris Causa, from the Swinburne University of Technology, Australia, and the degree of Docteur, Honoris Causa, from the University of Lausanne, Switzerland.

Alumni Update

Lindes announce alumni challenge

Caltech trustee and alumnus Ron Linde, PhD '64, and his wife, Maxine, have pledged $1.25 million to match contributions from other alumni. As part of Caltech's current campaign, called "Beyond the Genome: The Biological Sciences Initiative at Caltech," the resulting $2.5 million total will create and name the Ronald and Maxine Linde/Caltech Alumni Laboratories within the Broad Center for the Biological Sciences. Construction of the project is expected to be complete by 2002.

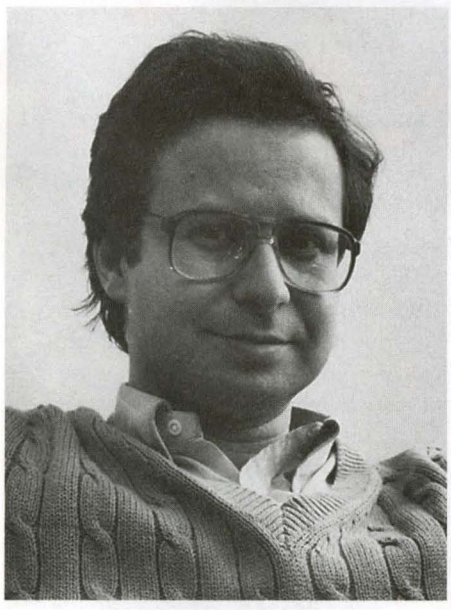
The challenge will provide alumni with the opportunity to have a highly tangible impact on Caltech, according to the Lindes. "Helping the BSI move forward quickly and on a firm footing is the most important thing we can do right now to help ensure the future of Caltech," said Ron, who earned the Institute's first PhD in materials science in 1964. "The BSI presents a wonderful way for alumni to make a real difference to Caltech; the challenge will demonstrate the impact of alumni-giving through a specific goal: funding a suite of laboratories as part of a new building. The resulting laboratories will be a tangible reminder of the critical role alumni play in the life of the Institute."

The Linde Alumni Challenge works in the following way: each Fund Year during the challenge, The Ronald and Maxine Linde Foundation will match on a 1:1 basis all BSI-designated portions of gifts (up to $75,000 per individual), provided that the total of all gifts to Caltech made by an alumnus equals at least 110 percent of the alumnus's "base year" giving during the 1997–1998 Fund Year. The challenge will continue through September 2001.

The Broad Center for the Biological Sciences, named after Caltech Trustee and Los Angeles executive Eli Broad—who provided the lead gift for the building—is the cornerstone of the BSI. The Broad Center will provide 100,000 square feet of space for 10 new research groups working at the cutting edge of the biological sciences. As a member of Caltech's Biological Sciences Advisory Council and the BSI Gift Committee, Ron Linde has been actively involved in the campaign. Both directly and through The Ronald and Maxine Linde Foundation, which they started in 1989, the Lindes have been long-time contributors to Caltech. Their support includes creation of the Linde Professorship, now held by physicist Barry Barish, and the Linde President's Venture Fund, which provides funding for various innovative research projects at Caltech.

"Ron and Maxine have been among Caltech's most dedicated supporters, providing generously for Caltech programs," said Jerry Nunnally, vice president for Institute Relations. "In addition, Ron has been deeply committed to enhancing the involvement of alumni in the Institute for some time, as chair of both the Alumni Relations Task Force and the Alumni Relations Committee of the Board of Trustees. The Linde Challenge is an exciting way to have alumni participate in a project that is the highest priority of the Institute."

Seminar Day to take alumni to the frontiers



Steve Koonin will give the keynote address.

Whether you're looking for a grand overview of research at the Institute or a specialized account of, say, protein design or gravitational-wave detection, Seminar Day promises to deliver.

Attendees can begin the day in the traditional way, charting their own course through Caltech's world of research, choosing from among 17 scholarly talks held in seven locations across campus. And for a late morning break, they can sit back and let Provost Steve Koonin '72 take the helm.

The provost and professor of theoretical physics will present "Research Frontiers at the Institute" during the 11 a.m. general session. Taking audience members on an armchair tour of research highlights, Koonin will emphasize "emerging themes and work that best exemplifies Caltech's tradition of innovative interdisciplinary research." In the same session, Alumni Association President Warren Goda '86 will welcome the crowd, and President David Baltimore will present the distinguished alumni awards. It all happens on Saturday, May 15, with reunion-class activities scheduled on Thursday, Friday, and Saturday. If you have not yet received a program, contact the Alumni Association at 626/395-8364.

Was life a beach at Caltech in 1918 and 1984? At least it wasn't all work and no play for Frank Capra (senior Gnome at far right in top photo) and Warren Goda (Page House sophomore in sunglasses and flip-flops at left).

It's a Wonderful Caltech Life

Every year during the holiday season, I usually catch a snippet of *It's a Wonderful Life*, directed by Frank Capra (BS '18). Suppose that I became like George Bailey and was able to view my life from a different perspective—one in which Caltech played no part? My predecessor in this position, Ed Lambert, posed a similar question in this column a few years ago, but he wondered about a *world* in which Caltech had played no part.

I'm going to bring the question a bit closer to home and ask that we consider Caltech's effect on *our* lives—our college memories, friends, education, career, and personal development. As I try to answer this question for myself, I won't take poetic license or ask for a willing suspension of disbelief. Instead, I will act like a Techer and extrapolate.

My memories of Caltech are tightly linked with my friends. If I had gone to some other college, I would have had memorable experiences. But they would not be the same. I remember crazy stunts that now seem incomprehensible to my mature eyes. Why would any sane person ignore homework assignments due the next morning to go eat a Tommy's double cheeseburger with extra chili? And then resume intense and intimate studies with the constant reminder of onions on our breath. Such insanity. But we all engaged in such craziness to maintain our sanity.

How would my education have been affected? An alumnus told me that Caltech is not necessarily the best college, but that its environment is unique for learning. After thinking about it, I have to agree with this fellow. There are many institutions of Caltech's size. There are several colleges and universities of Caltech's academic caliber. There are few colleges or universities that have Caltech's resources. But there are no other colleges with Caltech's environment. Because of a Caltech education that's been characterized as trying to drink from a fire hydrant, my thirst for knowledge is still unsatisfied.

My three previous jobs were influenced by Caltech alumni. Without Caltech, I probably would have landed other jobs. Caltech had its biggest effect on my first job. I had no idea what to expect, but having a Caltech degree made things a lot easier.

This may sound weird, but I believe that Caltech was a great environment for my personal development. I entered Caltech as an introverted nerd and suddenly found myself among peers. Because of some special mentors, the Institute's small size, and its environment, I was able to become comfortable with myself and establish my own identity. At another institution, things would have been much different. I would never have spent so much time chatting with the dean, unless it was for disciplinary matters. I hate to think what I would be like if I had never embraced the Honor System.

Caltech has had a profound effect on my life. Since graduation, I have maintained my contact with Caltech through the Alumni Association. One of the goals for the Association is to foster growth between alumni and Caltech and among alumni. All of us alums can help ourselves, help Caltech, and help our fellow Techers by getting involved with our alumni chapters, reunions, local programs, travel programs, and the Alumni College. The Caltech Alumni Association is a way to refresh and expand your memories, friends, education, career, and personal development. And you don't need the help of an angel named Clarence.

Warren A. Goda

President of the Alumni Association

Association offers Indian summer trip to Indian country

The high country of the southern Colorado plateau has played host to at least two millennia of human occupation in the Four-Corner states. The geological factors that influenced the appearance, disappearance, and survival of various cultures offer a fascinating subject for study. Even to this day, the same geological considerations influence life on the Navajo, Hopi, and various other pueblo Indian reservations.

This fall, alumni will have an opportunity to explore this remarkable environment in the company of an experienced guide. From September 27 through October 6, Professor Lee Silver, PhD '55, of Caltech's Division of Geological and Planetary Sciences, will lead a nine-day travel/study program through some of the more scenic parts of New Mexico, Utah, Arizona, and Colorado. Silver, the Keck Foundation Professor for Resource Geology, Emeritus, who has conducted geological studies in this region for more than a half century, will weave a fascinating fabric from elements of the geologic and human history.

The emphasis will be on the native people's integration of their lifestyles and cultures with the realities of the geologic features and resources available in this magnificent landscape. Sagebrush deserts and lush yellow pine forests, vast mesas and sheer-walled canyons, ancient and recent volcanoes, cliff dwellings, and Anasazi towns, sky cities and remote hogans will all form part of the itinerary.

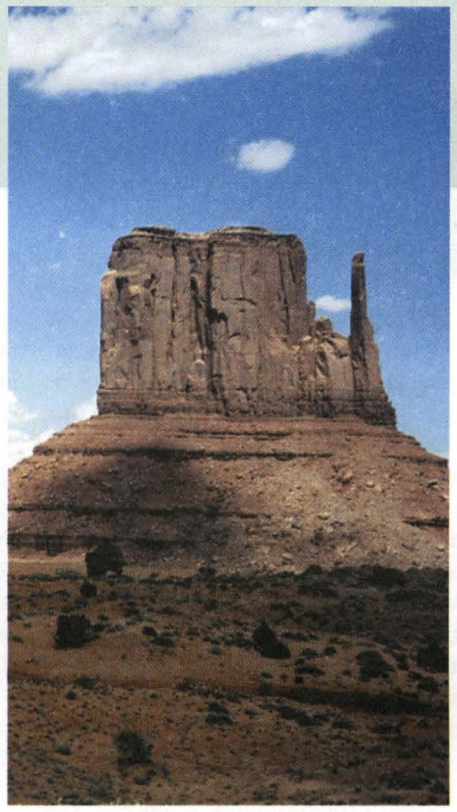
Participants will convene in Albuquerque, New Mexico, and then travel by railroad and bus to Acoma, El Morro, Window Rock, Hopi villages, Canyon de Chelly, Granado, Monument Valley, Mesa Verde, Durango and Silverton, and Chaco Canyon before returning to Albuquerque.

The price per person of $1,750 double occupancy, and $2,150 single occupancy includes all accommodations, transportation, gratuities, and most meals while with the group.

To take advantage of this special opportunity to explore the rich and varied geology, history, and scenic attractions of this region, please complete and return the form at right with your deposit. Because space is limited, reservations will be held until June 1. If there are more reservations than space available, a lottery will be held at this time. Confirmation of reservations will be mailed out after June 1, 1999. *Priority will be given to Alumni Association members.* Final payment is due by July 6, 1999.

Please note our cancellation and refund policy—Refunds less a cancellation fee of $50 per person will be given for cancellations made by June 30, 1999. Refunds following that date will be dependent on recoverable costs.

If you have questions regarding this program, please contact Arlana Silver at 626/395-8363 or via e-mail at *arlana@dar.caltech.edu*.



Indian Country Registration Form
Caltech Alumni Association
Travel/Study Program
September 27–October 6, 1999

I/we would like to participate in the *1999* ***Indian Country Travel/Study Program***. Enclosed is my deposit of $_____ ($200 per person), representing ___ participants.

Name_____
Class Year_____

Spouse/Guest_____

Home Address_____

_____

Email_____

In places where available I would prefer a: __Non-smoking room __Smoking room

__ I am traveling alone and am interested in sharing a room with another participant. (Please note that sharing cannot be guaranteed.)

__ Please arrange a single room for me.

Please make checks payable to the Caltech Alumni Association and return to
Indian Country Travel/Study Program
Caltech Alumni Association
Mail Code 1-97
Pasadena, CA 91125

Follow the jobs with JOBTRAK

The Career Development Center (CDC) has recently added password access to JOBTRAK for Caltech alumni. JOBTRAK, which is accessible online at http://www.jobtrak.com, is one of the nation's leading job listing services and allows employers to target their employment opportunities to specific schools. Employers who contact the CDC with job offerings are encouraged to post their openings with JOBTRAK. Now all Caltech alumni can access these job listings (many of which are Caltech-exclusive!) by obtaining the password from the CDC. Just call the CDC at 626/395-6361 or send an email to career@caltech.edu containing your full name, degree, option, and year of graduation. The password will be changed monthly and should not be distributed to nonalums.

The more than 100 alumni who returned to campus on October 2 for the Engineering and Applied Science Division Reunion included, from left, David Herting '62, Ted Combs '27, and George Sutton '42, MS '43, shown here enjoying lunch together in Dabney Gardens. After a welcome from President David Baltimore, attendees spent the day chatting with fellow alumni and with faculty and taking in a variety of talks and exhibits, among them a display of artifacts from the GALCIT Ten-Foot Wind Tunnel, research updates on microfabrication, metallic glasses, vortices, simulation of dynamic response of materials, and a talk entitled "Learning from a Tragedy: Explosions and TWA 800." Engineering and Applied Science Division Chair John Seinfeld hosted the event, which attracted alumni from as far away as Ireland.

Association makes board nominations

In January, the Alumni Association board of directors accepted the proposals of the nominating committee for new board officers and board members. The term of office for directors and officers will begin at the close of the annual meeting in June 1999.

Nominations for officers are: president, Kent Frewing '61; vice president, Blair Folsom, PhD '74; treasurer, Ted Jenkins '65; secretary, Debra Dison Hall '74. Association president for 1998-99, Warren Goda '86, will become official past president for 1999-2000 when the new terms begin this summer.

The following were nominated to serve on the board for three-year terms that will run from 1999 through 2002: Bruce Abell '62; Stephanie Charles '73; Ponzy Lu '64; Michael Nassir '93; and Samantha Seaward '91. Tom Tisch '61 will complete the three-year term vacated by Debra Dison Hall. Joseph Yang '86, PhD '91, will serve a one-year term as chapter representative.

Section 5.01 of the Association bylaws provides that members of the Alumni Association may make additional nominations for directors or officers by petition, signed by at least 50 members in good standing, providing the petition is received by the secretary no later than April 15. In accordance with section 5.02 of the bylaws, if no additional nominations are received by April 15, the secretary casts a unanimous vote of all regular members of the Association for the election of the candidates nominated by the board. Otherwise a letter ballot is required.

Alumni Activities

MARCH 13
Board of Directors and Committee meetings.

MAY 13
Alumni Reunions for Classes of '34, '39, '44, '49.

MAY 14
Alumni Reunions for Classes of '54, '59, '64, '69, '79, '84, '89, '94.

MAY 15
Alumni Association's 62nd Annual Seminar Day. Alumni Reunion for Class of '74.

JUNE 25–26
Alumni College on the Caltech Campus. See article, this page.

EXPLORE THE UNIVERSE AT SECOND ALUMNI COLLEGE

Building on the success of Caltech's first Alumni College, held last summer, the Alumni Association will present its second Alumni College on June 25 and 26. The program will focus on the latest findings in astronomy and planetary science and on some of the breakthroughs in technology and instrumentation that are driving new discoveries in these fields.

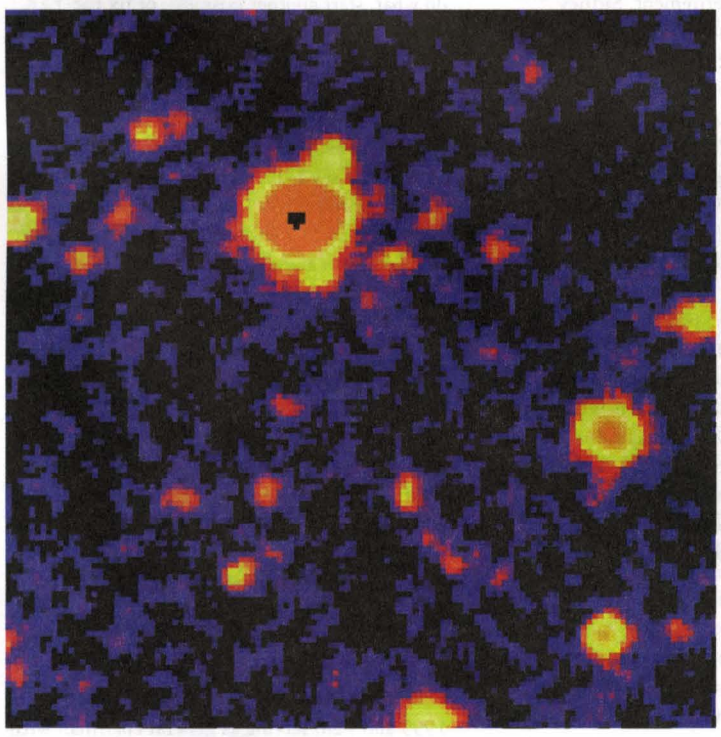
There are now more planets known to be orbiting other stars than there are planets in the solar system. Astronomers can directly observe stars and planetary systems in the process of formation, and using the Keck telescopes, they have at last found galaxies like our own in the process of forming at very early times in the universe.

These and other exciting developments will be explored in the two-day lecture program entitled "The Universe: Origins and Destinies." Prior knowledge of astronomy is not required.

The program will be held on the Caltech campus, and will include six lectures presented by faculty in the Division of Physics, Mathematics and Astronomy. The program is designed to provide ample opportunity for discussions with the scientists and/or their students during breaks and meals. Since these discussions are considered an integral part of the program, lunches and dinner will be included in the total cost. Spouses and guests accompanying Alumni College attendees, who do not wish to attend the lectures, are welcome at the dinner and reception.

The program also includes an optional day trip to Palomar Observatory on Sunday, June 27. Participants will tour the 200-inch Hale Telescope, hear talks on current research at Palomar and, after dinner at the observatory, have the opportunity to view selected objects through the 60-inch Schmidt telescope.

Formal announcements will be mailed to alumni residing in California. If you live outside of California and wish to receive the Alumni College brochure, please send your name, address, and email address to Alumni College, Caltech Alumni Association, Mail Code 1-97, Pasadena, CA 91125, or email the information to *arlana@dar.caltech.edu*.



Astronomy Professor George Djorgovski will shed light on galaxy formation at the second Alumni College. As a primer, he offers this Keck image of a very distant quasar surrounded by possible protogalaxies as they start to form in the early universe. Djorgovski will be joined by other Institute scientists at the June event.

ALUMNI ASSOCIATION FINANCIAL STATEMENT

ALUMNI ASSOCIATION
CALIFORNIA INSTITUTE OF TECHNOLOGY
Pasadena, California

STATEMENT OF FINANCIAL POSITION
September 30, 1998

ASSETS

Cash and Cash Equivalents:	
Cash on Hand and in Bank	$ 36,786
Charles Schwab Money Market Fund	41,275
T. Rowe Price Prime Reserve Fund	43,801
Caltech Employees Federal Credit Union	50,040
C.I.T. Consolidated Portfolio - Special Investment Fund	144,537
Total Cash and Cash Equivalents	$ 316,439
Investments:	
C.I.T. Consolidated Portfolio - Life Memberships	3,199,056
University ProNet	5,000
Accounts Receivable	8,236
Investment Income Receivable	3,942
Inventories	7,220
Deferred Expenses	16,218
Postage Deposit	725
Computer and Other Equipment	17,594
Accumulated Depreciation	(13,149)
TOTAL ASSETS	$ 3,561,281

LIABILITIES

Accounts Payable	$ 37,097
Deferred Income:	
Investment Income from C.I.T. Consolidated Portfolio - Life Memberships	106,956
Program Income	37,050
TOTAL LIABILITIES	$ 181,103

NET ASSETS

Life Membership Reserve	$ 3,199,056
Reserve for Directory	93,905
Investment in Equipment	4,445
Surplus	82,772
TOTAL NET ASSETS	$ 3,380,178
TOTAL LIABILITIES AND NET ASSETS	$ 3,561,281

STATEMENT OF ACTIVITIES
Fiscal Year Ended September 30, 1998

REVENUES

Dues of Annual Members	$ 76,520
Investment Income:	
C.I.T. Consolidated Portfolio:	
Life Memberships	102,287
Special Investment Fund	17,488
Charles Schwab Money Market Fund	3,950
T. Rowe Price Prime Reserve Fund	2,158
Caltech Employees Federal Credit Union	2,485
Checking Account	1,125
Net Income of Travel Study Programs	8,263
Net Income of Seminar Day	200
Net Income of Continuing Education	3,112
Sale of Legends and Other	4,290
TOTAL REVENUES	$ 221,878

EXPENSES

Publications	$ 35,623
Net Expenses of Local Programs	2,893
Net Expenses of Class Reunions	25,782
Net Expenses of Chapter Programs	3,516
Student/Faculty/Alumni Relations	28,547
Undergraduate Admissions Support	20,096
Administration	73,503
Membership	7,568
Directory	17,500
Communications	17,382
TOTAL EXPENSES	$ 232,410
REVENUES (UNDER) OVER EXPENSES	$ (10,532)
Surplus, September 30, 1997	93,304
Surplus, September 30, 1998	$ 82,772

INDEPENDENT AUDITOR'S REPORT

Board of Directors
Alumni Association
California Institute of Technology

I have audited the accompanying statement of fiancial position of the Alumni Association, California Institute of Technology as of September 30, 1998 and the related statement of activities for the fiscal year then ended. These financial statements are the responsibility of the Association's Board of Directors. My responsibility is to express an opinion on these statements based on my audit.

I conducted my audit in accordance with generally accepted auditing standards. Those standards require that I plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. I believe that my audit provides a reasonable basis for my opinion.

In my opinion, the financial statements referred to above present fairly in all material respects, the financial position of the Alumni Association as of September 30, 1998 and the results of its operations for the fiscal year then ended in conformity with generally accepted accounting principles.

Calvin A. Ames
Certified Public Accountant

January 23, 1999

Class Notes

1935

Chuck Thomas
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Alumni Association records of the class of '35 show about half still living, four "lost," and two "personal removals" as of August 1998. A card I received August 1998 shows Allan R. Scoville as deceased. Recent information from the living alumni includes this news:

Fred Allardt writes, "My wife and I are still alive. I have very poor vision but have equipped myself with a computer system which helps overcome the problem. My e-mail address is fhallardt@tcsn.net. My wife and I are thinking of moving to a life care facility and are interested in related info from my classmates."

Leon Becker says, "Greetings, Salutations & Hi!! So we're still kicking, are we? I've been hanging in there and have been in remission these past four years and still in there fighting. Living is too much fun to just let go when things get a bit tough. It's the old curiosity bug, don't you know? My e-mail address is Lebacbeck@aol.com."

"Hello fellow classmates," **James Davies** writes. "I remember most of you by name but have not seen any of you since getting my master's degree in '36. I'm in Houston after having retired as general manager of Texaco's Central Engineering Department in '79. While I've been involved for many years with soliciting for the Caltech Alumni Fund, this is the first time I've had the opportunity of contacting you. I hope some of you remember me. While we enjoy reminiscing about the days spent at the Institute, it is equally enjoyable to contemplate the future of the Institute. We are all part of Caltech's past; I hope you will join me now and be a part of Caltech's future by giving to the Alumni Fund."

Norman Dewees writes, "I play second fiddle in a string quartet at the Sherwood Oaks Retirement Community, where my wife and I live." **Jackson Edwards** can be reached at jedwa77289@aol.com.

Chuck Elmendorf reports that "after 42 years with Bell Labs and AT&T Engineering, I retired in 1978. I am enjoying good health, a pleasant retirement and a happy marriage (52 years)." **Charles J. Gibbs** sends word that his new address is 1519 South Novato Blvd., Novato, CA 94947. His phone number is 415/898-7438.

Adrian Gordon writes, "I continue to have an affiliation with the earth sciences department of Flinders University here in Australia. I do a bit of meteorology research and climatology research and supervise the occasional student. I was lead author of a meteorology textbook published this year in the UK and the Americas. About 18 months ago I published some personal memoirs, which contain among other things a section on my time at Tech. The chapter is headed 'How Linus Pauling affected my life.' My wife, Kay, is coming up on 88 and continues to do photography and audiovisuals, and our son owns a video production house." Adrian's e-mail address is moahg@es.flinders.edu.au

Robert Jones also has an e-mail address—LHJRPJ@juno.com—as does **Henri Levy**—levyha@usit.net.

Franz "Fritz" Merralls is "retired, living in Palos Verdes. Kay and I are dancing on weekends: Swing, Texas 2 step + macarena. Active in Cabrillo Beach Yacht Club. Enjoy Seminar Days with son and grandson. I travel less now, except to see my daughter-in-law, who is a professor at the University of Santa Clara, plus taking trips to Hawaii to see Kay's Hawaiian granddaughter."

Herbert Ribner writes that he "retired as prof at University of Toronto Institute of Aerospace Studies 20 years ago. But have kept up with personal research, summers at UTIAS, winters at NASA Langley Research Center in Virginia." His e-mail address is h.s.ribner@larc.nasa.gov.

Ivan Scherb writes that he saw Adrian Gordon in Adelaide, Australia, in June 1996. **Jack Schwartz** writes "to bring things up to date. My wife died in May 1996. Have traveled a lot since—Israel and Egypt in '96; Kenya and Zimbabwe in '97; Costa Rica in '98; and will be going to China."

Larry (Laurence) Stuppy reports that he is sad to say his wife, Mary, died of breast cancer on August 15, 1998. "I am retired from medical practice now for almost four years. I live in a condo of four rooms off the Wilshire Country Club golf course, 13th hole. I don't play golf. I am trying to adjust to my loss after 57 years. I have belonged to the Caltech Associates for years; Mary and I belonged to the President's Circle. I go to the symposiums every year. I have 6 children, 16 grandchildren, and 3 great grandchildren."

As for your class agent, after Caltech I worked during the summer as a mechanic at Douglas Aircraft in Santa Monica. It was here that I developed an appreciation of the fact that design engineers would benefit greatly by having to attempt to build the ideas! In 1935 I joined the engineering department at Lockheed Aircraft. In late 1935 I traded stress analysis on a small airplane for flying lessons at Monrovia Airport, and on July 16, 1937, soloed in a Fleet biplane at Mines Field (now LAX)! Fellow Caltech students with whom I later worked at Lockheed include **Milford Childers, Phil Colman, Louie Dunn, Laverne Howland, Ed Kasnicka, Lefty Leppert, Jim Lipp, John Magden, Bill Rassieur, Gene Root, Abe Vosseler,** and **Ralph White**. Aircraft with which I was involved in engineering or sales included Amelia Earhart's Electra for her 1937 around the world attempt; the XC-35 first successful pressurized air transport; and the P-38, F-80, and F-104 fighters. I finally retired from Raytheon in 1983 after 19 years and, before that, 25 years at Lockheed and four at RCA. My wife, Gladys, and I have been happily married for 52 years, and after living in Hollywood, Glendale, New Jersey, Massachusetts, and Palos Verdes Estates, we moved in 1994 to Carmel Valley Manor, a Life Care Community in Carmel Valley. We joined the Caltech Associates as Life Members in 1967, and have served on its board as well as on the Alumni Fund council. My e-mail is chuckt@redshift.com. I find I am enjoying serving as class agent for '35, and look forward to having a good response from those still with us.

1944

Paul Winter
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Pasadena, CA 91105-1738

Despite advancing Parkinson's disease, **Joe Bruman** continues to live on his own and drive a car. He would like to hear from any others with similar conditions. His e-mail address is jrbruman@ix.netcom.com. **Bert Golding** and his wife are active in a number of organizations, including the United Nations Association and the Fellowship of Reconciliation. They recently attended the World Affairs Council meeting in Ottawa, Canada.

Since retiring from Brookhaven National Laboratories in 1997, **Garmon Harbottle** is still doing research on applications of nuclear methods to archaeology and fine arts. **Tom Hudson**, in addition to remaining active in several professional organizations, is playing more golf and traveling to see old friends and relatives. He put 25,000 miles on his '93 Thunderbird this last year. **Fred Karstedt** wrote that he set up his 69-year-old electric train when he and his wife hosted their 14 children and grandchildren this last Christmas. The train ran like new. They continue their active involvement in the First Presbyterian Church of Bend, Oregon.

After tiring of retirement, **Bob Laabs** went into real estate in the San Diego area. He would be happy to hear from any alums passing through. **Neville Long** and his wife celebrated their 50th wedding anniversary last June with their three children and nine grandchildren. **Frank MacDonald** and his wife live in La Quinta, California, in the winter, and Lake Arrowhead in the summer, and seem to like the arrangement.

After retiring from Caltech in '92, **Wheeler North** continues part time at the marine lab at Corona del Mar and gets to the campus about one day a week. Leukemia and chemotherapy kept him from our class of '44 50th, but he is looking forward to our 55th—this May. **Joe Phelps** sounds busy and invites his classmates to visit him at his Web site, www.go-oaktree.com, to see what he is up to. His e-mail address is oaktree@pe.net.

Ralph Riffenburgh will be commander of the San Bernardino Sheriff Reserve Aerosquadron this year. They do aerial search, surveillance, and department transport. **Albert "Tony" Spaulding** is busier than ever, now that his partner in Eckels-Spaulding has retired. His new e-mail address is albertt2@flash.net. **Dean Stone** '46 is retired as an ordained minister but keeps active in church and volunteer work. He is expecting a seventh grandchild.

In their 15th year of retirement, **Sidney Stone** and his wife continue to travel the world. Highlights of their recent trips include Australia, Tasmania, New Zealand, and river cruising the Rhine, Mainz, and Danube from Amsterdam to Vienna. This year they will be cruising the Straits of Magellan to the Falkland Isles and then to Buenos Aires. After that they hope to see us at the 55th reunion.

After retiring as professor of aeronautics and astronautics at MIT, **Leon Trilling** is working in a program called TILT (The Institute for Learning and Teaching). This organization is associated with MIT and provides professional development for K–12 teachers. **Paul Wolf** retired in 1986 from the Marine Engineers Benevolent Association after 25 years of service on oil tankers and six years as a union official. He has no e-mail address but is active on ham radio. Call W6RLP at 9 a.m. Monday through Friday.

1949

Hugh Carter
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Our class, the class of 1949, continues to be active writing books, teaching as emeritus professors, training new classes of astronauts, starting new businesses, and so on. Hey guys, slow down, take it easy, you're supposed to be retired, though few act like it. It's not surprising for, as we all know, the class of '49 came from the golden years. Not only did our class include many very able people, we were also numerous. Our graduating class of 227 has been equaled in size only a time or two in the last 50 years. **Bill Muehlberger**, living in Austin, Texas, writes, "Still involved in geological training of astronauts." He boasts, "They all are 'A' students!" Bill, is that "A" as in Astronaut? Bill won "best paper award for [his] tectonic map of North America, from the Geological Society of America at their annual meeting in Toronto in October 1998. This is the first time a map has won first prize as a paper." Way to go, Bill. He concludes with "Sally and I travel—a lot." **James Hummel** is still teaching and is professor emeritus at the University of Maryland.

Myron Lipow and **G. Richard Morgan** are both authoring books. Myron's is *Aerojet: The Creative Company*, which was published by the Aerojet history group last August. "I have it all on my computer except for the figures." Myron resides in Rancho Palos Verdes. Dick Morgan writes, "Help, Help! I'm trying to retire but am eminently unable to. Am writing a book on the rocket history of the USA." He would like technical and poignant stories from the '40s, '50s, and '60s. "If you were a graduate student working with Malvia, Zwicki, or von Kármán on the Gemini, Mercury, and other programs, please call 818/704-5662." Dick lives in Canoga Park.

Frank Gift, residing in Rancho Palos Verdes, claims to be "enjoying retirement and working with my investments, especially the stock market. Also exercising and volunteering." Frank, we wonder if your portfolio includes Cisco, Intel, Amazon.com, and some other Internet stocks, as watching those stocks gyrate is real exercise.

Fred Schneider of Sherwood, Oregon, is another entrepreneur: "I retired from IBM in 1988. Moved to Oregon and started a small computer integrator/VAR business with several of my IBM coworkers. The business is very successful and growing. Plan to really completely retire in 2000." Oh sure Fred, to do what, start another business, or fix the Y2K dilemma? **David Liberman** and **Fred Nicolai** both wrote to let us know they are still located in San Diego and Green Valley, Arizona, respectively. Similarly, **Warren Danielson, Alex Drapes, John Hann,** and **Byron Karzas** all wrote to say hello and that they are still at their same respective locations. **James Johnson** has moved to 115 Roosevelt Drive, Poughquag, NY, and **Stan Barnes** is still fighting the good fight for clean water with the California Water Commission and has a new area code, 559.

Keith Kohnen and **John Heath** are both retired. Keith professes to "love Boulder, have been retired for six and a half years and am pleased that **John Price** of the class of '59 has moved into a house two doors away." John Heath writes from Rolling Hills, "now working on the newsletter for the local chamber of commerce. Looking forward to the 50th reunion and will be celebrating 50th wedding anniversary in June." He also is "willing to help for the reunion." **Joe Dobrowolski** take note.

Joe Dobrowolski writes, "I'm working to build enthusiasm for the 50th reunion in May of 1999 and I am serving as general chairman with an excellent committee including **Don Hibbard, Roy Gould, John Heath, Bill Simons,** and **Fred Selleck**." Joe lives in Alhambra and is author of the recently published *Concrete Construction Handbook, Fourth Edition* by the prestigious publisher McGraw Hill. Joe has worked for Caltrans and the

The big snow of January 1949 is not so easily forgotten. Pasadena celebrated the anniversary with a good dusting on the San Gabriels (see cover photo).

Portland Cement Association. We all know he will do a great job as our reunion chairman. Any volunteers, please contact Joe.

Don Hibbard is "still working up geological proposals for oil and gas exploration mainly in California and Nevada." He believes "there is lots of oil and gas to be found in the U.S., and the occasional field trips are enjoyable. Sandy and I enjoy traveling to see our kids and our dozen grandchildren. Getting together with friends and playing tennis are our fun activities. Looking forward to seeing everyone at our 50th reunion." **Carl Price**, living in Princeton, is planning a retirement from Rutgers and continues to be involved in the organization he founded to work on gene-pool-related subjects. Carl suggests a Web page for our reunion and will be in touch with Joe D.

Wayne Herzig writes, "I've been retired now for eight years from Herzig Corp. (Mechanical Construction and Engineering), which I spent 30 years building, and have adapted well (I think) to tennis; vegetable and fruit cultivation in my back yard; investing some; traveling; and occasional visits with old Caltech friends, including **Sam Fong**, **Hank Fasola**, **Bill Simons**, **Dwight Schroeder**, **Dave Nielsen** '46, **Warren Danielson**, and others. Bev and I usually get to Seminar Day each year and have taken trips with the Caltech Associates such as to the Keck and Palomar telescopes and on a geological tour of Death Valley. Looking forward to the 50th reunion in May."

Naomi Kashiwabara writes, "Lucky to live in San Diego. I've been in this wonderful place since 1950." Good call, Nish. **Steven Weisbrod** is also living in San Diego: "I'm now retired but I still do occasional consulting." **Fred** and Gretchen **Eimer** '47 have recently acquired a pied-à-terre in San Diego. **Richard Patterson** of Hacienda Heights writes, "I have been retired from Bechtel for 10 years and have enjoyed every minute of it. Ran my first 10K in 65 minutes and enjoy visiting with granddaughter and husband and my four-year-old great granddaughter." Lucky man!

Gene Six in Glendora has a new area code, 626, and has been "enjoying the well-organized Seminar Days. The sessions are well planned and professionally presented." He adds, "This is my fifth year of retirement from college education."

Sylvia Hirschberg of Carlsbad writes, "Sadly, **Walter [Hirschberg]** passed away from complications following open heart surgery, then lung cancer. Caltech provided us with an exceptional life because he was an exceptional man." Also **Davenport Browne**'s daughter Maxine Walling wrote, "I am sorry to report that our father died on May 31, 1997, in Salem, Oregon."

Bill Woods writes from Laguna Hills "Thanks for helping us keep in touch. Bev and I have now moved full time so that we can look over the Pacific, the move was a little dramatic, taking place during last winter's El Niño storms! We survived and are now well situated" [saturated?]. The door is open."

Frank Shelton from Colorado Springs writes, "I worked three years at Sandia Corp. then four years as technical director at the Department of Defense, and for 30 years was vice president and chief scientist for Kaman Science Corp. I founded Shelton Enterprises, Inc., which publishes technical books and articles.

Bill Holladay '24, yes that's the class of '24, writes me that he celebrated his 97th birthday and, as the guest list was over 40, he had to have two parties. He is in good health and his blood pressure is that of a teenager. This year he visited the Hearst castle, went on the Caltech cruise in a sailboat to the Seychelles, and spent a number of weekends at his summer home at Big Bear Lake. As this will be Bill's 75th reunion we might make him an honorary member of the class of '49.

Bill Basham continues "to teach a physics class and lab at the University of Texas, on the Permian Basin in Odessa," and says he enjoys the contact with the students. **Art Bruington** is "happily retired as former chief engineer of the Los Angeles Water Department, however I have accepted a short term revisit as general manager of the Irvine Water District. Goal is for a quick re-retirement. Otherwise all is well with Louise and me."

Hank Fasola is another Techer who can't stay retired. He has a company that makes electric propulsion systems for model airplanes. **Clayton Fletcher** maintains contact with Caltech friends from east North Bay at bi-monthly luncheon meetings.

Ed Fisk informs us that "My wife, Mary, and I have four daughters only, however we failed to send them off to Oxy to coach the football team. Our oldest grandson is a Caltech student on a three-year full scholarship and beginning work on a PhD in chemistry. Second grandson is in pre-med and we are expecting our third great grandson in March. My how time flies." **Aaron Fletcher** fills his spare time as an enrollment agent for H&R Block during tax season.

Well classmates, that's about it except for a bit of news from your class agent and his wife, Pat. My new e-mail address is hcarter1@home.com. We just returned from a land/sea cruise visiting Portugal, Spain, and the exciting ports of Tangier and Casablanca, Morocco. Pat continues to serve on the board of the Science Center and presided over the dedication of a large expansion of the Center. I am busy with the board of overseers at University of San Diego and also serve on the board of a foundation that gives money to engineering schools in California including, of course, Caltech. I have a limited practice in investigating construction defects. Investments, walking, and watercolors are entertaining, but the Jacuzzi at the end of a long day is for me the best way to relax and enjoy, what's that word, oh yes, retirement.

1954

Roland Miller
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This is the second edition of Class Notes for the class of '54. The response is getting better, and I have received quite a few replies to the second set of postcards I sent out. Thanks a lot for your help. Now, for the news.

John Billings is retired in Seattle, where he has been since 1965. He writes, "I have no avocation; i.e. nothing which produces an income in retirement, but the notion of having lots of free time turned out to be a myth. We have a sailboat and like to take summer cruises both in Puget Sound and up into Canadian waters. See you in Pasadena for the reunion."

Ron Ratney writes from Bedford, Massachusetts, "I retired from the Occupational Safety and Health Administration in 1995, after 20 years. However, I moved straight into a job with an environmental and safety health consulting company." I guess some of us just don't know how to quit.

Al Gale started his note to me by saying "I don't have much in the way of news," and then went on to say, "After graduation, I went to work for Aerojet in Azusa and stayed there for 35 years. Well, I didn't stay there all the time. I took field assignments in Denver from 1971 to 1980 and in Australia from 1980 to 1984. After my official retirement in 1989, I worked for them part time for 6 more years, including some interesting assignments in Germany and South Korea. The South Korean trips were especially interesting to me because of my Army service there on occupation duty in 1946–47 and during the Korean War in 1952." Sounds like a lot of news to me. Now he is a volunteer member of the Coast Guard Auxiliary in San Diego, inspecting commercial vessels.

Ray Newburn also said, "Nothing much in the way of news" and then provided an interesting summary of his work at JPL. He is head of the imaging team on the STARDUST mission, which launches to Comet Wild 2 next February. He writes, "We arrive at Wild 2 on January 2, 2004, and hope to return a sample of cometary dust to Earth in January 2006." He thinks that he'll probably retire some time next year, a few months after the launch, and then come back part time throughout the mission. "That should keep me from becoming too mentally ossified."

It appears that we have classmates all over the world. **John Goetten** writes from Mexico that "I am still in Atlixco, Puebla. The news is that the Mexican Maritza has left my life, and Paula and I have reestablished our 50 year association here in Mexico."

And **Mel Goldberg** writes from Altamonte Springs, Florida, that he is retired and enjoying children and grandchildren.

Phil Miller has been married to Elnona Duggan Miller since 1964. (I hope that is the right spelling, Phil, I took it direct from your e-mail.) He obtained his PhD in physics in 1958 and worked at Oak Ridge National Lab until 1988, when he retired. He moved from Tennessee to Texas in 1993 and has seven children and step-children spread out in California, Texas, Tennessee, and Wisconsin. He also has seven grandchildren, including an about-to-be-adopted granddaughter from Russia. He writes, "Besides entertaining ourselves with family, I occupy myself with skiing, salt water fishing, training and showing my dogs in obedience trials, and trying to outwit the damn stock market. Hope to make it to the 45th class reunion in 1999."

Glen Crabbs writes that he is "still living in the same home with the same wife (now 30 years)." He goes on to say, "In 1993 I tried to retire and consult part-time but was talked into being director of quality of a small firm for 3 years. They grew from 50 to more than 250 in those 3 years of a "6-month job" and went public as Powerwave. I retired from there but was talked into consulting part-time for another old friend where I have managed to keep my work to approximately half-time (this consulting appears to be permanent and at my discretion)." Sounds almost like he has made a career out of "retiring." He also said that they are starting to travel again, now that he has the time. He and his wife usually manage to attend Caltech Seminar Days and are planning to be there in '99 for the 45th class reunion. He looks forward to seeing many of you there.

Frank Dryden says that the "last 4 years have been more of the same—consulting on a variety of water recycling and other projects." After many years on the Alumni Association Board, he is now serving as chair of the Caltech Y Board. He has a son, David, who is married to an Australian and living in Sydney, Australia. His daughter, Kelly, is back from Auckland, New Zealand, and is now working at Scripps Institute in La Jolla. Sounds like his family has been spending more time looking at the Southern Cross than the North Star.

Well, I seem to be bumping up against my limit of 1000 words again. If you have responded to me and haven't seen your name in the first two articles, look for the next one. And I'm looking for those of you who haven't responded yet to get back to me. Keep in mind that you can e-mail me at rolmil@sprintmail.com if you don't want to write the postcard. I, personally, have found e-mail to be the easiest way of communicating with people. Also, keep in mind that **Sam Vodopia,** chairman of our 45th class reunion this year, is looking for suggestions and new ideas to make the session more fun; and I have volunteered to be a clearing house for such suggestions. If you write or e-mail me, I will make sure that Sam gets the message. One idea that has come up is to have a golf tournament on one of the days. Let me know if you are interested.

1964

Spice Conant
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Your class correspondent, **Spice Conant**, has nothing to report. Instead, he and **Bob Liebermann** wish to invite you to join the e-mail list of the Caltech Class of '64 Land Mines Round Table. (Also to be known by the unforgettable acronym CC64LMRT.) You probably know that there are millions of land mines scattered all over the earth, waiting to be stepped on. What you may not know is that in 1998 the standard way of clearing an area is to insert a 52-inch rod at a 40-degree angle at one-inch intervals. CC64LMRT will try to suggest clever, Tech-y ways of improving on that slow process.

The CC64LMRT e-mail list is now being compiled. There will be no physical meetings. Only e-mail back and forth: ideas, challenges, and information. CC64LMRT has a good contact with the landmines clearance program at the United Nations in New York City. We will be in regular communication with them, feeding to them for consideration any good ideas that pop up. The CC64LMRT needs to be multi-disciplinary. *We need you!* Drop a note to your

class correspondent.

Steve Green e-mailed some thoughts to me from the department of biology, University of Miami, Coral Gables, Florida. "I've been doing *real* biology (intact animals in their native habitat) since 1966, when I went to Uganda for the first time. Since then, I have studied the behavior and ecology of tropical forest animals (mostly monkeys) in Asia and Africa and have designed game reserves that are functioning in India and Sierra Leone to protect endangered species. Recently, I began some conservation work on whales and dolphins in the Caribbean. Although the field research produces publications, the associated conservation work is more fulfilling. It also adds some diversity to my professional activities in that I've encountered and arrested armed poachers, trained game wardens and rangers, been vilified in the press, received death threats from illegal timber harvesters, and been held at gunpoint by police and soldiers. This helps put into perspective the occasional unpleasantness with a student or the pitfalls of faculty politics. At Miami, I am professor of biology and currently [don't ask why!] chairman of the faculty senate. There I am called sgreen@umiami.ir.miami.edu. Karen and I have also grown two daughters, Rebecca, who starts a Fulbright Fellowship in Turkey this year, and Mara, who is just starting college."

Leon Thomsen reported that he and his wife, Purnima, are doing well in Houston, where Leon has been with Amoco for 20 years. Leon recently served as Distinguished Lecturer with the Society of Exploration Geophysicists. More recently, he was elected chair of SEG's research committee, and he has also addressed the Houston Caltech alumni on the topic of "A Caltech Education at Work: Industrial-Strength Geophysics."

How about opening a class of '64 Web page? Anybody know about that stuff? Which reminds me of this: I [Spice] am a disabled person with brain damage and heart disease. There will have to be a new '64 class correspondent soon. Who will volunteer? It's easy, and has compensations beyond belief. Take the letter I got from **Dennis Kodimer** '69, who "fell asleep with the *Caltech News* on my face, and when I woke up I found gro.tnanoc@ecips imprinted on my nose. So I went to a mirror and found that Spice's e-mail address is **Spice@Conant.org.** Does anyone ever come to the Washington, D.C., area? Marilyn and I live in a distant, woodsy suburb on the fringe of Washington, with many deer, cats, cows, trees, and birds of many feathers; plus 'coons, chipmunks, bears, fishing, easy livin' and good ol' boys. All classmates are hereby invited to visit!"

Barry Moritz wrote, "I am in forced semiretirement (can't work even close to full time due to a physical disability), and I'm living a stone's throw from the Atlantic beaches here in Virginia Beach. Got my PhD in physics/math from the University of Maryland and, with the exception of a few years of postdoc NSF grants just 'a bit' off my specialty, never worked in the field again. Computer systems and I seemed to get along, though, so I kept ends meeting and got my kids grown and educated before I was hit with the medical thing. I even got to play at being president of a small high-tech firm! Now I simply do some musical things in my home studio and play at being grandpa. If you come this far east, drop on in—though my beer consumption has been significantly curtailed, I still do a wicked iced tea."

Fallbrook, California, is home to **Lee Peterson** aka lpeter3619@aol.com "Since graduating I have spent most of my years working at TRW in Redondo Beach and San Diego. TRW funded my PhD studies in environmental engineering at Caltech under Wheeler North, king of the kelp beds. My work at TRW has varied from spacecraft engineering and avionics to environmental database management for the California Coastal Commission. Now I am taking up proposal management services. My lovely wife, Andrea, and I have been married 24 years and have a daughter living in New York and a son who's still at home. Andrea manages our specialty produce farm here in Fallbrook. I have run two marathons in the last five years, though I admit to a bit of walking along the way."

Dave Seib has lived in Costa Mesa and worked for Boeing (née Rockwell) in Anaheim for 20 years. He manages an R&D group that is involved with the development of very long wavelength infrared sensors for defense and astronomy applications. "My wife and I have nearly succeeded in raising three children. Two will be EEs (there must be a strong gene here somewhere!). I enjoy hiking and backpacking in the local mountains and the Sierra Nevada, visiting the Southern California beaches, woodworking, travel, jogging, and watching water polo games with my son playing for Harvey Mudd and drubbing the Caltech team I used to play for."

Dave Hammer sends this news. "Married, two children, aged 13 and 16. Twenty years at Cornell, as professor of EE. In recent years, I've run into **Bob Liebermann, Dick McGehee,** and **Ed Lee.**

Theodore Tarby is an MD and PhD, living in Paradise Valley, Arizona, a lovely community near Phoenix. **Steve Gorman** is in Houston and can be reached at stephen.a.gorman@jsc.nasa.gov.

"In the years since Tech," says **Malcolm Morrison**, "most of my professional work was fair, some good, none excellent, but my last job interview was in 1969 so my bosses put up with me well. Personal and family life were great. Some days I don't want to work, but no days do I want to retire. When my boss wises up, I'll move to a backwater, do some volunteering, and watch my sun set. Hopefully sooner rather than later."

In Stony Brook, New York, **Bob Liebermann** is chair of the department of geosciences at SUNY. His research specialty is in the field of mineral physics and in particular the study of the properties of Earth materials at high pressure and temperature. After managing for 20 years to avoid any administrative positions, he succumbed to an appointment as chair of the newly constituted department of geosciences in 1997. He and his family have been living for the past 22 years on Long Island. His wife, Barbara, teaches French at her high school alma mater. Bob and Barb have raised a family of three—Karen is in Vermont working as an Audubon Camp director; Erica works at a Planned Parenthood clinic in Boston and will soon return to graduate school in nursing; and Mark is completing his senior year at NYU.

Bockett Hunter lives in Riverton, New Jersey, and can be reached at hunterjb@acm.com. And, at 601 Van Ness in San Francisco lives **Larry Gowen,** who is called vux@logx.com (or is it yux@logx.com, Larry?) **Guthrie Miller** is in Los Alamos; **Tom Krueger** is in Kirkland, Washington; **Rod McCalley** is in Palo Alto; **Ralph Young** is in Rochester, New York; and my own backpacking companion **Mike Lambert** is in Stockbridge, Massachusetts.

Bob Ching wrote from Shanghai, China, "Back in '64, I tried in vain to send an announcement of my graduation to a newspaper in Shanghai, my home town. I am now here masquerading as a practitioner in enterprise and economic reforms. I surprise myself how often I reach back to my physics background to help communicate my ideas."

Reverend **Jim Arenz, SJ,** is another far-flung classmate. "After 30 years as a professor of mechanical and aeronautical engineering and sometime dean at three Jesuit universities, I have retired from the full-time faculty. Now at Loyola Marymount University (Los Angeles), I handle occasional engineering courses and over the past two years have collaborated on research of nonlinear mechanical behavior of polymers at the Center for Experimental Mechanics at the University of Ljubljana, Slovenia. An interesting side opportunity was to present a paper on the relation of physical science to the Bible at an international scripture conference there. As a Catholic priest, I am also active in religious ministry to the Loyola Marymount community and on weekends to nearby parishes when in Los Angeles. It might be called active retirement!"

Firmly in place in ol' Pasadena and doing very good things, as I hear by the grapevine, is **Bob McEliece**. "Here at Caltech I have remained (absent a few years here and there) since '64!" says Bob.

Classmates: We have a lot of catching up to do. Don't wait for a postcard to drop me a note about your activities during the last 30 years! There has been a delay in getting all class notes published, due to your class correspondent's hospitalizations. I still have some of your nice notes from almost a year ago, but space is limited. Still, send along your news, and I'll be catching up. Forgiving me for this delay, **Dave Hammer** wrote, "It is difficult to offend me, especially by leaving me out of a newsletter. I'll keep on donating to Caltech anyway and continue to be proud of having graduated from (survived?) the place."

1983

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Thanks to everyone who dropped me a postcard or e-mail! These gave me plenty of news to put in this, my first report, and it sounds like everyone is excited to hear about one another. Getting your messages has been a lot of fun. For those of you who haven't had a chance to write yet, or only sent me your contact information, we're anxious to hear from you! E-mail to lmartin@cfia.harvard.edu is easiest, but the postcards are fine.

First, news from people that I put in the "having too much fun" category: **Cheryl Robertson** reports that she spent a "fantastic year . . . in a 4x4 Campervan seeing Australia" as well as traveling around the United States and New Zealand. She liked Australia so much she moved to Perth and is now working as a safety consultant in the offshore petroleum industry. "Most weekends find [her] at the local drop zone where [she's] a skydiving instructor," when she isn't at the beach, bushwalking tracks, or touring wineries. Cheryl offers to "shout a drink" at the local pub for classmates planning to visit Perth.

Tom Berto reports that he married Monica Boettcher in April, and is working as a mechanical engineer at Hewlett Packard, at Lightwave Division in Santa Rosa. He also owns "a 21-acre parcel of rugged forest land," where he's built a studio and workshop, and plans to build a house this winter "in the spirit of the Gamble House in Pasadena." Tom and Monica use the studio for his painting and her fused-glass art. Tom's also playing Ultimate Frisbee three times a week.

Russell Quong says he is "proud to report, I've driven to work safely ten times in a row. And I discovered the hummus dip from Trader Joe's is very good." **Mike Weston** took some time off work last year to bicycle across the country and learn to fly an airplane. Pictures of both are available at http://www.netcom.com/~mweston.

Now, turning to the family updates: **A. J. Capowski** reports that he and his wife, Kirsten, just had their third child, Erik Robert. Erik joins his brothers Brian (6) and Steven (4), and Kirsten complains to A. J. about "the house being awash in testosterone." **Wendy (Rasmussen) Hall** is doing her best to offset this testosterone poisoning, with three ten-year-old daughters (really!), Dallas, Victoria, and Jessica. Wendy reports all her daughters are "ten going on forty." Wendy and her husband, Michael, recently moved to a new house in Newbury Park. **Ken Shrum** also offsets A.J.'s boys with daughters. He is married to Sarah Jamieson Shrum, and their second daughter, Anne Elizabeth, was born in July.

Rusty Schweickart is doing his best to keep the children gender balance even, with two sons, Eric (10) and Eston (6), and a daughter, Sarah, (1). Rusty is married to **Sue VandeWoude** '82, working for Ball Aerospace in Boulder, and living on 35 acres north of Loveland, Colorado. Rusty says he works "in a cryogenics group designing liquid helium and solid nitrogen dewars for NASA spacecraft," and is "just joining a group now that works on a superfluid helium dewar for the SIRTF (Space Infrared Telescope Facility) spacecraft."

Turning now to the career category: **Lynmarie Thompson** has received tenure and been promoted to associate professor of chemistry at the University of Massachusetts, Amherst. **Richard Pogge** has also been promoted to associate professor with tenure, in the astronomy department at Ohio State University. Richard is "maintaining a busy research program studying active galaxies and ionized nebulae with ground-based observatories and the Hubble Space Telescope." I'll put myself in this category as well. I was promoted to professor of government, with tenure, in the government department at Harvard University in 1996. I work on international relations, especially topics in international political economy and international institutions. If anyone wants to be convinced that social science is really a science, just let me know! More importantly, I'm halfway to my goal of hiking the fifty highest peaks in the White Mountains of New Hampshire.

Noemi de la Puente has returned to graduate school, "but this time in something I like." She is in the MFA acting program at the University of Iowa, with a Patricia Roberts Harris Fellowship. She is married to Ron Cohen, and has made appearances on television ("One Life to Live") and in a few films, including "The Devil's Own" and "Carlito's Way." **Carlos Valencia III** completed a secondary teaching credential program at Fresno Pacific University in April. He was quickly hired as a mathematics teacher by Reedley High School. **T. S. Michael** is currently an associate professor of mathematics at the U.S. Naval Academy in Annapolis.

Ri-Chee Chou has recently moved from San Diego to the Bay Area, where he is working on a satellite telecommunication system. He has temporarily left his wife, Elaine, behind in San Diego, while she finishes up her PhD in biology. They're looking forward to being reunited in

October. **Björn Matthias** is living in Heidelberg, Germany, working as a "group leader for electromagnetic computations at the German corporate research center and program manager for electromagnetic computations for ABB corporate research internationally." He is married to Susanne Matthias and has two children, Jessica (9) and Philip (6). **Philip Albert** has moved to Alameda, gotten married, become a patent lawyer, and was made partner at his law firm this year.

Finally, everyone should send their best wishes to **Chris McKinnon**, who reports that "I am about 120 days post–bone marrow transplant in an effort to cure leukemia. Things are going well, but it is still too early to tell if the procedure was successful in eradicating the leukemia." Good luck, and stay strong, Chris!

I'll be writing again for the newsletter in six months, so keep those messages coming! (It will save me the effort of tracking you down, hint, hint.)

1996

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There is a certain theme that runs like a broken record when it comes to class notes. The theme I refer to is the practice of sending blank cards back with no new information other than that you exist and that you have a mailing address. **Tobé Corazzini** '95 made a reference to this in the last Class Notes publication, and I have to reiterate that this is not useful. In the interest of setting an example, let me offer you some details about my life.

I am now working for JAFCO America Ventures, an early-stage venture-capital firm, in Boston. After spending two years in sunny places like Los Angeles and Johannesburg with McKinsey & Co, I decided that I needed to be in some place that actually has seasons. Apart from changing the toner and making coffee at JAFCO, I occasionally spend my time funding technology companies in the internet and software space, so if you know of anyone with a bright idea or who is starting a company, send him/her my way. Rooming with me in Boston is **Amalavayal Chari,** who is currently doing his PhD in physics at Harvard. As at Caltech, Chari is doing the academic equivalent of "kicking ass and taking names" at Harvard. Also with us in Boston are **Devabhakthuni Srikrishna**, who is doing his master's at MIT, and **Angie Bealko**, who is doing her MBA at Harvard. Angie writes that prior to Harvard she was "a product marketing manager at ADC Telecommunications in Dallas" and that she spends her free time coaching basketball teams and volunteering at Habitat for Humanity.

I also ran into **Mark Sorensen,** who currently works in Palo Alto for a design engineering firm called Function. He recently received his pilot's license and, having flown with him once, I feel confident in saying that at least when it comes to flying, Mark knows what he is doing. Mark mentioned that **Amir Alagheband** is also working for a design engineering firm but is living in Portland. **Anh Ly** wrote to say that after working two years for Pairgain in Tustin, she is now working for Lucent. **Aimee Quan** is finishing her third year in medical school at the University of Cincinnati and is doing her rotations. Also spending time happily in medical school is **Becky Blankenburg,** who is studying in Chicago. Other people who have mailed in cards to say that they are alive are **Nathan Scandella, Richard Chin, Mintao Fan, Walter Brisken, Chou Hung**, and **Michael Ru. Stephanie Haussmann** wrote in to say that she is getting married to **David Ozenne** '95. Congratulations, Stephanie! **Bryce Engelbrecht** e-mailed to say that he is still at TenFold and has now successfully managed to get more Caltech grads into his company than MIT grads. A worthy achievement indeed and one that needs to be repeated.

1997

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Jonathan Aldrich is doing a doctoral program in computer science at the University of Washington. He says that U of W has an excellent music program, and therefore he may pursue a master's in violin performance concurrently with his doctoral program in computer science.

James and Laura **Dooley** recently celebrated their first wedding anniversary, bought their first home, and remodeled their first bedroom. They are enjoying life in Bellevue, Washington. As part of the direct music group, James is working for Microsoft, writing music composition software for game developers and others. Laura is teaching math and science at a private prep academy on Mercer Island, Washington. She is planning to take classes to become a licensed massage practitioner, and James has volunteered his shoulders for her to practice on.

Heidi Eldenburg is back in her hometown of Denver, Colorado, working as a business analyst with Quark, Inc. She is sharing an apartment with a friend, but she and her roommate do not mind guests. Heidi says "If you are ever in town and need a place to stay, drop me a line! (heidile@ugcs.caltech.edu)."

Amy Herr is at Stanford pursuing her master's degree in mechanical engineering with thoughts of continuing on to a PhD. Next year, she will be a resident associate for graduate housing, involved with designing a new engineering seminar specifically for women, and delving into mechatronics.

Andrew Huntington is a graduate student in the materials department of UCSB. He is studying lateral carrier confinement in vertical cavity semiconductor lasers, using molecular beam epitaxy. Andrew says that "Santa Barbara is gorgeous. UCSB is, well . . . the Anti-Tech. Life is VERY good."

Priya Rai is in the biophysics program at UC Berkeley doing a joint PhD in the labs of **Stuart Linn** '62 (a former Caltech graduate himself) and David Wemmer. It involves a lot of running back and forth across campus but she gets to learn about both oxidative damage to DNA as well as NMR.

Adele Upchurch and her husband, Sean, purchased their first home in Chino Hills, California, last December. Adele is working as an ITS system administrator on campus, and Sean is working at JPL.

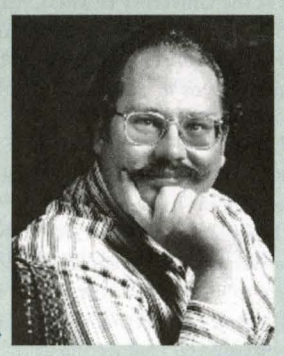
Luke Weisman is a graduate student at MIT and writing a book about angst and art.

Winston Yang is currently a second-year graduate student in math at UW–Madison, looking to specialize in combinatorics. He has just resubmitted his second math paper "Isomorphisms between derivatives and integer partitions" to the journal *Discrete Mathematics*; the paper is a culmination of research that he started in a 1996 SURF with his advisor and professor of mathematics, Richard M. Wilson.

Peter Shor '81, a mathematician with AT&T Labs in New Jersey, has been awarded one of the top honors in mathematics—the Rolf Nevanlinna Prize, presented every four years to a mathematician under the age of 40 in recognition of outstanding work in the mathematical aspects of information science.

Shor was presented with the award, which includes a gold medal and a cash prize, this past August at the International Congress of Mathematicians in Berlin. He is the second Institute alumnus to receive the medal; the first Nevanlinna Prize was awarded to Robert Tarjan '69 in 1982.

In honoring Shor, the Nevanlinna Prize committee commended his pioneering work in combinatorial analysis and the theory of quantum computing, noting that he received "worldwide recognition in 1994 when he presented a computational method for factoring large numbers," which, theoretically, could break many of the standard encrypting systems currently employed to maintain security for electronic cash transactions and online signatures, if carried out on quantum computers. Although only prototypes of quantum computers currently exist, experts speculate that these machines—which would make use of the quantum states of atoms, providing a computing capacity far in excess of current parallel supercomputers—could become a reality within the next decade. In the meantime, Shor's finding has "unleashed a boom in research among physicists and computer scientists. The possibility that in the future many of the safeguards that now protect electronic commerce and correspondence could be jeopardized has been summed up by Shor in a memorable limerick: "If the computers that you build are quantum/Then spies everywhere will all want 'em/Our codes will all fail/And they'll read our email/Till we get crypto that's quantum, and daunt 'em."



Peter Shor '81 has received the prestigious Nevanlinna Prize in mathematics.

After graduating from Caltech with a degree in mathematics, Shor earned his PhD in 1985 at MIT and spent a year as a postdoc at UC Berkeley, before joining AT&T in 1986, where he continues his work on quantum computing, algorithmic geometry, and combinatorial analysis, along with occasional versifying. He and his wife, Jennifer, are also parents to daughter Valerie, born on September 13, 1997.

1937
SHAO WEN YUAN, MS, PhD '42, of San Francisco, has received two honors from the American Biographical Institute (ABI). One, the Twentieth Century Achievement Award, honors his "outstanding service, example, and professional excellence" and features his inclusion in the biographical reference volume *Five Hundred Leaders of Influence*, which will be "on permanent record and display" at the Library of Congress. The second, the ABI's 1998 Commemorative Medal, recognizes Yuan's selection as ABI's Man of the Year for his "outstanding community and professional achievement."

1938
KAMAL DJANAB, PhD, is currently living in Tehran, Iran, and "leading an active social life as an elder scientist." After receiving his degree, he joined the faculty of the newly established Tehran University as an associate professor of physics. Within a few years he became full professor, and eventually dean of the Faculty of Sciences. From 1951 to 1953, during the premiership of the nationalist leader Mohammad Mossadegh, he served as deputy minister of education while continuing his faculty position and teaching duties. In 1955, he represented Iran at the First International Atomic Conference for Peace, in Geneva. He retired from Tehran University in 1973. The author of numerous works in physics, he has been a member of the Academy of Science and Literature.

1956
GORDON SATO, PhD, is living in Lake Placid, New York, with his wife, Miyo, whom he married in 1952. He writes that they have six adult children and two grandchildren. In 1955, he joined the UC Berkeley virus lab, and from 1956 to 1958 he performed research at the University of Colorado Medical School—he was an early user of the tissue-culture technique for growing cells. From 1958 to 1969 he served on the Brandeis University biochemistry faculty, and then in 1969 he joined the Muir College biology department at UC San Diego. In 1983 he accepted the position of director of the W. Alton Jones Cell Science Center, in Lake Placid. While at UC San Diego, Sato began to think about fish farming in the desert and started a prototype at the Salton Sea. Encouraged by the results, he contacted the government of Eritrea (during that country's 30-year war with Ethiopia) with the idea of fish farming near the Red Sea. "A sober assessment of the situation" revealed that this potential had been exaggerated. Rather, he concluded, "vast deserts, readily available sea water, and abundant sunshine can be utilized to grow plants that can be irrigated with sea water to create wealth." The board of directors of his Manzanar Project includes nine Nobel laureates as well as the cartoonist Gary Trudeau. Named after the area where Sato's family, along with many others, was interned during World War II, the project is "a tribute to the internment experience at Manzanar where so many people worked together to make something good blossom in the desert."

1957
RICHARD S. MULLER, MS, PhD '62, and Roger T. Howe, both professors at UC Berkeley and directors of the Berkeley Sensor & Actuator Center (BSAC), have received the IEEE Cledo Brunetti Award, for their "seminal, innovative contributions leading to the inception of the

field of microelectromechanical systems (MEMS). Early in the 1980s, Howe, then a graduate student, and Muller, his research professor, recognized the significance of extending integrated circuit technologies to construct mechanical as well as electronic devices. With their students, the pair moved MEMS toward the mainstream of engineering systems for sensing, control, communications, display, and bioengineering. One of two founding directors of the BSAC, Muller was elected a member of the National Academy of Engineering in 1992 and is the recipient of numerous fellowships and awards. A Life Fellow of the IEEE, he is the editor in chief of the *ASME/IEEE Journal of Microelectromechanical Systems*. He is the author or coauthor of 288 technical papers and 16 U.S. patents.

1959

AKIRA KOBAYASHI, MS, professor emeritus at the University of Tokyo and professor of mechanical engineering at the Science University of Tokyo, has been elected Academician, Engineering Academy of Japan, and has been Japanese national delegate to the International Committee on Aeronautical Fatigue since 1986. A life member of the Caltech Alumni Association, he writes that he has two alma maters, the University of Tokyo—where he received his PhD in 1965—and Caltech, and that he is "proud of being a Caltech graduate."

1965

GERALD R. ASH, MS, PhD '69, a systems engineer at the AT&T Labs, in Holmdel, New Jersey, has authored a book, *Dynamic Routing in Telecommunications Networks*, which was published by McGraw-Hill in February 1998. For his work on dynamic routing, which steers calls around possible delays caused by network congestion or disruption, Ash was named an AT&T Fellow in 1996 and received AT&T's Strategically Significant Patent Award in both 1997 and 1998 for his key patents. As AT&T Labs manager of routing evolution, he is now "leading the effort to extend efficient routing technology to next-generation packet switched networks for integrated voice and data services." Ash lives in West Long Branch, New Jersey.

1967

GARY G. CHRISTOPH was named last October as the first Chief Information Officer of the Health Care Financing Administration (HCFA), the federal agency that manages Medicare and Medicaid. "Although I took this job to modernize the largely legacy Medicare claims processing environment," he writes, "most of my time is now spent on a little-known problem called Y2K." He reports that the agency's systems are composed of "some 49 million lines of code," and adds that ensuring the renovation of the systems "so that Medicare beneficiaries do not have to worry about getting care when the clock rolls over onto 1/1/2000, is now my number one goal, and I am confident we will achieve it." He remarks that in this effort he continues to have the attention and interest of, as well as "very solid support" from, both the executive branch and Capitol Hill. After graduating from Caltech, Christoph received his PhD from the University of Chicago in 1971 and then returned to Caltech for several years as a postdoc. He spent eight years at Ohio State teaching chemistry, receiving tenure as associate professor of inorganic and physical chemistry. Before joining HCFA he worked for Los Alamos National Laboratory for 15 years in a variety of areas, from neutron scattering to supercomputer systems, and he was for a time responsible for the security of the laboratory's integrated computer network. "A charter member of the Caltech Flying Club, I still fly, and have owned a C-182 for over ten years now." He has one daughter, who has just turned 16, and a new wife, and both, he says, "share my love of travel and the outdoors."

1971

MATHAGONDAPALLY A. RAMASWAMY, PhD, of Bangalore, India, writes that he worked for the Aerodynamics Division, National Aerospace Laboratories (NAL), in Bangalore, from 1962 to 1987, for the last 15 years as head of the division. While at NAL he took sabbatical leave to work as a senior research associate at NASA's Langley Research Center from 1978 to 1980. In 1987 he became a professor in the Aerospace Engineering Department, Indian Institute of Science (IISc), also in Bangalore, retiring in July 1997 at age 60, as is mandatory in India. He continues to be active, however, by providing consulting services to several aerospace institutions. His areas of interest have been high-speed aerodynamics and the design of wind tunnels and special test rigs as well as conventional and special strain-gauge balances, and he played a major role in setting up the 1.2-by-1.2-meter Transonic Wind Tunnel at NAL and the Hypersonic Wind Tunnel at IISc. His wife, Uma, who was a research assistant in biochemistry at Caltech from 1966 to 1970, has worked as a computer programmer and systems analyst in India. Their children, Suresh and Sushma, are both married and working at Oracle as software engineers. The Ramaswamys would enjoy reviving contact with those they knew at Caltech.

1974

KENNETH M. LIECHTI, MS, PhD '80, a resident of Austin, Texas, and professor of aerospace engineering and engineering mechanics at the University of Texas, has been named a Fellow of ASME International (American Society of Mechanical Engineers) for his "significant contributions to the field."

1976

RICHARD K. MILLER, PhD, has been named president of the new Franklin W. Olin College of Engineering, to be located in Needham, Massachusetts, adjacent to Babson College. Prior to his appointment, Miller was dean of the College of Engineering and professor of civil and environmental engineering at the University of Iowa, where he conceived the Technological Entrepreneurship Certificate program for engineers, the first program of its kind in the nation, and "also initiated comprehensive engineering curricular reform and helped substantially increase fund-raising and recognition for the College." He has in addition served as associate dean of engineering (academic affairs) and as professor of civil engineering and aerospace engineering at USC, as assistant professor of mechanical and environmental engineering at UC Santa Barbara, and as consultant and advisor on aerospace engineering to the Aerospace Corporation, the Jet Propulsion Laboratory, and Hughes Aircraft Company, among others.

1980

RANDALL L. CALVERT, PhD, has been appointed Don Alonzo Watson Professor of Political Science at the University of Rochester. A specialist in American political institutions who concentrates on legislative politics and how organizational structure affects political outcomes, he has written widely on policy making and on formal political theory. He has taught political science at the University of Rochester since 1987, and he was chair of the political science department from 1991 to 1996. Before coming to Rochester he held the rank of assistant and then associate professor at Washington University in St. Louis. His current professional activities include serving as chair of the political economy section of the American Political Science Association, as a member of the advisory panel of the political science program of the National Science Foundation, and as coeditor of the journal *Economics and Politics*. He lives in Brighton, New York.

1982

BAKI M. CETEGEN, PhD, an associate professor in mechanical engineering at the University of Connecticut, Storrs, has been named a Fellow of ASME International (American Society of Mechanical Engineers). He is also a member of the Combustion Institute and of Sigma Xi. He lives in Glastonbury, Connecticut.

1984

JOHN D. SAHR, an associate professor of electrical engineering at the University of Washington, and ELIZA SUTTON, a physician, write: "Our son, John Isaac Sahr, was born on August 1, 1998. He is our first, and is a delight! We have both been able to take parental leave, which is wonderful." They live in Seattle.

1988

ARTHUR W. LUPIA JR., MS, PhD '91, an associate professor of political science at UC San Diego, has been selected by the National Academy of Sciences to receive the NAS Award for Initiatives in Research. He is the first political scientist to receive this award, which is given annually "to recognize innovative young scientists and to encourage research likely to lead toward new capabilities for human benefit." According to the NAS, he was chosen to receive the $15,000 prize "for his contribution to our understanding of the importance of knowledge, learning, and persuasion to political decision making by voters, legislators, and jurors." Much of his research draws on other disciplines, including psychology, economics, and cognitive science. A professor at UCSD since 1990, Lupia has been recognized for his research on rational choice theory and on persuasion and has been the recipient of numerous academic awards, including, in 1996, the American Political Science Association's voting and public opinion section's Emerging Scholar Award, of which he was the first recipient. His work has been published widely, and he is the coauthor with UCSD political scientist Mathew McCubbins of the new book *The Democratic Dilemma: Can Citizens Learn What They Need to Know?* Lupia, McCubbins, and UCSD political scientist Elizabeth Gerber are also recipients of a grant from the Public Policy Institute of California to conduct a study on voter initiatives.

1992

IAN AGOL, of Davis, California, writes that he received his PhD from UC San Diego in topology in June. "I'll be teaching at UC Davis in the fall. I went to Japan for a conference this summer, and I consulted at Microsoft research for a week on quantum computation."

1927

LEE W. RALSTON, of Sunset Beach, California, on October 21; he was 93. He worked in the field of vocational education, emphasizing engineering. He is survived by his wife, Wilma; two sons, Allen and Bill; and a daughter, Ann Carter.

J. DAVIS SHUSTER, of Braintree, Massachusetts, on January 19, 1998; he was 91. He was the head of electrical engineering for Bethlehem Steel at the Fore River shipyard in Quincy, and later a partner with Bowker Associates, a Boston engineering consulting firm. After graduating from Caltech, he worked for several years for General Electric, and then served in South America as chief engineer with Grace Lines, making 21 trips through the Panama Canal. He was a member of the American Society of Naval Engineers and the Institute of Electrical and Electronics Engineers. A past president and member of the Braintree Historical Society, he was involved with a variety of local civic activities. His pastimes included sailing and gardening, and "he was especially fond of dogs." He is survived by Ruth, his wife of 65 years; a son, John; and two grandsons. He was predeceased by his daughter, Betsy.

1928

WILLIAM MORTON JACOBS, of Medford, Oregon, on October 10; he was 90. His career with the Southern California Gas Company and its parent, Pacific Lighting Corporation, spanned 42 years, and he retired in 1972 as chairman and chief executive officer of the Southern California Gas Company. The recipient of the American Gas Association's Distinguished Service Award in 1971, he had served as the president of both that organization and the Pacific Coast Gas Association. He also served for nine years as a guest lecturer at the USC School of Business Administration. Active in a variety of civic organizations, he was a trustee of the California Museum Foundation, chairman of the Central City Association of Los Angeles, president of the Los Angeles Economic Roundtable, and president of the Los Angeles Chamber of Commerce. He served as president of the Caltech Alumni Association in 1947 and as president of the Caltech Associates in 1971 and 1972, and he received the Caltech Distinguished Alumni Award in 1971. Predeceased by his first wife, Frances, in January 1995, and by his second, Zepha, in May 1998, he is survived by a son, William; two daughters, Janice White and Carol Anspach; six grandchildren; and six great-grandchildren "with a seventh on the way."

1931

GLENN J. CHAMBERLAIN, MS '32, of Chula Vista, California, on September 22; he was 88. Although his degrees were in electrical engineering, there were no jobs available in his field during the depression, so he designed and built bridges for the California Division of Highways for many years. Registered in California as a civil, an electrical, and a mechanical engineer, he opened a consulting practice in 1947, which he continued until 1988, past his 78th birthday. In his engineering capacities he designed a variety of structures, his largest job being the 12-story Ridpath Hotel in Spokane, Washington; designed switchboards, distribution systems, and lighting layouts, and contributed to the design of a coal hydrogenation plant; and did structural design and analysis of highly stressed parts and performed thermal analyses,

kinematic studies, and gas-generator designs for aerospace companies. He was a "proud member" of the Half Century Club and "got great pleasure out of socializing with classmates when he attended his 50th reunion." Predeceased in 1980 by his first wife, Portia, he is survived by his wife, Adelina, and by his three sons, Robert (BS '60, MS '61), Jack, and Fred.

1932

ALBERT W. ATWOOD JR., MS '33, of Pasadena, California, on September 2; he was 90. He worked for the Metropolitan Water District—including a stint back on campus as the resident engineer at the Caltech Pump Lab—during the district's construction stage, and then had a long and distinguished career as an electrical engineer with Southern California Edison. Atwood was the founding editor of the *Caltech Alumni Review*, which began publication in 1937 and later became *Engineering & Science* magazine. He put out the original issue on a $150 grant from the Alumni Association, although, he said later, "I think I went $45 over budget." Predeceased in 1988 by Elaine, his wife of nearly 50 years, he is survived by his sister, Sally Daily, by a number of nieces and nephews, and by his dear friend, Lillian Skinner.

W. BAILEY "OZZIE" OSWALD, PhD, of Los Angeles, on July 31; he was 92. One of the first to receive a doctorate in aeronautics at Caltech, he was "one of the outstanding figures of American Aviation in the 'heroic era' of its development," according to Hans Liepmann, Theodore von Kármán Professor of Aeronautics, Emeritus. An interesting fact is that Oswald's first appearance at Caltech coincided with the birth of the Guggenheim Aeronautical Laboratory's 10-foot wind tunnel in 1928, and its decommissioning in 1997 was the occasion of his final visit. Early in his professional career he was a member of the Douglas Aircraft team that created the DC-3, the airplane that made commercial flying practical and that demonstrated the importance of interaction between industry and academia. As chief of aerodynamics, Oswald saw the Douglas commercial series through the prop-driven DC-4 and DC-6, which introduced the nose-wheel and pressurization, respectively, and the jet-propelled DC-8, which introduced turbojet propulsion. He is survived by his wife, Lucia, who was "known to all the Douglas team members as the genial hostess for their famous yearly party."

1933

MOSES B. WIDESS, MS '34, PhD '36, of Walnut Creek, California, on August 16. A division geophysical consultant for AMOCO Production Corporation, he was a pioneer in the development of seismic exploration. In 1977, for his numerous contributions to the field, he received the Gold Medal Award of the Society of Exploration Geophysicists. Born in 1911 in Russia, where his father dealt in emeralds mined in the Ural Mountains, he escaped with his family across Siberia, eventually settling in Pasadena within a block of Caltech. He met his wife, Anneliese, while she was visiting her relative, the eminent Caltech seismologist Beno Gutenberg. It was contact with Gutenberg that inspired Widess to pursue seismology. He is survived by his two sons, Paul and Jim, and by a grandson, Andy.

1937

WILLIAM L. PENN JR., of Easton, Connecticut, on September 20; he was 82. He spent most of his career in the quality-control department of the Remington Arms Division of E. I. du Pont de Nemours & Co., both in Bridgeport, Connecticut, and in Lonoke, Arkansas, where he was active in starting up the operation. He is survived by Marian, his wife of 55 years; a son, Douglas; his brother, Franklin; and several nieces and nephews.

1939

WILLIAM M. NORTON JR., of Hawthorne, Nevada, on July 8; he was 81. After graduating from Caltech he pursued work and further education in Illinois, learning surveying, machine design, and heating and air conditioning. In the early 1940s he returned to California and worked for Convair Enterprises. Later in the decade he worked in Montana on his family's cattle ranch. In the 1950s he returned to California and continued his engineering career with Trane Heating and Air Conditioning, in Manhattan Beach. While in California he frequently enjoyed sailing. After retiring, Norton in 1974 moved to Hawthorne, to enjoy fishing the Walker River and Walker Lake. He married Peggy Grosner in 1976, and together the couple operated the Anchor Motel, in Hawthorne. They enjoyed traveling and camping, and learning the history and geology of the places they visited. An accomplished pianist, he at one time performed as accompanist for a "crooner" on Los Angeles radio, and in Hawthorne he frequently played at local clubs and restaurants. Predeceased by his son James Cole, Norton is survived by his wife, Peggy; a son, William III; a daughter, Julie Larnard; a sister, Nancy Barkley; and three grandchildren, three great-grandchildren, and several nieces and nephews.

1940

GERALD B. LEVIN, MS '41, on April 4, 1998. He is survived by a son, Gene.

1941

MERRITT V. EUSEY JR., of Kewadin, Michigan, on July 14; he was 79. Predeceased by a daughter, Terry Elizabeth, he is survived by his wife, Elizabeth; a daughter, Regina; two sons, Merritt V. III and John; a brother, Don; and six grandchildren.

1948

ROBERT L. WENICK, of Woodland Hills, California, on March 21, 1998; he was 73. After graduating from Caltech he earned a master's degree at USC. As an engineer he made key contributions to the development of microminiature chips, the bar-code reader, and the Space Shuttle, and Rockwell International presented him with its Engineer of the Year award in 1975. He retired in 1987. He enjoyed reading, crossword puzzles, and bridge, in which he had earned master points. He is survived by his wife, Lillian; a son, Ronald; a daughter, Nancie; and a brother, Merwyn.

1949

WILLIAM A. DOOLIN, of Redwood City, California, on July 2; he was 76. During his career he worked for Douglas Aircraft Company, Southern Pacific, Lockheed, and San Mateo County. He was a chapter leader in the John Birch Society and a member of the Bay Area Electric Railway Association and the Pacific Coast Entomological Society. He is survived by Nancy, his wife of 40 years; five sons, Vincent, Peter, Rory, Patrick, and George; a daughter, Cynthia; a sister, Genevieve Williams; a brother, Brian; and two grandsons.

1952

JAMES G. HELMUTH, MS '53, of Monrovia, California, on September 13; he was 71. In 1953 he and JAMES CHADWICK, ex '44, founded the Chadwick-Helmuth Company. There Helmuth developed and patented various devices with applications to vibration testing, lighting systems, and photogrammetry. Helmuth retired from the company in 1987 as vice president and chief engineer. A senior member of the IEEE, he was also a life member of the Alumni Association. He is survived by his wife, Marvel; his sister, Margot Blum Schevill; his brother, George Hartmann; three daughters, Gay Poff, Rhea Nersesian, and Elizabeth Helmuth; a son, Clark; a stepdaughter, Janisse Coral; and two stepsons, Mike and Greg Cusick.

MELVIN A. PEDERSEN, MS, of Port Angeles, Washington, on July 30, 1997. He is survived by his wife, Josephine.

1953

THOMAS T. TAYLOR SR., MS, PhD '58, of Los Angeles, on August 1; he was 77. Prior to his graduate work at Caltech he had received his BS from Purdue, worked for GE and for the Hughes Aircraft microwave lab, and done research that would culminate in the publication of important discoveries in the field of antenna pattern analysis. After receiving his doctorate he joined the physics faculty at UC Riverside, then in 1963 moved to Loyola Marymount University, where he served as professor and as chair of the physics department until heart surgery complicated by a stroke forced his early retirement in 1977. Two of his most important papers were "Design of Line Source Antennas for Narrow Beamwidth and Low Sidelobes" (*AP Transactions*, 1955) and "Design of Circular Apertures for Narrow Beamwidth and Low Sidelobes (*AP Transactions*, 1960), the latter of which received that year's Best Paper Award from the Institute of Radio Engineers (now the IEEE). Other honors included membership in Sigma Xi and Tau Beta Pi and election as a Life Fellow in the IEEE. He published the textbook *Mechanics: Classical and Quantum* in 1976. Although somewhat disabled by the stroke, Taylor continued to participate in family travel and camping vacations, and to pursue carpentry and mechanical projects. His invention of a clock utilizing a circuit for electrically controlled intermittent motion was awarded a U.S. patent in 1995. He is survived by Grace, his wife of 40 years; a daughter, Francesca; a son, Thomas T. Jr.; and two grandchildren.

1955

ARTHUR W. FORT, PhD, of Lexington, Kentucky, in May 1998; he was 74. Prior to his work at Caltech he had served as a lieutenant in the 82nd Airborne during World War II and had received his BS and MS degrees from the University of Chicago. After receiving his doctorate he worked as a postdoc at the Iowa State Institute for Atomic Studies in 1955. He served as professor at the University of Kentucky and Emory University, and then joined Shell Oil as a research chemist in 1963. For the past 25 years he had been a chemist at the Center for Applied Energy Research, in Lexington. He published at least 20 papers. Predeceased by his wife, Patricia, he is survived by four children and six grandchildren.

1957

ALBERT E. GAEDE, MS '57, of Laguna Niguel, California, on August 27. A Pearl Harbor survivor, he served in the military continuously through World War II and the Korean War and entered Caltech 15 years older than his classmates. During a career in the fields of fluid mechanics and chemistry, he was involved in turbojet, rocket, ramjet, and nozzle design. He was chief of computer sciences and chief scientist at Garrett/AiResearch/AlliedSignal before retiring in 1984, when he became a consultant in the same fields. He is survived by his wife, Jean; a stepdaughter, Susan Ioppini; a stepson, Joseph F. Arnold; two sisters; a brother; and three grandsons and two great-grandchildren.

1958

JAMES N. WEAVER, MS '59, of Menlo Park, California, on July 3; he was 62. After serving in the Navy, he went to work for Varian as a microwave-tube designer. He earned his electrical engineer's degree at Stanford in 1964. During the next 30 years he worked at the Stanford Linear Accelerator Center. "Married and divorced he leaves behind no immediate family, but many devoted friends."

1960

LESTER L. HIRST JR., of Frankfurt, Germany, on April 27, 1998. A professor in the department of physics at Johann Wolfgang Goethe University, he specialized in solid-state physics and magnetism. Prior to joining the faculty there in 1974, he completed his PhD at the University of Maryland, then did postdoctoral work in England and Germany. He is survived by a sister, Margaret Holdredge.

1991

CHARIKLIA ECONOMOUS, MS, on October 9, 1993; she was 27. While at Caltech she worked in protein engineering, and she coauthored several papers and was first author of a piece in *Biotechnology and Bioengineering*. She died of cancer and is survived by her husband, Michael Tsipatis, and by family in Greece.

Fowl-weather friend:
A frequent flier with a fetish for free fish has spent many a winter afternoon catching catfish and other treats in the ponds south of Baxter Hall (see back-page poster). According to campus birdwatcher Alan Cummings, featured on page 8, this year's visitor is a great white egret.

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