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# Caltech News

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Geniuses, the Skipper Too

The Millionaire, and His  
New Life

The "Loh Life" Star

Professors, and  
the Reunion Clan

... Here in *Caltech News*





# Caltech News



## ON THE COVER

Two Beatles and a dean, or at least their namesakes, could be seen frolicking in Millikan Pond in late May. Nate Austin, a Blacker House sophomore majoring in engineering and applied science, created Jean-Paul (named for Dean of Students Jean-Paul Revel), George, and Ringo after deciding the pond needed some cetaceans. Inspired by a Mexican sculpture he spotted, Austin got some funding from Blacker House and the Associated Students of Caltech organization and started welding. Long hours and many copper triangles later, he sums up his experience: "I learned a lot doing the project, like how to weld, for one. And that if you want something badly enough, especially at Caltech, you can make it happen." Alas, the dolphins' romp came to an untimely end soon after this photo was taken. Unnamed persons climbed on the scaffolding, causing it to collapse. The dolphins currently reside on the terra firma of Blacker Courtyard, says Austin.

## Up Front

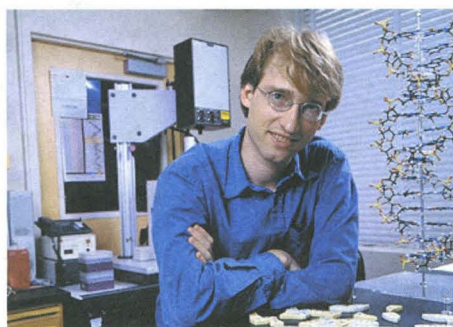
### TWO FACULTY GET THE GENIUS NOD

Two Caltech faculty members—and alumni—are now credentialed geniuses: each has a \$500,000 grant from the John D. and Catherine T. MacArthur Foundation to prove it.

Erik Winfree, PhD '98, assistant professor of computer science, and Hideo Mabuchi, PhD '98, an assistant professor of physics, both received word in June that they are among the 25 new MacArthur Fellows in the program often referred to as the "genius awards." The awards are presented each year to individuals chosen for their exceptional creativity, accomplishments, and potential—no strings attached.

Mabuchi, a specialist in quantum optics, says he was surprised by the phone call from the foundation and is not yet sure exactly what he'll do with the money.

"I may try to incorporate creativity into the type of science education we normally do at Caltech," he said.

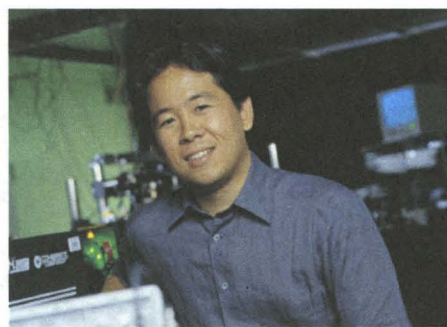


"Physics usually builds technical skills, so I would like to see if something could be done to encourage creative skills."

Mabuchi's research primarily explores the details of how microscopic quantum systems interact with macroscopic measurements and control devices used in the lab. This is an important avenue of work for future electronic devices, because as those devices increasingly shrink in size, designers will find it more necessary to take quantum effects into consideration.

"Microelectronic devices are coming down to the size where you have to understand the physics very carefully," Mabuchi said.

Winfree, who is wrapping up a year as a visiting scientist at MIT, said he



**Professors Erik Winfree (left) and Hideo Mabuchi (above) are the most recent Caltech recipients of "genius awards" from the MacArthur Foundation. Both received their doctorates from the Institute in 1998.**

felt a "sense of freedom" when he received word of the award. His research emphasis is the emerging field of biomolecular computing, and he has been especially interested in DNA computing.

"I might, if I am lucky, be able to augment our understanding and imagination of computation in the molecular world," he said of his goals as a scientist. "The understanding of algorithms will serve as a key to understanding the behavior of complex systems such as the biological cell. The question is how to make this transfer of concepts

concrete and useful.

"Thus, if my brief moment in the limelight is good for anything, I would like to champion—as others have before me—the notion that computer science is not just about computers. It is the study of processes that generate organization, wherever you find them; algorithms are a fundamental part of nature."

Winfree and Mabuchi, along with the other 23 winners this year, were nominated by an anonymous panel and then selected by a 13-member committee, also serving anonymously. The Fellows are required neither to submit specific projects to the foundation, nor to report on how the money is used.

An important underpinning of the program is the foundation's confidence that the Fellows are best able to decide how to use the money in furthering their work.

Mabuchi, 28, earned his AB from Princeton before coming to Caltech on a Millikan Fellowship as a graduate student; Winfree, 30, received his BS from the University of Chicago and, after graduating from Caltech, was a postdoctoral scholar at Princeton from 1998 to 1999.

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Also in this issue: Caltech eProNet offers new career options to Caltech grads; Seminar Day brings reunions and research reports; alums send letters; a cardiologist oversees a heart-y reunion in Miami; and summer blossoms across campus (on our back page poster).

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# From High Tech to the Loh Road



SANDRA TSING LOH FINDS HER OWN WAY  
FROM SCIENCE TO SOCIAL COMMENTARY

BY DARYN KOBATA

On a small, brightly lit stage stands a tall, dark-haired woman. Though she is framed on all sides by towering walls of Chinese takeout boxes, she looks more, say, Latina than Asian. She scurries around the stage, gestures animatedly, and speaks: now in the creaky accent of an elderly Chinese man, now in the world-weary tones of a college kid, now leading the audience in a sing-along, holding an imaginary glass of peach schnapps. "Edelweiss! Edelweiss! . . ."

Meet Sandra Tsing Loh '83, former physics student turned humorist, author, and social commentator, performing her latest solo show, *Aliens in America*. As her fans will attest, Loh's forte is portraying the ironic and disconcerting side of life—those situations in which cultural dissonance, in all its various forms, often seems to play a part. With her trademark wit, tinged with poignancy, she captures the many ways one can suddenly feel like a stranger in a strange land: as an ethnic American battling stereotypes, a single navigating the murky waters of dating, a nerdy adolescent trying desperately to be cool.

The semiautobiographical *Aliens* taps into moments that are diverse in scope—highly personal, yet somehow universal. The tales unfold of her immigrant parents, a Chinese father and German mother, trying to forge a life together in a "brave new (*wildly* cross-cultural) world," and of her own search for a place in that world. As she describes it, "The first confident product of my parents' Sino-Germanic experiment was [older sister] Kaitlyn and I. Looking vaguely Hispanic, we were given Chinese middle names and hustled off to kindergarten in Heidi of the Alps-type dirndls and clogs. We had more strange appendages grafted onto us than the jackalope."

*My physics GPA was so  
low it inspired a kind of  
Talmudic awe . . . I  
didn't so much graduate  
from Caltech as flee.*

Critics and audiences alike embraced *Aliens*—its initial Los Angeles run was extended to 15 weeks before it moved to Seattle—and Loh notes that the show seems to strike a responsive chord with people of all different backgrounds. "Everyone is 'mixed' in some way, simply by being in America." She was also gratified to see several Caltech professors among the audiences, including Ray Owen, former head of biology, and Steve Frautschi and David Politzer, professors of theoretical physics. "I think they appreciated the science jokes—Ray Owen's wife, June, thanked me for the DNA joke!" she says. "The science types come to congratulate and correct me, like the physicist who argued that the formula my sister's character says with such hatred, ' $S = \frac{1}{2}AT^2$ ,' should be ' $S = GG^2$ .' Maybe these kinds of lines reflect my own anger with science, but everyone is forgiven in the end."

As might be deduced from that last statement, Loh's time as an undergrad wasn't entirely rosy. While growing up, Caltech seemed like a second home to her. The daughter of

Top: Happy trails? Little love was lost when Sandra Tsing Loh '83 departed the halls of science, diploma in hand. Above: Belying her middle name, which means "quiet" in Chinese, Loh now gives voice to life's absurdities (here, performing at the J. Paul Getty Museum in 1998).

Continued on page 8 . . .



## CALTECH MADE KEY CONTRIBUTIONS TO GENOME PROJECT

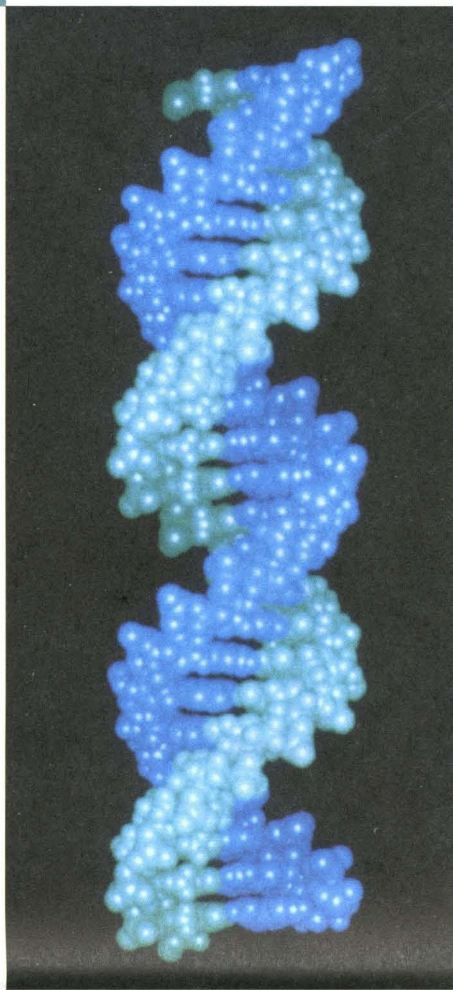
The long and winding road that recently culminated in the successful mapping of the human genome is marked by several landmark Caltech contributions, as well as by a number of Institute signposts pointing toward future directions in genomics research and data management. In particular, Caltech developed two of the key inventions that made possible the ambitious task of sequencing the genome's three billion DNA base pairs. These inventions were especially important because they contributed significantly to faster progress on the Human Genome Project.

The first invention, a method for the automated sequencing of DNA, was developed by former Caltech biology professor Leroy Hood '60, PhD '68, and his colleagues Mike Hunkapiller, PhD '74, Tim Hunkapiller, PhD '93, Charles Connell, and Lloyd Smith, PhD '75. Prior to that, figuring out the sequence of a segment of DNA had been exceedingly difficult and laborious. Because the process was so slow and required the efforts of highly skilled technicians, it was clear to most scientists by the mid '80s that it would not be possible to sequence entire genomes by manual methods.

Hood and his colleagues changed that. They developed a novel chemistry that permitted a machine to detect DNA molecules, using fluorescent light. This method revolutionized DNA sequencing, ultimately making it possible to launch the Human Genome Project. Coupled with more recent advances, this technique has remained the core of the just-completed phase of sequencing the human genome.

A second key invention was developed at Caltech by Professor Mel Simon, who chaired the Institute's biology division from 1995 to 2000, and his coworker Hiroke Shizuya. They recognized that a critical part of sequencing would be preparing large DNA segments for the process. To accomplish this, they invented "bacterial artificial chromosomes" (BACs), which permit scientists to use bacteria as micromachines that can accurately replicate pieces of human DNA that are over 100,000 base pairs in length. These BACs provided the major input DNA for the public genome project.

The Simon research group was also a major contributor to the completion, in 1999, of the mapping and sequencing of chromosome 22—a substantial segment of the human genome. The same team is currently using genomic infor-



Two strands of DNA wind around each other in the famed double helix. In this computer-generated image, one strand is colored blue, the other green. Each horizontal link between the strands is a letter in the genetic code. There are about 24 letters in this image, and about 3 billion in the newly mapped human genome.

mation to create an "onco-chip," which will give researchers convenient experimental access to a miniature array containing hundreds of BACs, each carrying a gene whose mutation can cause human cancer.

Caltech scientists, both current and past, have also been important in promoting the Human Genome Project itself. President David Baltimore has been a highly influential supporter of the project since its inception and chaired the National Institutes of Health meeting at which the project was launched. Caltech biology professors Norman Davidson and Barbara Wold, PhD '78, and current provost, Steve Koonin '72, have served in advisory roles to the project. In 1997, Koonin chaired the JASON study, which reported to the scientific community that quality standards could be relaxed so that a "rough draft" of the human genome could be made years earlier and still be of great utility. This, in fact, was the approach that prevailed.

The Human Genome Project is unique among scientific projects for having, from its inception, earmarked support for research into the ethical, legal, and social implications that the new knowledge of human genes would inevitably bring. Caltech professor and

historian of science Dan Kevles has examined these ethical issues in his book *The Code of Codes: Scientific and Social Issues in the Human Genome Project*, which he coedited in 1992 with Lee Hood.

Caltech scientists are also actively involved in the burgeoning field of genomics, in which newly obtained DNA sequences are used to discover and understand the function of genes in normal biology and in disease and disease susceptibility. This includes devising new ways to extract and manipulate information from the human genome sequence and from recently completed genome sequences of important experimental organisms, such as the fruit fly, mustard weed, and yeast.

In one new project, directed by biology professor Paul Sternberg, Caltech recently became the home site for the international genome database of a key experimental organism called *C. elegans*. This tiny worm has about 19,000 different genes, many of which correspond to related genes in humans. The shared origin and functional relationships between the genes of worm and human (and fruit fly and all other animals) have enabled scientists to learn a great deal about how human genes work.

The Worm Genome Database, called Wormbase, has taken on the major task of collecting, and making computer-accessible, key information about every worm gene, its DNA sequence, and its function in the animal. Achieving these goals will require that new methods in automated data-mining and computing be brought together and fused with expert knowledge in biology, and then made accessible by computer to anyone interested.

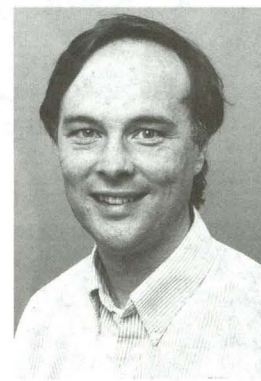
Another major genomics effort at Caltech is aimed at understanding how groups of genes work to direct a fertilized egg's development from a single cell to an adult organism, and how these groups of genes change their action—or fail—in aging, cancer, or degenerative disease. The genomics approach to these problems involves the application of new computational methods and automated experimental technologies.

To do this, Barbara Wold, together with Mel Simon, physics professor Stephen Quake, and Eric Mjolsness of JPL, has established the L. K. Whittier/Caltech Gene Expression Center on campus, funded by the Whittier Foundation. The new work in genomics is also fueling new interdisciplinary programs at Caltech that center on the computational modeling of cells and organisms.

For more information, see <http://www.caltech.edu/events/dna.html>.

## FACULTY MEMBER, FIVE ALUMS NAMED TO NAS

Professor of Chemistry Doug Rees has been elected to the National Academy of Sciences, one of the highest honors that can be accorded an American scientist or engineer. Rees was among 60 new members and 15 foreign associates named on May 1 "in recognition of distinguished and continuing achievements in original research." His election brings to 66 the number of Institute faculty who are NAS members.



Doug Rees

A Caltech faculty member since 1989, Rees is also an investigator with the Howard Hughes Medical Institute. He received his BS in 1974 from Yale

and his PhD in 1980 from Harvard.

At Caltech, Rees heads a research team that uses X-ray diffraction techniques to investigate the relationship between structure and function in a variety of large molecules. The group achieved a major breakthrough in the last decade when it solved the long-standing puzzle of how plant enzymes called nitrogenases take nitrogen out of the air and convert it to ammonia—the process, noted the journal *Science Watch*, "that begins the nitrogen cycle in nature, and on which all life on Earth depends." More information about the Rees group and its research can be found on the Web at <http://www.its.caltech.edu/~reesgrp/>.

In addition to Doug Rees, the following Caltech alumni were admitted into the National Academy of Sciences for their outstanding contributions in various fields of study:

Roger Angel, MS '66, is Regents Professor at the Steward Observatory, University of Arizona, Tucson. Francis Dahlen '64 is a professor of geophysics at Princeton University. William Newsome III, PhD '80, is an investigator with the Howard Hughes Medical Institute and a professor of neurobiology at Stanford's School of Medicine. Sean Solomon '66 is the director of the terrestrial magnetism department at the Carnegie Institution of Washington. Roddam Narasimha, PhD '61, is the director of the National Institute of Advanced Studies and the ISRO K.R. Ramanathan Distinguished Professor at the Indian Institute of Science and Jawaharlal Nehru Center for Advanced Scientific Research, in Bangalore, India. Narasimha was named an NAS foreign associate.



## ROD KIEWIET IS THE NEW GRADUATE DEAN



Rod Kiewiet

"Grad study at Caltech is pretty decentralized," muses Rod Kiewiet, who has just begun to define its center as the Institute's new dean of graduate studies. The role of a student affairs administrator is not a new one for Kiewiet. The Caltech professor of political science served as dean of students from 1992 to 1996. He expects, however, that this position will be "quite different."

"For the most part the various disciplines on campus run their own programs, and they are very good at it," says Kiewiet. "As I see it, our job in the graduate office will basically be to help the divisions recruit the best students and, once they're here, to help them succeed in their career goals. It may sound a bit mom-and-pop, but that's what we want to do."

Kiewiet started his new job July 1, succeeding Professor of Geology and Planetary Science Arden Albee, who stepped down as dean after 16 years. His appointment was announced shortly after *U.S. News & World Report* released its latest rankings of graduate programs nationwide and put many Caltech programs at or near the top in the country (see story, page 6). No stranger to survey methodology himself, Kiewiet is inclined to take such plaudits with a grain of salt.

"The criteria that go into creating this type of rating are extremely subjective," he says. "Obviously, we're doing a great job, but we don't need *U.S. News* to tell us that." He points out that the "essence of Caltech's graduate education—the opportunity it affords students to experience a genuine academic apprenticeship"—isn't something that can be easily quantified in a survey.

"Compared to most competitors, our programs are very small, which means that each student is going to get a great deal of individual attention. It's a great quality to have in education, offering lots of scope for faculty involvement. No matter how we are rated, the ability to offer that type of experience means we're always going to be better than we look on paper."

Kiewiet, who holds a BS from the University of Iowa and a PhD from Yale, joined Caltech as an assistant professor in 1979, becoming full professor in 1989. His research has focused on such areas as electoral politics and voting patterns in the United States and the former Soviet Union, and on the interaction of economics and politics in domestic policy. He is the author of two books—*Macroeconomics and Micropolitics: The Electoral Effects of Economic Issues* and *The Logic of Delegation: Congressional Parties and the Appropriations Process* (with Matthew McCubbins), which received the American Political Science Association's Gladys M. Kammerer Award for the best book on United States National Policy in 1992. A third book, coauthored with McCubbins and two other colleagues, will be published later this year.

In addition to his four years as undergraduate dean, Kiewiet has chaired the Institute's convocations committee (which oversees commencement) and has served on a variety of other campus committees and on the faculty board.



The toast of three presidents, Arnold Beckman, PhD '28 (seated), chair emeritus of Caltech's board of trustees, was saluted by Caltech's present and two past chief executives when the Institute threw the noted inventor-industrialist-philanthropist-alumnus a gala party to celebrate his 100th birthday in April. From left, David Baltimore is joined by Tom Everhart (1987–1997) and Harold Brown (1969–1977).

## MURRAY NAMED TO CHAIR EAS DIVISION

Fifteen years after he headed out of the Division of Engineering and Applied Science with his EE undergraduate degree, Richard Murray '85 is now heading it up as the new division chair. Murray started his new job June 1, succeeding John Seinfeld, who has returned to full-time faculty and research duties after 10 years as chair.

Murray, an associate professor of mechanical engineering, has been on

the faculty since 1991.

"Both as a student and a faculty member, I've been proud to be a part of Caltech," he says. "There's no question that it's an absolutely exceptional environment for the kind of



Richard Murray

cutting-edge research and rigorous education that's needed to move technology forward." As division chair, he looks forward to playing an active role in helping to shepherd these developments.

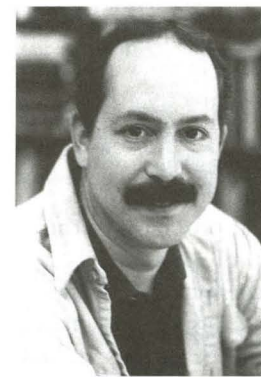
"This is an exciting time for engineering research, as areas such as information and communications, biology and medicine, materials and devices, and global environmental science present new possibilities for redefining the world around us," says Murray. "Caltech has a history of making an impact that is out of proportion to its size. We need to continue to do this without spreading ourselves too thin as we move into new areas. As a division, we need to identify those areas where Caltech's strengths can help us to lead the way and insure that we continue to attract the best people. My job is to help make that happen. I'm very excited to have the opportunity to represent the division at the Institute level and to learn more about the breadth of research going on in EAS and elsewhere at Caltech."

After graduating from Caltech, Murray went on to UC Berkeley, where he earned his PhD before coming back to campus in 1991 as a faculty member. At Caltech, his research interests have included nonlinear control of mechanical systems with applications to aerospace vehicles and robotic locomotion, active control of fluids with applications to propulsion systems, and nonlinear dynamical systems theory. Murray has also worked as a JPL engineer on the Galileo spacecraft, now orbiting Jupiter.

## MEYEROWITZ BLOSSOMS INTO BIOLOGY CHAIR

Professor of Biology Elliot Meyerowitz, a specialist in the genetics of flowering plants, became the new chair of Caltech's Division of Biology on July 1. He succeeds Mel Simon, who has returned to full-time teaching and research after five years in the position.

Meyerowitz, who was previously the executive officer for biology, has been a Caltech faculty member since 1980. He is internationally known for his



Elliot Meyerowitz

research into the developmental biology of flowering plants, focusing specifically on the genes that control the formation of flowers and on the ways in which altering these genes will affect flower

development, structure, and function.

Meyerowitz earned his bachelor's degree in biology from Columbia in 1973, and his PhD from Yale in 1977, where he received the John S. Nicholas Award for the year's outstanding biology dissertation. Following a postdoctoral appointment at Stanford, he joined the Caltech faculty as an assistant professor, and was appointed full professor in 1989.

Elected to the National Academy of Sciences in 1995, Meyerowitz was also the corecipient of the 1996 "Science pour l'Art" Science Prize, presented annually in Paris by the firm LVMH—Moët Hennessy•Louis Vuitton to researchers whose science is of aesthetic and artistic merit. His other honors include the Genetics Society of America Medal (1996), the Gibbs Medal from the American Society of Plant Physiologists (1995), and the Pelton Award from the Botanical Society of America and the Conservation Research Foundation (1994).

Meyerowitz was named to the American Academy of Arts and Sciences in 1991, and to the American Philosophical Society in 1998. He received the Richard Lounsbery Award of the National Academy of Sciences in 1999.



U.S. News & World Report Weighs In Again

Caltech has the top geology and physics graduate programs in the nation, and isn't doing half badly in a variety of other disciplines either, according to recent rankings compiled and released by *U.S. News & World Report*. The magazine, which last year proclaimed the Institute the top undergraduate university in the country, has now published its graduate science-program rankings and its engineering school evaluations on its Web site. The magazine also evaluated major subspecialties within each field of study.

To find the rankings online, along with information about how they were derived, follow the links off the magazine's home page at [www.usnews.com](http://www.usnews.com), or access them directly at [www.usnews.com/usnews/edu/beyond/bceng.htm](http://www.usnews.com/usnews/edu/beyond/bceng.htm) (engineering) and [www.usnews.com/usnews/edu/beyond/bcphd.htm](http://www.usnews.com/usnews/edu/beyond/bcphd.htm) (doctoral programs in the sciences). Alternatively or as an adjunct, read about them here. The overall disciplinary rankings are presented in bold, followed by the various ranked programs within each discipline.

**Biological Sciences**–5, Biochemistry/Molecular–7, Genetics–7; **Chemistry**–2, Inorganic–2, Organic–5, Bio-Organic/Biophysical–1, Physical–2,

Polymer–3; **Computer Science**–11, Hardware–9; **Engineering**–6, Aerospace/Aeronautical/Astronautical–3, Chemical–4, Civil–10, Electrical/Electronic/Communications–6, Environmental/Environmental Health–3, Mechanical–8; **Geology**–1, Geophysics–1, Geochemistry–1, Tectonics/Structure–3; **Mathematics**–8, Applied Mathematics–7, Logic–6, **Physics**–1, Astrophysics/Space–1, Atomic/Molecular–9, Nuclear–5, Elementary Particle–4; **Economics**–14, Microeconomics–10.

HONORS AND AWARDS

*Giuseppe Attardi*, Grace C. Steele Professor of Molecular Biology, and Douglas Wallace of Emory University have received the 2000 Passano Award "for their ground-breaking accomplishments in human mitochondrial DNA research."

Following in the footsteps of Benjamin Franklin and Albert Einstein, three Caltech scientists have been named Foreign Associates of France's Académie des Sciences. The honor went to President *David Baltimore*, Nobel laureate and professor of biol-

Honored for pioneering research in viral genetics that led to the discovery of retroviruses, and for his leadership in national science policy, Caltech president David Baltimore, along with 10 others, received the National Medal of Science from President Bill Clinton at a White House ceremony in March.



ogy; *Seymour Benzer*, Crafoord laureate and James G. Boswell Professor of Neuroscience, Emeritus; and *Peter Dervan*, Bren Professor of Chemistry. The Caltech threesome were among five Americans named to the Académie this year (a total of 48 Americans are members), and their election demonstrates the esteem in which they are held both for their scientific work and personally, according to the award letter. The French scientific society was established in 1666 by King Louis XIV's finance minister Jean-Baptiste Colbert. Original members included René Descartes, Blaise Pascal, and Christiaan Huygens.

Caltech president *David Baltimore* has been elected to the board of directors of the Los Angeles World Affairs Council.

Arthur and Marian Hanisch Memorial Professor and Professor of Chemistry *Jacqueline Barton* has been elected a fellow of the American Association for the Advancement of Science for her "creative demonstration of the importance of shape in the molecular recognition of transition metal complexes by the microstructure of nucleic acid polymers and for landmark experiments that establish DNA-mediated electron transfer over long distances leading to oxidative damage at remote sites."

Visiting Associate in Chemistry *Richard Bing* received an honorary degree from Johns Hopkins University on May 25. He worked at Johns Hopkins during the 1940s with Drs. Alfred Blalock and Helen Taussig, famous for their "blue baby" surgeries, helping diagnose congenital heart disease by catheterization of the heart chambers.

The Program in Early American Economy and Society has selected *Lance Davis*, Mary Stillman Harkness Professor of Social Science, to receive an award "for one of the best journal articles" in the field of American economic history. He and his coauthor, Stanley Engerman, are being recognized for their article "The Economy of British North America: Miles Traveled, Miles Still to Go." The award includes a cash prize.

*Peter Dervan*, Bren Professor of Chemistry, has received the 1999 Richard C. Tolman Medal from the Southern California Section of the American Chemical Society, for his "outstanding contributions to chemistry in Southern California."

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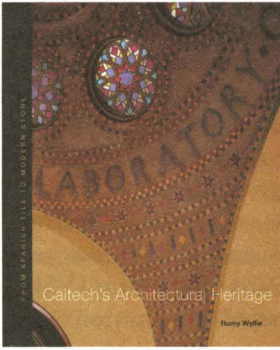
ED STONE TO STEP DOWN AS HEAD OF JPL

Ed Stone plans to step down from his position as a Caltech vice president and the director of JPL sometime next year, President David Baltimore has announced in a letter to the Caltech community.

Crediting him with taking on "formidable tasks" and successfully shepherding JPL "through an era of tremendous change," Baltimore said that Stone will return to full-time teaching and research at the Institute. Stone joined Caltech as a research fellow in 1964, began his tenure track in 1967, and was named the David W. Morrisroe Professor of Physics in 1994. He has directed JPL since January 1991.

The search for his successor has begun with the formation of a search committee that includes Caltech trustees Bobby Inman (chair), Kent Kresa, Ruben Mettler '44, PhD '49, Albert Wheelon, and Gayle Wilson; Vice President for Business and Finance Bill Jenkins; professors Fred Culick, John Ledyard, Anneila Sargent, PhD '77, and Robbie Vogt; and grad student William Weber. Administrative support will be provided by Tom Schmitt, assistant vice president for human resources, and Mary Webster, board of trustees secretary.

People who wish to provide initial input with regard to the JPL director's role can write the search committee at campus mail code 169-84. All communication with the committee will be held in strict confidence, according to Baltimore. He hopes to appoint a new director "early enough to ensure a smooth transition of leadership and continued, effective operation of the Laboratory."



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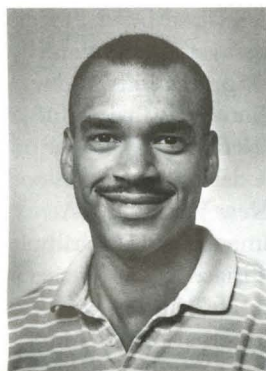


## Friends

### INSTITUTE RECEIVES \$2 MILLION GRANT FROM PARSONS FOUNDATION

The Ralph M. Parsons Foundation has made a gift of \$2 million to be used over three years to purchase scientific computer equipment for Caltech's Biomolecular Structures Laboratory.

The computational biology hardware will be used by scientists such as



Steve Mayo, PhD '88, will use new computational biology hardware funded by the Parsons Foundation to further his research in protein design.

Stephen Mayo, PhD '88, associate professor of biology and Howard Hughes Medical Institute assistant investigator. They will use it to study protein structure, function, and design. "It's phenomenal," said Mayo. "Computational biology is a new and rapidly emerging area and this will be very high-end, high-performance computer hardware. It will be one of the most significant computing facilities at Caltech."

The equipment will provide a means for studying biotechnology materials that could be used in human therapeutics, industrial biotechnology, and agriculture. It will be housed in the Broad Center for Biological Sciences, a structure that, when completed in 2002, will provide space for 10 new Caltech research groups that will work at the cutting edge of the biological sciences.

Caltech kicked off the Biological Sciences Initiative in 1998 to raise \$100 million for new faculty and resources. The Parsons Foundation gift is the first to address one of the key objectives of the Initiative—that of providing equipment for state-of-the-art instrumentation facilities that scientists in the Broad Center will share with others on campus.

The Ralph M. Parsons Foundation was established in 1961 by the late Ralph M. Parsons, founder of the international engineering and construction firm that bears his name. The foundation, since 1974 a separate, freestanding, charitable organization independent of the corporation, awards grants focusing on the areas of higher education, social-impact programs, health, and civic and cultural endeavors.

## Associates Calendar

September 9, *Associates Day Trip to the Palomar Observatory*—"Exploration of the Outer Solar System," with Michael Brown, assistant professor of planetary astronomy. Tours, dinner, and program at the Palomar Observatory. This day trip embarks from Pasadena.

September 9–10, *Associates Overnight Trip to Rancho Santa Fe and Palomar*—"From Space to Cyberspace: Digitizing the Sky," a lecture by George Djorgovski, professor of astronomy, at a Saturday luncheon with the San Diego Associates. Followed by trip to Palomar to join the Pasadena group (see above).

September 21, *Campus Tour and Dinner for New Members and Associates with Prospects.*

September 23, *Northern California Dinner and Program*—"The Human Genome Project," with Barbara Wold, PhD '78, professor of biology. Stanford Court Hotel, San Francisco.



### ASSOCIATES MAKE WAVES

Members of the President's Circle of the Caltech Associates followed the California coastline from Santa Monica Bay south to the Port of Long Beach on their May 4 tour of the structures that tame the marine forces at work in the region. Led by Fred Raichlen, professor of civil engineering and mechanical engineering, the Institute support group learned about the problems caused by the destructive interplay between tides and shoreline and about the ingenious solutions that have been developed to deal with them. They also toured the structures that engineers have designed to create and maintain a usable coastline, including breakwaters, piers, and landfills. Pictured at the Santa Monica Pier are (photo right, from left) Fred Raichlen, Herbert Royden '47, Cornelia Fuller, Duane McRuer '45, MS '48, and Doreen Mason. Enjoying their time in the sun (above) are Camilla Frost and Associates President John Glanville. At top, Marlene Konnar, John Baldeschwieler (Johnson Professor and Professor of Chemistry, Emeritus), and Paul Lee '67, PhD '72, take a time-out from their vantage point overlooking the Long Beach and Los Angeles harbors.



October 5–9, *President's Circle Trip to Mammoth and Owens Valley*, with Clarence Allen, PhD '54, professor of geology and geophysics, emeritus; William Deverell, associate professor of history; and Anneila Sargent, PhD '77, professor of astronomy and director, Owens Valley Radio Observatory.

October 19, *All Associates Program and Dinner*—"The Origin of Earth and the Moon," with David Stevenson, Van Osdol Professor of Planetary Science.

October 23, *President's Circle Program and Dinner*—"The Technology and Science behind the Internet Revolution," with Amnon Yariv, Summerfield Professor of Applied Physics.

November 2, *Joint Event in Boston with the Alumni Association*, with Caltech president David Baltimore.

November 9, *All Associates Program and Dinner*—"Grocery Bags to Baseball Bats: Polymers and Us," with Robert Grubbs, Atkins Professor of Chemistry.

November 13, *President's Circle Dinner and Program*, with Tom Palfrey, professor of economics and political science.

December 1, *Associates Luncheon and Program*—"Images of the Early Universe," with Andrew Lange, professor of physics.

December 7, *Joint Event in San Diego with the Alumni Association*, with Caltech president David Baltimore.

Events will be held at the Athenaeum unless otherwise noted. Individual invitations for each event will be sent monthly. For further information, call the Associates at 626/395-3919.

And don't forget—Plans are under way for the Associates' 75th anniversary celebration in spring 2001!





Loh . . . from page 3

Eugene Loh, PhD '54, and sister of Eugene Loh '80, she says, "I've been going to Alumni Seminar Day since I was 5 . . . I love the campus, it's such a warm place." But studying physics there turned out to be the kind of angst-ridden experience that would later provide grist for her writing mill. "It was so competitive, lots of pressure, everyone scoring 30 percent and 'flaming out.' I felt like a complete freak."

After posting what she believes to be the lowest score ever recorded on the Graduate Record Exam in physics—"The .07th percentile? If you sign your *name* you'll get a higher score!"—Loh opted for an English graduate program at USC and embarked on a performing career, much to her parents' dismay. In a family of science and engineering PhDs, the arts, whether liberal or performing, were highly suspect in regard to future employability. Since that time, she and her family have gained sympathy for each other's views. "They just want to make sure their kids will have a roof over our heads," she says.

In fact, her father now delights in sharing—if not stealing—the spotlight, being one of her most popular subjects. The elder Loh's legendary eccentricity has, among other things, inspired a song, "Mr. Loh," recorded by local band Boy Hits Car, and gotten him picked up by the likes of Anjelica Huston while hitchhiking—a longtime habit he continues at age 79. (Loh recalls that when she hitchhiked with him as a young teen, "he'd hide in the bushes and put me out in front since I was more likely to draw sympathy, and when a car stopped he'd leap out!")

Loh muses on the seeming turnaround in her father, a retired aerospace engineer who was orphaned in Shanghai at age 12: "He's like a child that never got attention. He could never have run off to join the circus—he's always had to work and do the responsible thing. Maybe he didn't really want to work at Hughes. Maybe there's

always been a frustrated performer in him. Now that he's retired, he can live this out." When Loh recently returned to campus as a guest speaker at the Institute's annual International Week campus event, an audience member who had attended Caltech with the elder Loh recalled some of that re-



Loh's father and muse of sorts, Eugene Loh, PhD '54, on a recent visit to the Galapagos Islands—one destination to which he was unable to hitchhike, his preferred mode of transportation.

pressed theatricality: "Even then he was quite a character!"

Loh regaled the International Week crowd with memories of her own Institute days. Claiming that "my physics GPA was so low it inspired a kind of

Talmudic awe," she attributed her passing grades to "lots of partial credit," and speculated that theoretical physics' "dreamy, ineffable" nature allows even hazy and haphazard exam responses to merit points. Loh also surmised that "the things that made me bad at physics make me a good writer—like remembering things in an imaginative kind of way, not as they actually are." When Tom Tombrello, her former faculty advisor, said that everyone thought her to be great at physics, she countered with, "That's why I ended up in drama!"

Although her time at Caltech was rocky ("I didn't so much graduate as flee"), today Loh has made peace with her alma mater and is proud of her degree. "I see it as a character-building experience, even though I remember no physics now." And, she notes, "it's freeing to come back to Caltech and be totally confused about physics, and not be insecure about it." As for speaking on campus, she sums up her experience in one line: "Do not face the rabid Caltech crowds without a chuckly Feynman anecdote!"

If science was a hard row to hoe, Loh acknowledges that the road to a creative career has had its rough patches as well. On the up side, as she met like-minded souls, Loh began coming into her own. "I felt like I'd found a groove of unhappy misfits. It's good to find people as weird and unsuccessful as you are!" At the same time, the meaning of the phrase "starving artist" became all too apparent. Loh learned the useful art of "shrinking down to no expenses if needed," with help from her longtime companion and now husband, Mike Miller. "He's been a studio musician for 20 years . . . he learned how to make a lot of bean casseroles." (The couple might have to stretch those casseroles even further come September, when they expect their first child.)

With successes coming more often in recent years, though, it looks like Loh's bean days should soon be past. "I finally feel like I'm on a roll," she says. She's published several books, including *If You Lived Here, You'd Be Home by Now*, a novel that was named one of the *Los Angeles Times*' Best Books of 1997;

and *Depth Takes a Holiday: Essays from Lesser Los Angeles*, a collection of articles from her days as a columnist at the now-defunct *Buzz* magazine. (*Entertainment Weekly* described *Depth* as "less like . . . an essay collection and more like . . . a long, fabulous phone conversation with a witty, insightful pal.") *Bad Sex With Bud Kemp*, Loh's 1998 show on the dating scene, was well received in New York and L.A. theaters; her commentaries air locally on public radio affiliate KCRW twice weekly ("The Loh Life") and nationally on Public Radio International's "Marketplace" every third Wednesday ("The Loh Down"). She says, "Public radio saved my career . . . it doesn't pay great, but the exposure is important."

A resident of L.A.'s San Fernando Valley—whose "downscale" lifestyle she chronicles in *Depth Takes a Holiday*—Loh occasionally gets recognized "at Trader Joe's or Zankou Chicken,

*She describes her growing success as "kind of like a virus . . . Finally, the number of people reaches a critical mass, and there's enough of a following to become viable."*

usually when I'm very sweaty." She describes her growing success as "kind of like a virus," noting the ironic science metaphor. "People will read one of my books and get to know my name, and then maybe come to a show and bring someone else along. Finally, the number of people reaches a critical mass, and there's enough of a following to become viable."

These days, Loh's profile seems to be going nowhere but up. Nonetheless,



Loh hits the nightclub circuit, circa 1992, with her husband-to-be, studio musician Mike Miller.







she's savvy enough about the caprices of success to keep it all in perspective, taking things "one gig at a time." Even as she pops up in new and sundry places (such as on the cover of *Los Angeles Times Magazine* and in a recent guest-host spot on *Later*, a late-night NBC show "after Conan O'Brien") and works toward publication of another book of essays, *A Year in Provence Van Nuys*, Loh appears to remain firmly planted on Earth—probably due to the very nature of what keeps her going.

As she explains it: "When I was writing for *Buzz*—a glossy, hip L.A. magazine—reality was always different under the surface. What most people feel or experience is that reality, but it's not reflected in the *über* culture. The more you put it out there, though, the more people respond. This is my calling—to point out, as my friend says, that *Us* magazine is really about 'Them'! It will always be there to make a living from."

## HOW TO BECOME FAMOUS

*This excerpt from Depth Takes a Holiday: Essays from Lesser Los Angeles, copyright 1996 by Sandra Tsing Loh, is reprinted with permission from Riverhead Books, a member of Penguin Putnam Inc. Loh is currently at work on another book about life in L.A., A Year in Provence Van Nuys, to be published in spring 2001.*

The American mass media is organized in such a way that any reasonably clever citizen can become famous overnight, and on a shoestring budget too. In addition, Los Angeles is the best place in the country to nurture the kind of fame you make yourself. Armed only with a handful of press releases, you can create your own little globe of notoriety. Performing a single awe-inspiring action in a public place can get you on the evening news and the Associated Press wire, which can lead to feature articles, to Tawny Little mispronouncing your name, and to phone calls from sleazy, rabid radio talk-show hosts. It can even lead beyond—to *People* magazine itself.

So how does one make the evening news without the benefit of having anything important to say, without inside connections, without a grant, a sugar daddy, a political cause even? Lacking any social relevance, the only selling point you have is that you will give great video.

1. *Use a location fraught with symbolism.* Doing something appropriate at the Hollywood sign or the Federal Building will lend an ordinary action great significance and meaning, and makes a readily identifiable setting.

2. *Do something that provokes interaction with the public, possibly at great danger to yourself.* Danger creates an atmosphere of Geraldo Rivera-like tension—i.e., great live television.

Media outlets in other parts of this country—who will be seeing your photo if it goes out on the Associated Press wire—consider Los Angeles to be largely populated by self-promoting yahoos. This is a terrific advantage, as you are operating in an already well-established genre—no one need interview you directly to understand your motivation.

In a sense, we in Los Angeles are the most honest and highly evolved citizens of a nation of self-promoters. Folks in Denver or Kentucky have to pull a child out of a well or grow an enormous glandular pumpkin to get their moments of glory. Thanks to the likes of Angelyne, we can head directly, unapologetically, for the grail itself.

Honors . . . from page 6

Associate Professor of Economics *Jeffrey Dubin* has been awarded a 2000 Haynes Foundation Faculty Fellowship for his proposal, "Economic Analysis of San Fernando Valley Secession." The foundation makes grants for study and research in the social sciences, with emphasis on policy issues of the greater L.A. region.

Professor of Astronomy *Richard Ellis* has received the title of Honorary Professor of Observational Astrophysics, conferred on him by Cambridge University in recognition of his "significant contributions to the development of astronomy at Cambridge." He will hold the title for a period of three years.

Assistant Professor of Economics *Caroline Fohlin* has been awarded a Berlin Prize Fellowship by the American Academy in Berlin. Fohlin's project for her fellowship period of spring 2001 will be "Financial System Design and Industrial Growth: Lessons from the German Experience." Fohlin has also been selected to receive a grant to write the ninth annual Sanwa Monograph on International Economics and Financial Markets, for her proposal titled "Financial System Design and Industrial Development: International Patterns in Historical Perspective." The \$35,000 grant is awarded by the Center for Japan-U.S. Business and Economics Studies at the Stern School of Business, New York University, and the monograph will be published by Cambridge University Press.

Professor of Physics and Applied Physics, Frank J. Gilloon Distinguished Teaching and Service Professor, and Vice Provost *David Goodstein* has been selected to receive Sigma Xi's 2000 John P. McGovern Science and Society Award. He will present the McGovern Award Lecture at the conclusion of the 2000 Sigma Xi Forum, *New Ethical Challenges in Science and Technology*, in Albuquerque, New Mexico, in November.

*Harry Gray*, Arnold O. Beckman Professor of Chemistry and director of the Beckman Institute, has been named a Foreign Member of Great Britain's Royal Society, an honor bestowed each year on a select number of the world's outstanding scientists. One of the world's most prestigious learned societies, whose founding helped usher in the age of modern science, the Royal Society was established in 1661 under the patronage of King Charles II "for the purpose of improving natural knowledge." Isaac Newton served as its first president. In announcing Gray's election, the society credited him with making "seminal contributions to virtually every area of modern inorganic chemistry," adding that "Professor Gray has received much national and international recognition for his work on

inorganic and bioinorganic chemistry, spectroscopy and photochemistry."

Assistant Professor of Physics *Fiona Harrison* has been selected to receive a Presidential Early Career Award for Scientists and Engineers.

*George Housner*, PhD '41, Carl F. Braun Professor of Engineering, Emeritus, has received an honorary doctorate in science from the University of Southern California.

Three Caltech faculty have been elected to the American Association for the Advancement of Science in recognition of their outstanding contributions to science. Faculty Associate in Biology and Senior Councilor for External Relations *Alice Huang* has been elected for her "fundamental studies in the biology of RNA viruses, particularly for studies on the replication and pathogenesis of vesicular stomatitis virus, and for contributions to science education programs." *David Stevenson*, George Van Osdel Professor of Planetary Science, was recognized for his "innovative research on planetary magnetic fields, structures of the terrestrial and gassy/icy planets and satellites, and realistic scenarios of thermal/chemical evolution of the Moon and Earth." Visiting Associate in Electrical Engineering *Armand Tanguay, Jr.*, '71, was cited "for distinguished contributions to physical optics, optical materials and devices, and optical information processing and computing, including the invention of stratified volume holographic optical elements."

Assistant Professor of Physics *Hideo Mabuchi*, PhD '98, has been chosen as an Office of Naval Research Young Investigator. He was one of 26 investigators selected from 178 applicants.

*Frank Marble*, PhD '48, Richard L. and Dorothy M. Hayman Professor of Mechanical Engineering and Professor of Jet Propulsion, Emeritus, has received the Daniel Guggenheim Medal and Certificate, which were presented May 12 at the American Institute of Aeronautics and Astronautics' Global Air and Space 2000 International Business Forum and Exhibition.

Louis E. Nohl Professor and Professor of Chemical Engineering *John Seinfeld* has been elected a fellow of the American Association for the Advancement of Science for his "outstanding contributions to the field of atmospheric chemistry and its role in air pollution and climate."

Instructor in History *Doug Smith* has been awarded a National Academy of Education/Spencer Foundation Postdoctoral Fellowship for 2000–2001. As

Continued on page 14 . . .



# Alum Bitten by the Millionaire Bug

BY ANDREA NYLUND

Spotlights swirled overhead and television cameras zoomed in on Caltech alum Joe Trela '97 as he pondered the million-dollar question on ABC's popular game show *Who Wants to Be a Millionaire*.

His fate rode on the final question: "What insect shorted out an early supercomputer and inspired the term *computer bug*: a moth, roach, fly, or Japanese beetle?"

Trela correctly identified the moth as the culprit and, in one fell swoop on March 23, the 25-year-old became the show's third contestant—and the youngest ever—to take home the grand prize of \$1 million.

"I was lucky, which I guess was enough," said the San Jose native and former Dabney House resident, who is anything but brash. On the contrary, he is a systematic, pensive fellow, who launched his fortune with a toll-free number.

Armed with the advantage of youth—that is, the leisure time to experiment with toll-free numbers—Trela called *Millionaire's* automated hotline this winter for the umpteenth time ("I had been trying since August") and finally connected. Asked three sets of questions, he answered all correctly and later was selected in a random drawing to continue to the next round.

Having attempted to get on the show twice before, Trela vowed this time to cover his weak spots. "I know

what I don't know," he admitted. "I got nailed on music both times."

Determined not to let his lack of knowledge about the Rolling Stones and other rock legends slow him down, the planetary science major headed to the library to prepare for the kill.

In the second round of telephone questioning, he was required to answer five sets of questions. Both speed and accuracy were key. Trela didn't miss a beat. The show called him that same day and invited him to New York. And he asked to bring a guest—his mother.

It's one thing to complete an exam or spout answers to an automated telephone system. It's quite another story to divulge your knowledge in front of millions of television viewers in 52 countries.

Trela took the experience in stride. It had to have been more pleasant than his Caltech theater arts debut in the 1995 production *Revenge of the Space Pandas*, in which he got "wacked" three times a day with pumpkin mix.

"With a certain amount of dignity and charm," he joked.

When it came to performing on television, Trela said, "I felt I had a good chance. It's not a big thing—the music, lights, and crowd. I just closed it out."

Caltech equipped him with some of that ability to focus, he said, and with the tools to assimilate and organize information, particularly within math and science. But it was his Caltech literature professor Jenijoy La Belle whom he invoked on the air, saying she



He's by no means the first Techer to become a millionaire, but Joe Trela '97, shown here rejoicing on the air with Regis Philbin, definitely did it his way.

would be very disappointed in him if he couldn't correctly identify the source of the quote "The first thing we do, let's kill all the lawyers." Trela didn't let her down, correctly citing Shakespeare's *Henry VI, Part ii*.

The pressure intensified toward the end of the show, however, when host Regis Philbin asked Trela which baseball player has been in the most World Series games.

Trela took his single opportunity to do a 50/50, which eliminates two of the possible four answers. He then phoned one of his three personal advisors, which the show refers to as "lifelines."

Although he had a group of his pals from Dabney House on standby as a lifeline, Trela elected to pose this question to his brother, a sports writer. His brother suggested Reggie Jackson as the answer.

"I thought about Jackson but had a feeling about Yogi Berra," Trela recalled. "My brother made it clear that he wasn't sure, so I went with my intuition."

That intuition has paid off in the form of wealth and celebrity status. Recently, Trela participated in a commercial for a bank in Chicago.

He has also now had his own moment as a *Millionaire* lifeline—for singer

Queen Latifah on the *Celebrity Millionaire* version of the show. But when she phoned him with the question regarding a 16th-century poet, Trela was not able to cast his mind successfully back to La Belle's lit class for the answer, which turned out to be John Donne. Queen Latifah passed on the question and walked away with \$250,000, which she donated to charity.

"The attention hasn't started grating on me yet," quipped Trela, adding that his philosophy on life has not changed much since he appeared on the show. "I'm still working it all out."

For now, he is enjoying more time with friends and family. He quit his job as a customer service representative for a semiconductor manufacturer in order to devote more time to finishing a science fiction screenplay he is writing.

"I can do things now that I really want to do," said Trela, who lives with his mother in Gilroy. "We moved from San Jose to Gilroy because of the housing costs. We'll see how long that lasts!" he said with a laugh.

When asked what advice he would give to other *Millionaire* wannabes, Trela joked, "Take advantage of toll-free numbers, read widely, and don't talk to the tabloids."

Nylund is a Los Angeles-based freelance writer.

## LETTERS TO THE EDITOR CONSIDER HIGHS AND LOWS OF MAPS, MOUNTAINTOPS, AND TEACHING



### SKY & TELESCOPE EDITOR REFLECTS ON "MIRROR OF THE HEAVENS"

Just got the latest *Caltech News* (volume 34, number 1) and saw the gorgeous reproduction of the celestial map on the back (reprinted at left). I'm no expert, but there are some interesting things about that map worth pointing out.

First, all the constellations are shown reversed with respect to their appearance in the sky. Early celestial cartographers took this approach because celestial globes (portrayed the same way) were popular at that time, and the idea was to show the universe from the "outside looking in," with Earth hypothetically at the globe's center. However, by the late 17th century, when this map was supposedly

published, such mirror-imaging was already considered an archaic practice.

Second, the map has a series of concentric circles with one planet placed on each (Jupiter and Venus are below center, below Ursa Major). The reason for this is unclear. Third, it really doesn't show all the constellations, nor even all the naked-eye stars, even though the brightness scale (near the bottom) extends to 6th magnitude. Notice how the stars are clustered within each constellation figure but are sparse elsewhere. And, finally, the sequence of Roman numerals around the margin is very strange. By then astronomers were using the 24-hour "right ascension" convention for celestial longitude. Much better celestial maps existed by the time this one was published, so maybe this was a purely

aesthetic rendition. But don't take my word for it. . . .

—Kelly Beatty '73

### ALUM LEARNS HE HAS TROD IN THE SHADOWS OF CALTECH PEAK

I first heard of Caltech Peak in 1999, at the Half Century luncheon for the 50th reunion of the class of 1949. That day, after the lunch, I went home, pulled out my well-used topo map and penciled in "Caltech Peak" on the unnamed peak on my map.

I have not climbed Caltech Peak and probably never will, but I have had many memorable adventures in its shadows.

In the summer of 1950 my father and I camped at Sheep Camp at 11,000 feet elevation, about three miles south-



east of the base of Caltech Peak. We hiked and fished all around the base of the mountain, including visiting Lake South America to the west. I caught an 18-inch rainbow trout, one of my largest catches, in the lake just to the east of the mountain.

In 1953 my wife, Cleo; my cousin; Val Lund '47; and I hiked and camped the south half of the John Muir Trail starting at South Lake, west of Bishop, and ending at Whitney Portal, west of Lone Pine. We used two rented burros to carry our gear. We covered the 105 miles in 13 days. We passed the base of Caltech Peak and camped one night at the same Sheep Camp I had stayed at three years before.

Starting in 1988, Cleo and I, our daughter, her husband, and three of our grandchildren made annual summer pack trips into various places in the High Sierra. We used llamas to carry our food and camping equipment. We covered the entire length of the John Muir Trail in segments over several trips.

One of the most memorable trips was in 1997. We started in Onion Valley, west of Independence. The seven of us used four llamas. We traveled west over Kearsarge Pass to the John Muir Trail. Going south on the Muir Trail, we crossed Forester Pass and camped one night at the eastern base of Caltech Peak, at about 12,000 feet elevation. After continuing south, we turned west at Crabtree Creek and camped at the western base of Mount Whitney. Leaving the llamas tethered in a lush green meadow, we spent the next day making the 14-mile round trip from the campsite to the top of Mount Whitney and back. On our return route we went west, north on the Muir Trail, and finally east over Shepherd Pass. We spent our last night on the trail at Anvil Camp on Shepherd Creek on the eastern slope of the Sierra.

The reason we took such a long, roundabout trip to climb Mount Whitney was because the Forest Service does not allow stock on the trail that goes directly to mount Whitney.

If I had known Caltech Peak existed, I certainly would have climbed it on one of my many trips in the area.

—Dick Patterson '49

#### GREAT PROFS! TEACHERS TELL OF TEACHERS, EDUCATIONAL TRIALS

I was delighted to read in *Caltech News* (volume 34, number 1) that my old prof and friend, Don Cohen, has received the Feynman Prize, an honour which he deserved to win, even all those years ago (circa 1972). He was one of the clearest and most dedicated of teachers in a department renowned for its great teachers.

His course on singular perturbation methods was a delight and is still highly memorable. He had several endearing mannerisms, like the famous

“Don fistication.” This was a curious crushing movement Don used to make with his fists, somewhat suggesting that he was squeezing the life out of a singularly perturbing problem (forgive the Donnish pun). It is not easy to describe it now, but all his students will (hopefully) recognize what I am talking about!

As for what I think makes a good teacher, there are four essentials: a deep understanding of the subject taught; unbounded enthusiasm, humour, and the ability to communicate the excitement; clarity and precision of thought and word; and the ability to put oneself in the mind of a student new to the subject. The rest is window dressing. All the greatest teachers I have encountered, including Don Cohen, had these invariant qualities in huge measure. I was in a privileged position of being able to take courses with Don as well as Feynman himself, not to mention the luminaries of applied math such as Paco Lagerstrom (my supervisor), Gerry Whitham, Philip Saffman, and Herb Keller. It is good that Caltech recognizes great teachers with a prize named after the greatest of them all.

—Chippy Thyagaraja, PhD '72

Culham Science Centre, Abingdon, UK

In my experience the skills of teaching and research are independent variables. Only the rare educator possesses both. A 4th-grade science teacher does not have to do frontline research to successfully instill in young students a love of learning and a rudimentary appreciation of the scientific method. . . . I had a great high school chemistry teacher. He was the reason I chose that profession. When I went east on interview trips just before I got my Caltech PhD, I visited him. He got his PhD in education the same year I got mine in chemistry. Teaching chemistry had nothing in common with doing chemistry research. We barely spoke the same language.

[As an undergraduate] I went to “that other institute of technology.” My first term freshman chemistry lecturer was outstanding. The second semester I was arbitrarily assigned to another lecturer. This one was a real dud. I asked my advisor to switch my section. He refused. I gambled that there would not be any pop quizzes and snuck in to the other's lectures. Naturally, this outstanding lecturer did not get tenure. First term sophomore year was organic chemistry. The lecturer was one of the school's research stars. His lectures were bad, terrible, atrocious. It almost seemed like he was deliberately trying to discourage us. Only later did I find out that was indeed the case. . . . MIT provided an outstanding place to learn, but the average quality of teaching I received was not all that good.

[In graduate school] I was interested

Continued on page 14 . . .

## WHAT MAKES A GOOD TEACHER? WHERE DOES RESEARCH FIT IN?

By Bruce Reznick '73

In the most recent issue of *Caltech News*, you asked readers to share their thoughts on several questions regarding teaching. I can (and probably should) write a book on the subject. First, I should say that I am a Caltech graduate. For more than twenty years, I have had the privilege to be a professor of mathematics at an excellent public research university, the University of Illinois at Urbana-Champaign. I have been active throughout my career in research, and I have also won two college awards for my undergraduate teaching. I feel that my education at Caltech was superb, and it certainly has had a stronger influence on my professional activities than have my graduate studies at Stanford. Almost 20 years ago, I wrote “Chalking It Up,” a guide for new teaching assistants in mathematics, which has been used by more than 60 graduate programs. The third edition is downloadable from my Web page at <http://www.math.uiuc.edu/~reznick/ciu.html>.

My short answer to the question of what makes a good teacher is that a good teacher's primary interest must be successful communication. My long answer is about 16 pages long and contained at the URL listed above. My favorite teachers at Caltech were Prof. W. A. J. Luxemburg in mathematics and Prof. Thayer Scudder in anthropology. I learned an incredible amount of interesting mathematics from Prof. Luxemburg, including the topic which eventually became my PhD thesis. I learned an incredible amount about the way the world works from Prof. Scudder.

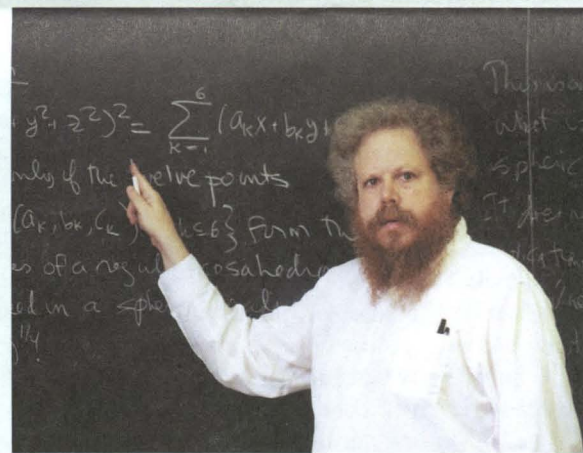
I have two types of answers to the question of how the twin responsibilities of teaching and research conflict and complement each other. These depend on whether you are interested in talking about the ideal university, or the university in the real world. The ideal university is a community consecrated to the creation, transmission, and preservation of facts, knowledge, culture, and wisdom. The university in the real world does many things which are done by other institutions in our society, but it is unique in its respect for the love of learning wherever learning

occurs—in the classroom, in the library, in the laboratory, at our desks. Learning in the real-world university is respected as a legitimate end in itself, as well as a means to other ends.

The enterprise of scholarship takes a great deal of dedicated effort by many people. One transcendent moment of pure intellectual insight will make students feel their college education was worthwhile; three or four will turn them into scholars. These moments are difficult to measure, and so are difficult for administrators to manage. This does not make them valueless! Furthermore, it is difficult to translate these moments into any sort of coherent planning model for the university or reward structure for the faculty. Universities could learn a lot by polling graduates at their 50th reunion to identify the teachers who had had the greatest impact on their lives. But then what?

Ideally, teaching helps you do research, and research helps you teach. You gain a much deeper understanding of your subject when you have to explain the basics to students for whom it is not so obvious. You are forced to broaden the part of your subject with which you are readily conversant, and this helps your research immensely. At the same time, research brings a steady stream of new examples into your teaching, and, most importantly, creates the sort of intellectual open-endedness that uniquely distinguishes education from training. However much you learn, the best college courses leave you aware of how much more you do not know.

In the real world, however, one only has 24 hours in a day. Universities are



**“To paraphrase Tolstoy, good teachers are good in their own way, but bad teachers are alike: they are unable or unwilling to communicate with their students,” writes Bruce Reznick in his online teaching guide, “Chalking It Up.”**

Continued on page 14 . . .



# Olympics, Ho!



BY HILLARY BHASKARAN

Gary Bodie '78 charted a novel course for himself when, after heading west to do undergraduate study at Caltech, he made a 180-degree turn and sailed into a career as a coach. Today he is the head coach of the U.S. Olympic Sailing Team.

Appointed to the top post in September 1998, Bodie has been organizing training camps and trials, supervis-

ing coaches, and coaching sailors. He and his team will attend this year's Olympic games in Sydney, Australia, from September 15 to October 1.

"It's a movable feast," said Bodie from his home in Hampton, Virginia. He was in between trips to San Francisco, where the last members of the 18-person team were being selected from a pool that originally numbered several hundred. Then, following international races in Europe and more training in the States, the sailors and coaches will fly to Australia two weeks before the games begin. In Sydney, Bodie will continue to oversee the U.S. team's physical training and technical preparations. He will help team members analyze the wind and current and set up boats and sails for approximately two races each day. The U.S. team will sail one-, two-, and three-person boats to compete in all 11 events, including the single-handed Laser and triple-handed Soling classes that Bodie coaches. During the races, Bodie and his team of coaches will have to sit tight as communication with the boats

is prohibited, but they will provide feedback after each race.

Nostalgic alums and sailing fans alike should not expect to see Bodie or the sailors on television. "Sailing is never on TV," he says. "No one even knows it's in the Olympics." But in terms of medal acquisition for the States, "it's one of the most prolific sports."

Still, U.S. Olympic sailing has had its ups and downs since the team won gold and silver in seven out of seven events in Los Angeles in 1984. Four years ago the team garnered only two medals—both bronze—in Atlanta, Georgia.

Bodie remains realistically optimistic. "The days of any country getting all the medals are gone," he says, citing an increase in the number of countries participating in the races, some of which concentrate all their resources on top sailors in a few of the races. But despite minimal funding, he adds, the United States competes in all 11 classes and gives the other nations a run for their money. He looks forward to some smooth sailing. "Then we come home

**The head Olympic coach (above) was calling his own shots in 1990, when he sailed into seventh place in the world championship for the 505 class (in the front boat at left). Now when he's not coaching, he sails with his family, including daughters Katie and Kelly (bottom right) in Hampton, Virginia.**





with lots of medals and go to the White House to celebrate.”

#### CHANCE OF A LIFETIME

“I couldn’t pass it up,” Bodie says of the top coaching position. In order to come on board, he gave up what he calls another great job, at Hampton University, where he spent three years developing and heading up the first sailing program at a historically black college. For that job, he had settled down in his hometown of Hampton, where he still lives (between races) with his wife, Mary, and their daughters, Kelly, Katie, and Caroline, ages 11, 8, and 5.

Before that, Bodie held positions at Old Dominion University in Virginia and at the United States Naval Academy in Annapolis, Maryland, where he coached top teams for seven and ten years, respectively. Meanwhile, he kept his feet wet as a racer until 1990, when he placed seventh in the world championship for the 505 class in a level just below that of the Olympics. And of course, he has a degree from Caltech, a school that actually had a sailing team of sorts at least once in its history.

When Bodie came to Caltech a fellow student, Paul Gazis ’76, had recently “resurrected a dormant club,” Bodie recalls. Gazis had scraped together enough funding to get a boat, which he called *Kobold*, “a Dungeons and Dragons name.” A bare-bones team of four to six Techers competed against varsity teams from Stanford, UC schools, and elsewhere, securing an eighth-place ranking among California schools in 1978. “We were okay,” says Bodie.

It seems that this was the heyday for

Caltech sailing. Boating specs would soon change twice, and the Institute would tire of buying new boats in order to stay in the game. *Kobold* now sits in a shed outside Brown Gym.

In the world of sailing, Bodie is more likely to run into an MIT grad than a Caltech one. “Caltech has a natural disadvantage when it comes to sailing,” he says, “unless you rebuild Millikan Pond and enlarge it by a lot.” Being on the water is an advantage that that other institute of technology shares with all the schools where Bodie has coached. “MIT almost invented college sailing,” he says and, riding a wave of enthusiasm for the sport, blurts out, “maybe I should have gone there.” He quickly corrects himself. “I rub it in to all my friends that MIT is for people who get turned down from Caltech.” One of those friends, with a doctorate from MIT, is the chairman of the Olympic sailing committee, Robert Hobbs.

“There are a lot of engineers and scientists in sailing,” Bodie says. “The 505 is a technical class. You can get very involved in fluid dynamics and balancing the forces of lift in the water and the air, which propel the boat forward.”

People, including Bodie, can also get excited about design improvements that make boats go faster and win races. But when it comes to the science of redesign, he admits that the America’s Cup races steal the show. Compared to the “strictly controlled Olympic-class boats,” the America’s Cup boats are “more open to design innovations,” and they’re larger. Thus, “tank testing and computer modeling play a much more important role in that arena.” Bodie

says that he and Hobbs discuss how scientific research could benefit Olympic sailing as well. But sailing in the smaller Olympic boats is “much more empirical,” he adds, and funding for research is hard to come by. Since “there’s no use doing bad science,” he and Hobbs keep their discussions purely hypothetical.

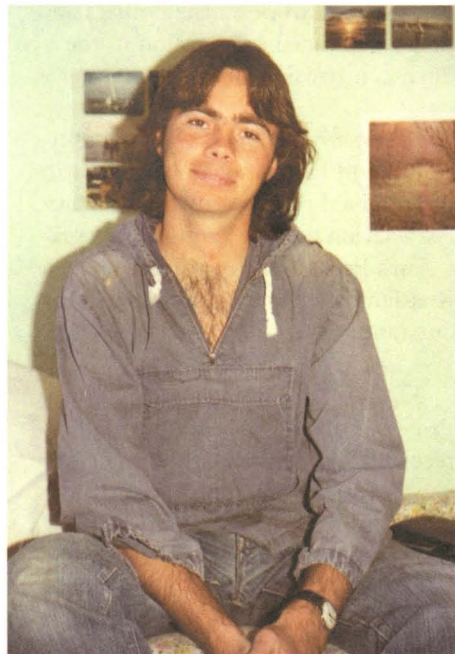
Bodie’s love of sailing goes beyond technical know-how. “What really attracts me—besides tuning to go as fast as possible and helmsmanship, or driving the boat better than anyone else—is the game element of decision-making in sailing.” Taking advantage of shifting wind conditions and water currents, “racing against the race course” and finding its shortcuts, maneuvering among the other boats while “all the time tuning and driving”—these are the challenges that have kept Bodie in the game.

“Now I ride around in a motor boat and watch other people race,” he says. “It’s like being a basketball coach. I don’t shoot the shots. I agonize over every one.”

#### WHY CALTECH?

When Bodie made the decision to apply to Caltech, he wasn’t considering a career in sailing. The sport had been his hobby while growing up in Virginia, providing the occasional summer job. Then Caltech sent him information because of his status as a National Merit Scholar. He landed a spot on the waiting list and was later admitted—a mistake, Bodie suggests. He explains that Caltech had canceled its interviews for applicants in the spring of 1974, presumably because of cost-cutting and environmental concerns related to the oil embargo. So neither the admissions committee nor Bodie realized that, although he was “good in math and science,” he “didn’t have a passion for it.”

That became clear to the undergraduate one summer. “I was a research assistant at JPL, working with a great bunch of people in the exact field that I



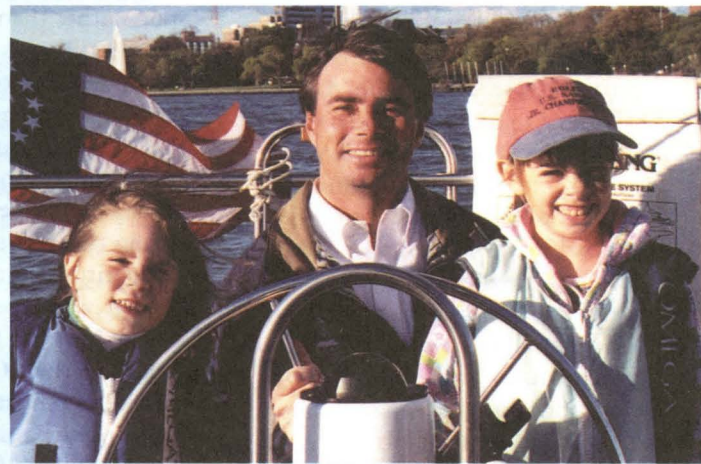
**Adrift at Caltech? Bodie stayed afloat while securing an eighth-place ranking for the Tech sailing team in 1978.**

had the most interest in (environmental engineering), and I realized it still didn’t grab me.” Sailing always had. That emotional connection was important to Bodie, a self-proclaimed product of the do-what-you-love mentality left over from the sixties.

Bodie even loved sailing at Caltech. While fellow students studied, he and a few other diehards would fight L.A. traffic in order to set sail from Long Beach, Marina Del Rey, and points nearby.

“I was a C student at Caltech,” says the Olympic coach. “If I hadn’t sailed there, clearly I would have had better grades. But if I hadn’t sailed at Caltech,” he adds, “I never would have graduated. Sailing was my outlet.”

Caltech News *would like to hear from other sailing enthusiasts. We know from Bodie that, in addition to Gazis, tacking Techers of the seventies included Cora Hunter ’79 (her married name is Swalec) and Ole Eichborn, who attended but did not graduate from Caltech. Send your tall, true tales to [billary@caltech.edu](mailto:billary@caltech.edu).*





a Spencer Postdoctoral Fellow, he will continue his work on the politics and policies of racial segregation in the 20th-century South.

*Alexander Soshnikov*, Olga Taussky—John Todd Instructor in Mathematics, has received the Moscow Mathematical Association's 1999 Young Mathematician's Prize, which is given out to a Russian mathematician under 30 for outstanding work.

*Kip Thorne* '62, Richard P. Feynman Professor of Theoretical Physics, has received an honorary doctor of science degree from Utah State University, where he gave the university's 2000 commencement address.

*Alexander Varshavsky*, Howard and Gwen Laurie Smits Professor of Cell Biology, and Avram Hershko, of the Technion-Israel Institute of Technology, are co-recipients of the \$250,000 Alfred P. Sloan, Jr. Prize, awarded by the General Motors Cancer Research Foundation for their "major contribution to cancer research." They were cited for "the discovery of the ubiquitin system for protein degradation," which "has become central to the understanding of the emergence and progression of cancer."

Associate Professor of History *Alison Winter* has been selected to receive the Arthur Shapiro Award for 1999 from the Society for Clinical and Experimental Hypnosis, for her book *Mesmerized: Powers of Mind in Victorian Britain*. The award is presented each year for the best book on hypnosis.

Nobel Laureate *Ahmed Zewail*, Linus Pauling Professor of Chemical Physics and professor of physics, has received the Faye Robiner Award from Ross University, New York; this is one of several annual awards conferred on individuals "who have made substantial contributions in the sciences and humanities." He has also been elected as a foreign member of the Royal Danish Academy of Sciences and Letters and has received the degree of Doctor of Science, honoris causa, from the University of New Brunswick, Canada.

in teaching, so I signed up to be a TA. Since I was majoring in organic chemistry, I hoped that was what I would teach. Not quite! Caltech needed physical chemistry TAs, and they assigned me to teach there. I did a poor job because I had no interest in the assignment. Sorry, students. The next year I hoped my seniority would get me an organic slot, but the administration again asked me to teach P-chem. This time I passed. My research abilities in physical organic chemistry in no way helped me to be a good teaching assistant in a physical chemistry lab.

Industrial career: DuPont sends each new hire to a course in how to write. The company believes it essential to undo the bad effects students bring after 20 years in the educational establishment. There is also an optional course in how to speak. The student presents a 10-minute lecture on any topic, which the teacher videotapes. The class then delivers feedback to the lecturer. Face the audience. Write legibly. Don't wave your pointer around.

How many entering graduate students who will teach undergraduates get any training in how to teach? How many young professors receive teacher's training? During the early part of my career the presentations made internally were far superior to academic lectures. . . . Our superiority ended when Apple loosed the Macintosh on the world. When speakers made their own charts, quality deteriorated markedly. Slides made by industrial speakers became as crowded and disorganized as those of our academic brothers.

The bottom line: Teaching is a skill, just like research. It is not the same skill. By accident, you can find a Feynman in whom both skills are highly developed. Most schools have to make do with teachers outstanding in neither.

Suggestion: The real problem with the education establishment is leverage. The best teachers stimulate the same number of students as the worst teachers turn off. Imagine a world in which music, acting, or sports were all local. There would be no CDs, no television other than public access cable, and no sports other than the neighborhood beer distributors vs. the VFW. Schools at all levels fail to take advantage of media technology.

The best lecturers in the county/state/country/world should address perhaps 50 percent of the students taking that subject. There should be competitors lecturing to 25 percent, 10 percent, and 5 percent of the students.

The medium for this distribution should be the VCR. Superior lecturers should become media stars and receive compensation due their worth. Mediocre lecturers should find other jobs. Caltech

might franchise its finest teachers to state university systems that can't afford to hire their own stars. This works at every level in the academic chain. A student's 5th-grade English lecturer should be the finest available, not just the one who happens to live in the same neighborhood.

—Frank Weigert, PhD '68

*Caltech News* welcomes letters while reserving the right to select and edit them. Send yours to [hillary@caltech.edu](mailto:hillary@caltech.edu).

famous for continually piling new duties on their faculty without ever removing old ones. Administrators laughingly refer to the "juggling act" of research, teaching, committee work, service to one's profession, professional service to your community, (lately) contributions to regional economic development, etc., let alone one's responsibilities as a family member, a citizen, a sentient human being. The unexamined life will not always wait for summer break. Prof. Scudder told us that some primitive cultures believe in the "principle of limited good"; many academics have a similar "principle of limited enthusiasm," under which an

*Implement the good  
ideas that we already  
know work. Direct the  
minds of the faculty  
toward the minds that  
face us in the classroom.*

interest in teaching may suggest an unhealthy lack of interest in research. And much of the heavy lifting of teaching, especially dealing with weaker students, contributes nothing to one's research except the exhaustion of time to do it. If you are a mediocre teacher, but not a disaster, your career in a research university will not suffer. If you are a mediocre researcher, but not a disaster, time spent at a research institution can seem like a sentence, and, no matter how good a teacher you are, the best career path may be to apply for that post of assistant to the acting associate vice provost.

I have to add that an interest in educational innovation, while necessary and valuable, can also serve as a

distraction from the job of teaching. Many universities, such as my own, have been devoting great amounts of resources towards developing new curricula, modes of instruction, etc. They are strongly supported by the NSF and other funding agencies, both private and public. For a variety of reasons, a marginally successful innovation is more desirable than an extremely successful ongoing program. With the flurry of grant proposals, conferences, evaluative paradigms, and panel discussions, the educational reform community is often a translation of the research culture, with too little emphasis on the student. It's not surprising: our culture treasures structural innovation and cannot easily see that even in the most traditional setting, if the material is new to the learner, then it's new, period. New programs also allow administrators to share the stage. I can't say that the way we teach now is immune from criticism or improvement, but the limiting resource preventing better teaching at the university has never been a shortage of good ideas, but a shortage of will in implementing the good ideas that we already know work, and the will to direct the minds of the faculty toward the minds that face us in the classroom.

It is unmistakably clear from the inside that the reward structure at the research university is tilted towards research: this is the filter by which job candidates are screened; it is the basis for promotion and tenure and most salary raises. I have been fortunate at Urbana to have been rewarded financially for my teaching, as well as my research, but a narrow economic analysis would have compelled me to spend less time teaching and more time writing grant proposals. My weakness is that I find something irresistible in becoming Scheherazade with a syllabus, trying to tell the wonderfully interlinked stories of mathematical discovery and keep the students' attention through the two thousand and one minutes of a semester.

Whose fault is this displacement of learning from its deserved central role in the university? Everybody's. The faculty who look at fame, pleasant working conditions, or financial reward as their goal (and where do we get that idea?); the administrators whose bean-counting souls reduce research, teaching, and service to outside funding, credential validation, and press releases; the alumni donors, who do not often fund chairs for great teachers or modernized classrooms but, rather, fund chairs for great researchers and new laboratory buildings. Hmm. Anybody out there getting some ideas?



## Alumni Update

### CALTECH eProNet: WHERE ALUMNI HIRE ALUMNI

BY MICHAEL ADAMS, *eProNet*

Caltech alumni have become some of the most successful entrepreneurs and business owners in the country. Companies founded and led by Techers—some of them profiled in *Caltech News*—are at the forefront of the country's economic boom. With one of the tightest labor markets in history, these alumni now face the difficult challenge of finding and hiring quality people. Caltech alumni looking for new career opportunities also face a challenge—finding an employer who can appreciate their combination of real-world experience and top-notch education.

Caltech eProNet (find it on the Web at <http://www.caltechepronet.com>) is helping alumni overcome these challenges by matching exceptional individuals with exceptional job opportunities. Caltech eProNet is part of a consortium of alumni associations of select universities that have joined forces to offer superior career resources to their alumni.

"Until now, there has been no easy way for employers who are Caltech graduates to connect easily with other Techers who are midcareer professionals accomplished in their fields," said Andrew Shaindlin, executive director of the Caltech Alumni Association. "Caltech eProNet makes these connections much easier, for the job seekers and for the employers."

#### QUALITY, NOT QUANTITY

Just as Caltech focuses on quality education and students, Caltech eProNet focuses on quality job seekers and the best career opportunities.

"This is where Caltech eProNet stands apart," said Shaindlin. "The caliber of the members is top-notch, making it valuable to start-up companies or established firms that need to hire senior-level talent or top management and can't afford to make a mistake with a single hire. Plus, the job seekers list not only their resumés with 'official' duties and responsibilities, but also a set of key words that employers can use to pinpoint the candidates whose relevant expertise might not be obvious from a job title or company name."

Caltech eProNet's client base of employers is diverse, with job opportunities at companies ranging from dynamic start-ups to venerable corporations. Its employer roster includes many

high-tech and Internet firms, as well as financial service institutions, and communications, biotechnology, pharmaceutical, and consulting companies (a list of employers who use Caltech eProNet is available at the Web site).

#### FOR ALUMNI SEEKING NEW CAREER OPPORTUNITIES

Caltech eProNet membership is a free lifetime service for all Caltech alumni and offers benefits whether alumni are actively seeking a new position or are merely interested in keeping abreast of opportunities in a given field. Security is also a key concern, and Caltech eProNet strictly guards alumni confidentiality.

#### FOR ALUMNI WANTING TO HIRE CALTECH ALUMNI

Graduates of Caltech who have started their own businesses know first-

### HOW A CALTECH GRAD CAN JOIN eProNet

There is no charge for this service. Here's how it works:

1: Caltech grads go to the Caltech eProNet Web site at <http://www.caltechepronet.com> and complete a resumé and profile (these can be updated anytime).

2: The information submitted then becomes part of the proprietary eProNet database, designed to ensure the best fit possible between alumni and hiring companies.

3: eProNet account managers regularly conduct searches for corporate clients. If the Techer is a match for an open position, eProNet sends notification of the employer's interest along with a detailed description of the job.

4: It is then up to the Techer to decide whether or not to release contact information. If the job looks interesting, eProNet puts the alumnus and the hiring company in contact with each other. If not, the alumnus's information remains on file, and his or her name is not divulged to the employer.

### Caltech eProNet membership is a free lifetime service for all Caltech alumni.

hand the caliber of people who graduate from the Institute. Caltech eProNet lets employers quickly and easily find these candidates by using its Managed Search service. After meeting with an employer to identify the key abilities needed in an open position, an eProNet manager searches the proprietary database, identifies likely candidates and sends resumés and profiles (without identifying information) to the hiring manager. Those candidates identified as a "good fit" by the employer are then contacted by eProNet. If the candidate wants to pursue the opportunity, eProNet then obtains the release of contact information so that the employer and candidate can connect.

For those who want a more "hands-on" approach, there is a new service called Direct Search that lets hiring managers mine the database directly with powerful search tools that help zero in on the right candidate for the job.

#### GIVING BACK

By using Caltech eProNet, alumni can also help the Alumni Association fund programs and services for alumni, such as regional chapter events and on-campus reunions. Each time a hire is made, a portion of the "success fee" charged to the employer comes back to the Caltech Alumni Association from eProNet.

"Caltech eProNet is actually a win-win service," concluded Shaindlin. "Alumni get access to great career opportunities for free, and employers can reach Caltech alumni who have the right combination of professional experience and top-notch education and research or other work experience." He also noted that eProNet differs from the publicly accessible online job posting sites in that membership is limited to member schools' alumni, and the major-

## Alumni Activities

September 18–27, *Indian Country Travel/Study Program*, led by Lee Silver, PhD '55, Keck Foundation Professor for Resource Geology, Emeritus.

November 2, *Boston Alumni and Associates Event*, with Caltech president David Baltimore.

December 7, *San Diego Alumni and Associates Event*, with Caltech president David Baltimore.

January 1, 2001, *Tournament of Roses Parade Event*. Includes reserved seating for viewing the parade, reserved parking, and lunch at the Athenaeum.

January 14–29, *Antarctica Travel/Study Program*, led by Joann Stock, professor of geology and geophysics.

ity of positions available are not entry-level jobs for graduating seniors without practical experience.

However, notes Shaindlin, "thanks to SURF and other programs that emphasize practical real-world experience," Caltech seniors will frequently discover that they are qualified for positions that would ordinarily not be available to someone straight out of school.

*Note: Those alumni who were previously registered with Caltech ProNet automatically become members of Caltech eProNet and can begin using the service immediately to update their resumés and profiles.*

### REMINDER: ALUMNI FUND CALL MOVES TO FALL

For the 2000/01 Alumni Fund year, Caltech alumni will be contacting their classmates during October and November to ask for their support of the Alumni Fund. Preparations will begin soon. The fund is looking for alumni who received their bachelor's and/or graduate degree(s) from the Institute to serve as coordinators and callers. Alums who are interested in being Alumni Fund volunteers, or who would like more information, are asked to contact the Alumni Fund office at 626/395–6323.



## SEMINAR DAY SESSION LOOKS BACK ON TIMES PAST, AHEAD TO FUTURE IN SPACE

On May 20, Caltech's annual reunion weekend once again culminated in Seminar Day, a day of lectures, tours, and special events celebrating the Institute's alumni, faculty, and research. At the general session in Beckman Auditorium, the more than 1,000 alumni who returned to campus for the event heard fond reminiscences from recipients of the Distinguished Alumni Awards and predictions about developments in space exploration from NASA administrator Daniel Goldin.

Humility marked the brief acceptance speeches of this year's recipients of the Institute's highest honor. Mihran Agbabian, MS '48, spoke of his encounter as a student with the legendary Robert Millikan. "I would have expected to see him sitting on a throne in some inaccessible location on the campus," he said, adding that he had studied physics using Millikan's textbook. "I didn't imagine I'd meet him at the greasy spoon cafeteria." Agbabian went

on to earn a PhD from UC Berkeley; subsequently, he taught at USC, founded an engineering company, and in 1991 cofounded the American University of Armenia in Yerevan, Armenia, where he is now professor emeritus.

Although Yoshiaki Hagiwara '71, PhD '75, was introduced by President Baltimore as having "revolutionized" modern photography, the current CEO of business strategy and development for Sony's CNC/Semiconductor Company struck a nostalgic note when he recalled his difficulties with English and the gentle encouragement of his Caltech advisor, Professor Amnon Yariv. "He gave me warm and kind advice whenever I dropped by his office, which I needed very much, as a very silent and wordless boy," Hagiwara said, noting that he had come to Caltech partly because of the Glee Club, which he joined as a freshman.

Chaitan Khosla, PhD '90, associate professor of chemical engineering, chemistry, and biochemistry at Stanford, called the award "easily the second most significant honor I've received in my life, the first being the Milton and Francis Clauser Prize [for his doctoral dissertation at Caltech], which I received almost 10 years ago to the day." As for the Institute's impact on him, Khosla acknowledged that the Caltech aura may seem like a cliché, but said that experience bears it out. "Every time I meet a fellow Techer, in the real world or in the academic world, I know them when I see them approach a problem with a direction and accuracy that is truly scary."



Above, NASA administrator Dan Goldin speaks at the Seminar Day general session and, below, joins President Baltimore and this year's Distinguished Alumni Award recipients. From left, Mihran Agbabian, Dan Lindsley, David Baltimore, Dan Goldin, David Lee, Chaitan Khosla, and Yoshiaki Hagiwara.



A brief history of Caltech contributions to genetics research shaped the remarks of Dan Lindsley, Jr., PhD '52, whose work on the *Drosophila* fly has played a unique part in that history. Twice the recipient of the prestigious Thomas Hunt Morgan Award and a member of the National Academy of Sciences, Lindsley was professor of biology at UC San Diego for more than two decades before he retired in 1991.

Finally, David Lee, PhD '74, recalled the special nature of the Caltech experience. A certified public accountant, Lee helped found Global Crossing Ltd, a long-distance telecommunications firm of which he is currently president and COO. Calling the Institute of the turbulent early '70s "an oasis—the biggest scandal was Richard Feynman protesting the closing of a topless bar in Pasadena"—Lee said his Caltech years were the best of his life. "I learned to be bold. How many of you sat down in the cafeteria, discussing physics with Feynman at lunch? Those were great days."

From the retrospective thoughts of the awardees, the morning's focus shifted to the future, as NASA administrator Dan Goldin spoke of the agency's current and long-term plans for space exploration.

After a brief tribute to retiring JPL director Ed Stone, Goldin described NASA's general approach to exploration both within and beyond our solar system, highlighting the role that would be played by promising new technologies. Exploration within our solar system, he said, will increasingly rely on robotic spacecraft and, when necessary, humans. Looking beyond our solar system, new space-based telescopes will dominate the agency's efforts.

A few years ago, Goldin launched a major NASA initiative directed at finding out whether life exists elsewhere in the universe. Thus far, ground-based telescopes have identified some 30 planets beyond our solar system, suggesting that many more exist, some of which may harbor life. Ground-based

methods can only detect very large planets, however, and the Space Interferometry Mission (SIM) currently under way at JPL is slated to introduce new space-based telescopes in 2006. Using the technique of optical interferometry—in which two or more telescopes are linked together to act as a single very large and powerful telescope mirror—SIM will address questions about the size and age of the universe and will search for Earth-like planets orbiting stars up to 100 light-years from our planet. Looking further ahead, Goldin envisions that within 20 to 25 years, space-based mirrors, supported by a network of laser beams, may be developed to directly image distant planets in fine enough detail to discern oceans, continents, and mountain ranges.

Goldin said that the discovery of primitive life forms in some of the least hospitable places on Earth has boosted the prospects for detecting life beyond our planet. A large variety of these so-called extremophiles have now been found on Earth. They include microbes that do not need oxygen or that thrive at temperatures well above the boiling point of water or in rivers with a pH equivalent of sulfuric acid. Goldin noted that their discovery has also raised awareness of the need to design effective safeguards to protect against the risk of contamination that could arise through the possible export and import of terrestrial and nonterrestrial organisms via space missions.

Goldin also commented on the impending end of an era—the conclusion of NASA's three decades of flyby and rendezvous missions, an approach that is increasingly giving way to establishing a sustained, long-term presence in space. The days of infrequent, extremely expensive missions are over, he said. He pointed to the ongoing success of the Mars Global Surveyor, which will, within the coming year, map the entire surface of the Red Planet at a resolution of 30 meters, and map one percent of that surface at a resolution of 1.6 meters.

But advances on many fronts are required for the optimal success of more ambitious and sophisticated missions. Communications capabilities must be speeded up; spacecraft must be capable of maneuvering more independently; and landers must do a better job of locating landing sites. The innovations envisioned for future missions include long-range rovers, atmospherically borne or propeller-driven sensors, and robotic probes that can drill beneath a planet's surface.

"We will search for water," Goldin said of NASA's search for life on other planets; and that search, which has already begun on Mars, is likely to





## LETTER FROM THE ASSOCIATION PRESIDENT

move on to Jupiter's moon Europa, where liquid oceans may exist under surface layers of ice. The sleuths will be mostly robots—small, agile, and intelligent machines, operating largely autonomously. Since the success of these future missions will depend on rovers being able to independently process information as they receive it, the development of artificial intelligence systems that can mimic human reasoning and adaptive flexibility will be a key factor.

In Goldin's view, such advances in information technology, combined with breakthroughs in biotechnology and nanotechnology, will constitute a "golden triangle" ("golden, not Goldin") of technology for future space exploration. Biotech research should lead to new materials that can repair themselves when damaged, while nanotechnology—the design and fabrication of extremely small devices—will yield stronger structural and smaller conducting elements, making way for the development of sensors a thousand times more sensitive than those that currently exist.

To support the coming "renaissance" in technology, said Goldin in his concluding remarks, the academic and commercial sectors must work together with industry and government to make the world a better place for us all. "Together we can revolutionize life on Earth."

This year's annual induction of Caltech graduates into the Half Century Club gave me the opportunity to share a few thoughts with the class of 1950 on how our Alumni Association continues to enrich our lives after graduation. I touched on some of the improvements we hope to make in Association programs in the near future. I would encourage all of you to take advantage of those programs and to contribute your time and energy to these efforts, which support Caltech and its students.

At the luncheon, I mentioned three major ways that I believe the Association has added to the quality of our lives since graduation—first, by providing communication opportunities among ourselves, and between Caltech and us; second, by offering social and intellectual activities through which we can meet classmates and keep up with events on campus; and third, by giving us a range of opportunities to support the Institute's teaching and research missions. All these Association activities have changed over the years since we graduated, and I hope they've become more extensive and better. Let me summarize some of the recent developments in these services.

Each year, the publications *Caltech News* and *Engineering & Science* seem to get more colorful and to contain more articles that are "must" reading. For this, we can thank the staffs of these

periodicals in the Caltech public relations office, who have worked hard to keep us up to date on the Institute's latest activities and in contact with one another. In the last issue of the *Caltech News* Class Notes, Dwight Schroeder, the class correspondent of this year's Half Century Club inductees, reported on the lives of his classmates between graduation and grandchildren. I urge all of you to respond to your own class agent by sending in notes about your lives. Please don't feel like you're bragging when you describe your careers or volunteer work, since your classmates are genuinely interested in what you've done with your lives, and many of us are surprised and inspired by your accomplishments.

To make it easier to reach your class agents, *Caltech News* has added a Class Notes coupon to cut out and mail in; and the Association has recently made it possible for you to identify your class agent and to communicate with him or her electronically via the alumni Web pages. For those of you who don't have agents, you can clip the Personals coupon from *Caltech News* and send that in. The Association will further improve communication among alumni with an electronic directory. Keep an eye on the Caltech Alumni Association Web site and your e-mail in-box for notification about this much-requested new service.

By attending the reunion and coming to Seminar Day, the Half Century Club inductees were participating in the second major area of service provided by our Association. Many have also taken part in Association trips that combine traveling with learning from respected Caltech scholars (and alums) like Bob Sharp, Clarence Allen, and Lee Silver. We're currently working on improving and increasing the frequency of our regional programs for those of you outside the Pasadena area. A major recent innovation spearheaded by Fred Eisen '51 is the alumni college weekend each summer after commencement. We started two years ago with a program on biology; we focused last year on astronomy; and this year we continued with a weekend devoted to guaranteeing that alumni can legitimately claim to have some understanding of what is happening in the new economy.

Finally, your Association offers you the opportunity to improve our society by contributing to the educational and research missions of Caltech. Because of your Caltech training, the Institute has contributed to society through all of your accomplishments. You can augment those contributions by participating in the Association's mentor-



Kent Frewing '61 meets and greets returning Caltech alumni at the Half Century Club luncheon for the class of 1950.

ing program, "Connect eCaltech," and the Signature Awards program, in which alumni present signed reference volumes to hundreds of outstanding high school science and math students to honor their accomplishments and (not incidentally) to encourage them to apply to Caltech. We continue to expand this Association-initiated program in support of Caltech's admissions office. Alumni can also visit high schools and attend college fairs on behalf of Caltech, meet and congratulate outstanding students admitted to Caltech and encourage them to enroll, and encourage outstanding science and engineering undergraduates to consider Caltech for graduate school. Those of us who live in the Pasadena area can meet entering freshmen, graduate students, and graduating seniors at annual Alumni House receptions.

Through all of these avenues, I believe that our Alumni Association enriches and adds meaning to our lives after graduation. It continues to evolve, and I believe that Executive Director Andrew Shaindlin and his predecessors, the dedicated Association staff, and each group of volunteers on the board and committees have continued to improve the Association's service to us alumni and to Caltech. Thank you for your past involvement, and I hope that you'll continue to keep in touch with Caltech and with one another throughout your lives. I salute all of your accomplishments.

*Kent Frewing*

Newly elected Alumni Association president, Blair Folsom, PhD '74, will take over this column in the next issue of Caltech News.



**A NOSE BY ANY OTHER NAME.** Returning to campus for Seminar Day, alumni spouses Marie Beall '75 and Rich Gruner '75 (center) sniff out the array of conducting polymer sensors that constitute Caltech's electronic nose, created by Beckman Institute scientist Mike Freund (left) and Professor of Chemistry Nate Lewis '77, MS '77.



**SEMINAR DAY MEETS DITCH DAY.** Returning alums come face to face, more or less, with student revelers as two popular events—Alumni Reunion Weekend and Ditch Day—collide.



# Classes Notes

## ALUMNI ASSOCIATION FINANCIAL STATEMENT

ALUMNI ASSOCIATION  
CALIFORNIA INSTITUTE OF TECHNOLOGY  
Pasadena, California

### STATEMENT OF FINANCIAL POSITION September 30, 1999

#### ASSETS

|   |            |
|---|------------|
| Cash and Cash Equivalents:                              |            |
| Cash on Hand and in Bank                                | \$ 51,975  |
| Charles Schwab Money Market Fund                        | 43,027     |
| T. Rowe Price Prime Reserve Fund                        | 45,834     |
| Caltech Employees Federal Credit Union                  | 37,112     |
| C.I.T. Consolidated Portfolio - Special Investment Fund | 128,761    |
| Total Cash and Cash Equivalents                         | \$ 306,709 |
| Investments:  |            |
| C.I.T. Consolidated Portfolio - Life Memberships        | 3,377,655  |
| University ProNet                                       | 5,000      |
| Accounts Receivable                                     | 5,636      |
| Investment Income Receivable                            | 30,905     |
| Inventories   | 6,416      |
| Deferred Expenses                                       | 52,556     |
| Postage Deposit   | 4,085      |
| Computer and Other Equipment                            | 17,594     |
| Accumulated Depreciation                                | (15,878)   |

**TOTAL ASSETS** ..... \$ 3,790,678

#### LIABILITIES

|   |           |
|---|-----------|
| Accounts Payable  | \$ 75,443 |
| Deferred Income:  |           |
| Investment Income from C.I.T. Consolidated Portfolio - Life Memberships | 111,642   |
| Program Income  | 72,700    |

**TOTAL LIABILITIES** ..... \$ 259,785

#### NET ASSETS

|                         |              |
|-------------------------|--------------|
| Life Membership Reserve | \$ 3,377,655 |
| Reserve for Directory   | 21,678       |
| Investment in Equipment | 1,716        |
| Surplus                 | 129,844      |

**TOTAL NET ASSETS** ..... \$ 3,530,893

**TOTAL LIABILITIES AND NET ASSETS** ..... \$ 3,790,678

### STATEMENT OF ACTIVITIES Fiscal Year Ended September 30, 1999

#### REVENUES

|  |           |
|--|-----------|
| Dues of Annual Members                 | \$ 75,840 |
| Investment Income:                     |           |
| C.I.T. Consolidated Portfolio:         |           |
| Life Memberships                       | 106,955   |
| Special Investment Fund                | 8,560     |
| Charles Schwab Money Market Fund       | 1,887     |
| T. Rowe Price Prime Reserve Fund       | 2,034     |
| Caltech Employees Federal Credit Union | 1,937     |
| Checking Account                       | 295       |
| Net Income of Travel Study Programs    | 22,462    |
| Net Income of Continuing Education     | 6,172     |
| Sale of Legends and Other              | 1,273     |

**TOTAL REVENUES** ..... \$ 227,415

#### EXPENSES

|                                  |           |
|----------------------------------|-----------|
| Publications                     | \$ 37,639 |
| Net Expenses of Local Programs   | 2,120     |
| Net Expenses of Seminar Day      | 6,112     |
| Net Expenses of Class Reunions   | 26,382    |
| Net Expenses of Chapter Programs | 4,807     |
| Student/Faculty/Alumni Relations | 26,255    |
| Undergraduate Admissions Support | 27,135    |
| Administration                   | 71,168    |
| Membership                       | 1,805     |
| Directory                        | (32,000)  |
| Communications                   | 8,920     |

**TOTAL EXPENSES** ..... \$ 180,343

**REVENUE (OVER) EXPENSES** ..... \$ 47,072

Surplus, September 30, 1998 ..... \$ 82,772

Surplus, September 30, 1999 ..... \$ 129,844

#### INDEPENDENT AUDITOR'S REPORT

Board of Directors  
Alumni Association  
California Institute of Technology

I have reviewed the accompanying statement of financial position of the Alumni Association, California Institute of Technology as of September 30, 1999 and the related statement of activities, changes in life membership reserve, reserve for directory, investment in equipment, surplus and cash flows for the year then ended, in accordance with Statements on Standards for Accounting and Review Services issued by the American Institute of Certified Public Accountants. All information included in these financial statements is the representation of the management of the Alumni Association, California Institute of Technology.

A review consists principally of inquiries of the Association's personnel and analytical procedures applied to financial data. It is substantially less in scope than an audit in accordance with general accepted auditing standards, the objective of which is the expression of an opinion regarding the financial statements taken as a whole. Accordingly, we do not express such an opinion.

Based on our review, we are not aware of any material modifications that should be made to the accompanying financial statements in order for them to be in conformity with generally accepted accounting principles.

The financial statements of the Alumni Association, California Institute of Technology as of September 30, 1998 were audited by another auditor who has ceased operations and whose report dated January 23, 1999, has expressed an unqualified opinion of those statements.

Fred T. Arjani  
Certified Public Accountant

February 25, 1999

1950

*Half Century Club/Reunion Report*  
—by Jay Montgomery '50

The class of 1950 celebrated its Half Century Reunion on May 18–20 in conjunction with the 63rd Seminar Day. Thursday afternoon a busload of alums and guests traveled to JPL for a tour of the lab. Of course, the day was the first above 90 degrees in Pasadena in some time, and it seemed hotter as we climbed the hills and walkways. We saw a presentation on the Mars landings and were guided through JPL's museum. The tour continued to the Space Flight Operations Facility, where we saw the engineers monitoring existing satellites. We concluded the tour in the Spacecraft Assembly Facility, which is a gigantic "clean room." Our reunion banquet, at the Athenaeum on Thursday evening, was attended by 45 alums and 40 guests. The dinner and the reminiscing

Humphery, Jerry Jacobs, Rod Jenkins, Eric Johansson, Walter John, Merle Kam, Dick Knipe, Bill Lansdown, Ralph Lovberg, Dave MacKenzie, Monte Marks, Craig Marks, Bill McLellan, Don Merrifield, Reha Mesara, Jay Montgomery, David Oakley, Don Oswald, Caryl Otte, Jack Ottestad, Cal Porcher, Ed Reinecke, Werner Riesenfeld, Bruce Robinson, Dwight Schroeder, Hank Shapiro, Bud Smoot, Winsor Soule, Eugene Spencer, Don Stillman, Howell Tyson, Vic Van Lint, Martin Walt, Wilbur Wikholm, and Dick Wright.

Reha Mesara traveled from Yenisehir, Ankara, Turkey, for the reunion, and 14 other classmates came from states other than California. We hope to see everyone in another five years for sure and next year if you can make it.

In the meantime, please keep sending your class notes news to our class agent, Dwight Schroeder, either via the class notes coupon or to his e-mail address at: dwightcsch@aol.com.



**Marking their 50th year as Institute alumni, the members of the 2000 Half Century Club gather for a commemorative class photo on the steps of the Athenaeum.**

1954

Roland Miller  
rolbet@olypen.com

This is the fourth issue of class notes for the class of '54, and I am running out of news for the next one. So far, I have heard from about 30 of our classmates out of approximately 100, which isn't too bad; but it is not great. Actually, quite a few more returned their postcards but didn't say anything except that the address was correct or something had changed. What I need is a few sentences (or more) about what you are into or have been up to since graduating from Tech almost 46 years ago. Without input from all of you I have nothing to write about. Please also be aware that, because of my relocation, I now have a new e-mail address: rolbet@olypen.com. If you have sent anything after the middle of February, please resend it.

Now to get into some of the correspondence that I have received. **Bruce Kaiser** wrote from Wilmington, Delaware, and said, "Am completing 42 years with DuPont Co. Plan to continue working. Travel, work for nonprofits, play golf, collect art and craft art." He also

were excellent, but we could not find an electrical engineer to operate a balky jukebox for the dancing.

Friday morning the hardier souls walked the campus while taking the architectural tour. Then at lunch we were all inducted into the Half Century Club. It was great to see many members of earlier classes that had returned to the campus for this event. The question of the day was, Who was the speaker at the commencement exercises in June 1950? We did not respond very well, but of course it was Lee DuBridge. And that's the final answer. Friday evening we again gathered at the Athenaeum for wine, cheese, and more conversation.

Saturday, the 63rd Seminar Day, was a day full of presentations by professors relating their current research projects. The keynote speaker, NASA administrator Daniel Goldin, outlined future goals for JPL research that will use small unmanned satellites. The day ended with more food and talk on the lawns at the Gates Annex.

All who attended certainly enjoyed the event. Here is a listing of those registered by the Alumni Association, and I hope it is complete: Jared Abell, Myron Arcand, Don Asquith, Don Baker, Leon Bass, Jim Blom, Raymond Brow, Stan Burket, Fernando Corbato, Bill Cox, Bain Dayman, Cecil Drinkward, Fred Drury, Vern Edwards, Al Eschner, Norman Fink, Rudolph Frey, Donald Glaser, Bill Haefliger, Bill Higgins, Chuck Howard, Peter Howell, Floyd



informed me that he has seven children, 11 grandchildren, and one great grandchild.

John Lloyd is presently living in Lake Tahoe, California (God's Country, he says). He wrote, "I enjoyed reading your column in *Caltech News*. I especially enjoyed reading about the tour given by Ray Newburn, as he and I were classmates at Glendale High before going to Caltech." John and his wife, Andrea, had planned to attend the 1999 reunion and reestablish some old acquaintances since he has had no personal contact with classmates since 1955. He wrote, "I was looking forward to finally taking the time to see old friends. Unfortunately we had a last-minute house guest conflict that we couldn't change. We were disappointed then, and now we are especially disappointed after reading your column about how successful the reunion was." Maybe we'll see you for the 50th, John.

John goes on to say, "Andrea and I retired from Lockheed in 1994 where we both enjoyed exciting and challenging careers. We moved to our new home at Lake Tahoe, where I have become something of a local volunteer-uncompensated-computer-para-guru. We spend our summers hiking, rafting, and touring and our winters skiing. Our home is just off the Alpine Meadows Sherwood Lift at an elevation of 7200 ft. We get tons of snow, which helps keep us physically fit. We love the great outdoors and are enjoying our retirement to the fullest."

Phil Miller wrote a follow-up note to his e-mail of last May to say that "all is still the same, except that the adoption of a new granddaughter by my stepdaughter in Dallas is now a fait accompli and was entirely successful." Congratulations Phil! He went on to say, "Thought I should get you a personal update." That's the right idea, Phil. Even those of you who have written before should keep us up to date on what is happening in your busy retirement lives.

Some of our classmates have established themselves abroad, as I have previously noted. Bob Ryan has sent me two e-mails, which weren't included in previous articles. He wrote, "I have been retired from the Office of Naval Research and living in Paris, France, since September 1993. During these five years, I have translated, coauthored, and/or revised four books on wavelets and/or harmonic analysis. The latest was published by Springer in New York in November. Another one will be finished soon, and three more are on my desk." For those of you who weren't there, you might be interested to know that Bob came all the way from Paris for the 45th reunion.

It is interesting that this idea of class notes is also helping reestablish relationships that were established at Tech, even between people who weren't necessarily classmates. Paul Shumate '55 wrote me and asked, "Although I am class of 1955 (BS ME aka Paul Farley) I have some friends in your class. When you referenced a golf game, I was reminded of old golf buddies. Can you give me e-mail addresses for any of these?" He listed Donald Turcotte, George Patraw, and Bruce Watkins. "These were all excellent golfers. I'm in San Diego surrounded by the golf industry, but busy myself with gas turbine APU development at Sundstrand Power Systems (recently bought by UTC)." If any of you want to e-mail Paul directly, his address is



There's quite a crop of Caltech alumni at Mt. San Antonio Gardens, the Pomona, California, senior community where these twelve self-styled "perennial sophomores" now make their homes. Pictured front, from left, are Michael McMahon '36, John Keyser '40, Joseph Lewis '41 (sporting his Caltech letter sweater), Owen Johnson '37, and William Fred Arndt '31. Back: Willys Lemm '40, Ralph Riffenburgh '44 Ex, John Wiggins '38, Robert Poindexter '48, Herbert Worcester '40, William Lawson '39, and Richard Kirkendall '44 Ex.

cpshumate@integrityonline7.com.

Neal Huntley wrote, "I have been retired for three years, after having worked for the Clorox Co. for 40 years. I now carry my wife Charlotte's bags as she teaches watercolor painting around the country. We have three grandsons, aged 3 to 4, with another grandson expected in September '98. Retirement is great!"

I also received a very "newsy" postcard from Alex Gansa. He writes, "My wife, Jean, and I have, since my retirement in early 1995, spent some time traveling, particularly to Russia, where we have spent approximately a month during each of the past three summers, staying with my relatives and visiting the towns surrounding both Moscow and St. Petersburg." He and his wife also enjoy the company of their children. "My son Andrew and Sarah were married in a beautiful hilltop Napa Valley vineyard ceremony. We get down to Southern California because my oldest son, Alex, his wife, Lauren, and our grandchild, Wally, live in Santa Monica. We've attended Seminar Day at Caltech as well. I have continued to collect books, particularly Russian pre-1917, as well as Tauchnitz editions."

Last, but definitely not least, I received a letter from Lee (Moose) Henderson. He says he is still working and enjoys life tremendously. He goes on to say, "Betty and I spend about 15 percent of our time at Lake Cherokee, East Texas, but the shop keeps in touch by phone, FAX, and FedEx."

As for yours truly, Betty and I are finally ensconced in our new home in a community called Sunland near the town of Sequim, Washington, and we are loving it. We invite any of you who might be traveling to this beautiful part of the country on the Olympic Peninsula to visit us. Just give us a call at 360/582-1315.

That brings me up to date on all the correspondence that I've received. I think that I have included news from everyone who has corresponded with me since I became class agent. If anybody has submitted news that

didn't get printed in this or previous articles, I apologize, but please send it to me again and it will get into the next one. I really need input from all of you, so that we can keep these class notes going. It doesn't have to be a long dissertation. Just a few lines will do. I love to get e-mail, but remember to send it to the new address noted above.

1959  
Phil Harriman  
pharrima@nsf.gov

Your class agent, Phil Harriman, celebrated the new millennium by spending the month of January in Antarctica, taking a National Science Foundation-funded class on the unusual marine biology there. I help run a program at the Foundation called "Life in Extreme Environments," which led to my being invited to take part in the course. The biggest adjustment was to the 24 hours of continuous daylight. It was exciting to see the summer (southern) stars again at night in New Zealand on the way home (the McMurdo base, where the lab is located, is about 2,000 miles south of New Zealand).

The Washington, D.C., Caltech alumni chapter sponsored a reception for Caltech President David Baltimore the day he received the National Medal of Science from President Clinton. I ran into Bill Graham at the reception. You may remember that at one point he headed NASA, and later was President Reagan's science advisor. He currently has a consulting firm in D.C.

John Stack reported to me by telephone that his work on quark confinement has been particularly rewarding recently (he described his research at a meeting in Japan not long ago). He's also teaching premed physics at the University of Illinois. Barry Clark, PhD '64, reports that he has been living in New Mexico for the last 25 years, where he designs upgrades for the Large Array Telescope, part of the National Radio Astronomy Observatory.

I heard from Jim Somberg that after about four years as an electronics engineer, he went to

### CLASS NOTES CUTOUT COUPON

If you're a Caltech undergrad with a class agent, please take a moment to update us on what you've been doing, and we will be sure to send that info on to your class agent. Return this coupon and any additional materials to Caltech Alumni Association, 1-97, Pasadena, CA 91125.

If you would prefer to e-mail your news directly to your agent, you can find your agent's name and e-mail address on the Web at [http://www.its.caltech.edu/~alumni/class\\_notes.htm](http://www.its.caltech.edu/~alumni/class_notes.htm)

And if your class doesn't yet have an agent, please fill out and mail the Personals Coupon on page 21.

Name\_\_\_\_\_

Option and Degree Year\_\_\_\_\_New address?\_\_\_\_\_

Address\_\_\_\_\_

Day Phone\_\_\_\_\_E-mail\_\_\_\_\_

NEWS\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



law school at UCLA and has been practicing law ever since. He entered semiretirement a few years ago, and he and his wife "tried the great outdoors—remote living thing, and recently returned to Pasadena for the 'city' environment."

As for the rest of the class, I could use more news for upcoming issues of *Caltech News*—please send anything you have to me at pharrima@nsf.gov or clip out the coupon for class notes. Thanks.

1962  
Bruce Abell  
bruce@santafe-strategy.com

Since becoming class agent I have had contact with 42 classmates, plus one ex-classmate. That's only about a quarter of us, so that means there are a lot more stories to be told. Don't be shy (oops, I forgot, we're still Techers). There are still about 150 class notes I'm waiting for, so write to me by e-mail at the above address or fill out and mail the class notes coupon.

I was pleased to hear from **Tom Sallee**, who obviously saved up his life story for publication in the Class Notes. Tom married Joan Selke right after getting his PhD in 1966, and they're the parents of four daughters, ages 21 to 31, with careers (or objectives) from Internet start-up to community health education to student services. Joan works for the California Postsecondary Education Commission and is the person who signs off if, for example, the University of California wants a new doctoral program. Tom has taught forever in the math department at UC Davis. For a while he was an associate dean (aside: a disgruntled academic once told me an associate dean is a mouse in training to be a rat, but we know that couldn't apply to our gentle Tom). But his real love is teaching—for which he has received three awards in the past five years, including the Mathematics Association of America Northern California Award. For the past 10 years he's been devoting considerable energy to the College Preparatory Math Project (CPM—[www.cpm.org](http://www.cpm.org)), a high school program used by about 400,000 students in more than 20 states. It was recently named one of five exemplary math programs in the country. Tom sees some of the old Tech crew and visits Pasadena often with fond memories. The fondest was being with **Lyn Hardy** as Lyn got the award for the best prank in Caltech's first 100 years.

**Bob Lawler** writes that he married Barbara Brody (Vassar '67) in November 1998. He's a professor of curriculum and instruction at Purdue, where he focuses on the interrelation of studies of knowledge, intelligence, and learning in people and machines. He spent the fall of 1999 as a visiting professor at the MIT Media Lab, where he was able to work with his mentors, Marvin Minsky and Seymour Papert (that's not bad company). His usual summer residence is Lake Geneva, Wisconsin, but he and his new bride spent the summer of '99 in France.

**Ron Gebhardt**, one of the three geology majors in our class (**Doug Smith**, PhD '69, and I were the others) writes from Slatington, Pennsylvania, where he and Ginny have settled, that he has "largely made a career in large-scale experimental petrology and . . . been involved with production of over 100 million tons of samples, with direct responsibility for several million tons. Specifically, I have been making portland cement clinker, which is nothing but large-scale experimental petrology at atmospheric pressure in the  $\text{CaO-SiO}_2\text{-Al}_2\text{O}_3$  system

## A MEETING IN MIAMI

This past March, a visit to the heart doctor resulted in an unexpected reunion for a couple of Caltech alumni. While recovering from surgery at Miami's Mount Sinai Medical Center, Andrew Fejer, a longtime Miami resident, mentioned to his doctor that he had studied aeronautical engineering at Caltech. Surprised, Dr. Alfonso Tolention told Fejer, now 86, that he was treating another patient with an oddly similar background. His name? Henry Nagamatsu, a friend Fejer hadn't seen in nearly 60 years. So Dr. Tolention arranged for a meeting between these former classmates.

"I didn't recognize Andrew at first because he used to be a stocky guy with lots of hair," the 84-year-old Nagamatsu said. "He was very excited that we got together again and caught up on old times."

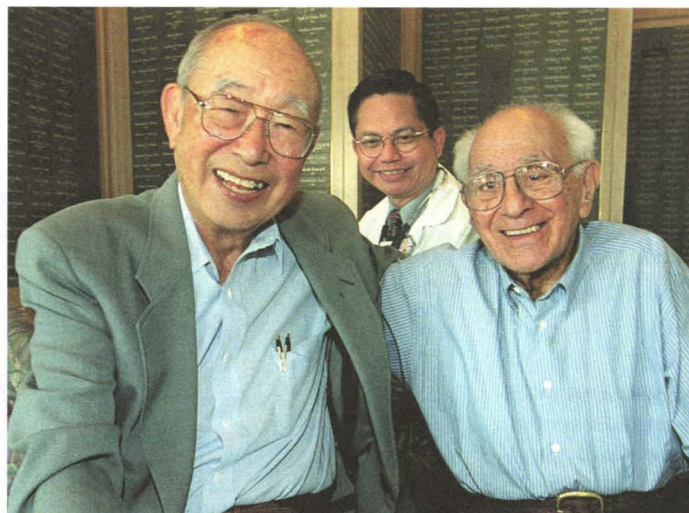
The reunion between the two friends was as peaceful as the 1940s were turbulent. With Europe at war, Caltech became one of a number of educational institutions conducting research for the United States armed forces. Aeronautical engineers Theodore von Kármán and his students led the research into designing and building better aircraft for the war effort.

There were only nine graduate students in Von Kármán's program. The intimate nature of the lectures and class meetings contributed to Fejer and Nagamatsu's fast friendship.

"We attended all the same classes and lectures, everything we did together," Fejer said. "It was a very unique arrangement; we

with various minor impurities. I am now an independent consultant doing business as Kiln Technology, Inc., and consult on product technology and process technology for the kiln product and related industries. I have developed numerous analytical methods, published many papers (most company proprietary), and have published two books in that area."

We had a minireunion of two percent of our class last fall. **Hal Wyman** and his wife, Linda, and **Danny Romm** took a trip to Albuquerque to visit **Gary** and **Sallie Burke**, and they all came to Santa Fe to buy me a drink. The most interesting news is that Hal and Linda's new boat is finally finished and ready to cruise. Hal says, "I grew up with boats that my father owned and have owned quite a few myself. I've always admired the long-range trawlers designed by Steve Seaton and commissioned him to design our dream." You can see pictures and specs of the 55-foot *Que Linda!* at [www.halwyman.com/quelinda.htm](http://www.halwyman.com/quelinda.htm). After cruising from Seattle to California in June, they'll go to Mexico in October, Panama in January/February 2001, Florida in April/May, Bermuda in June, and Gibraltar (yes, that means an Atlantic crossing) in July. After that, they'll play it by ear. Hey Hal, how about a floating 40th reunion for the class of 1962?



Caltech alumni Henry Nagamatsu and Andrew Fejer embrace on the day they reunited in Miami. Behind them stands cardiologist Alfonso Tolention, the man who brought them back together.

became a very famous group. I mean the research that was being done was very important."

For much of their time at Caltech, he and Nagamatsu shared classes and meals. Fejer, a Jewish refugee originally from Czechoslovakia, who lost both parents during the war, was struggling with English, so Nagamatsu lent him his lecture notes. They also studied and hung out at Fejer's off-campus apartment.

"He and I spent an awful lot of time together and we both liked to hike in the mountains above Los Angeles," Fejer recalled. "As a matter of fact, on December 7, 1941, we were hiking up Mount Wilson. When we came back we heard what had happened."

In the aftermath of Pearl Harbor and the rise of anti-Japanese sentiment in the United States, Nagamatsu, the American-born son of Japanese immigrants, had to leave the west coast or risk getting sent to an internment camp.

On von Kármán's recommendation, Nagamatsu went to work for an aircraft company in Buffalo, New York. In 1946, he was called back to Caltech to assist the

faculty with the high number of GIs who had enrolled. He completed his PhD in aeronautical engineering in 1949 and worked for a time at JPL. Today, he is an active professor emeritus at Rensselaer Polytechnic Institute, conducting research on laser propulsion and magnetohydrodynamics.

Fejer remained at Caltech and continued his studies, finishing his PhD in aeronautical science and physics in 1945. In that span of time, he also worked at JPL. He later landed a position at a jet engine factory in Ohio. When the war ended, the University of Toledo asked him to establish an aeronautical engineering department, where he served as chairman for 13 years. He is now retired and living in Miami.

Which brings us back to this uncanny case of serendipity. In order to escape the New York winter, Nagamatsu flies south and stays at his daughter's home in Bal Harbour. Fejer resides in the town of Surfside, less than a mile away. For years, they were only a heartbeat apart. It took the passage of time and an alert cardiologist to help these men pick up where they left off.

—JAVIER MARQUEZ

1986  
Scott Karlin  
[karlin@alumni.caltech.edu](mailto:karlin@alumni.caltech.edu)

**Sherry (Smith) Pervan** and **Boris Pervan**, MS '87, are enjoying exploring the Chicago area as new residents. Sherry is working at SAIC (Science Applications International Corporation) as an aerospace engineer, primarily on NASA projects. Boris is an assistant professor at the Illinois Institute of Technology. "Our daughter, Ana, age 5, loves kindergarten, and 3-year-old Nick has lots of friends at day care," writes Sherry.

**Steve Molnar** reports that he is working on the next generation chip from NVIDIA, a Silicon Valley graphics company that recently released a high-powered 3-D graphics chip that is "miles ahead of the competition." Steve and Wanda reside in Chapel Hill, North Carolina, with their four children: Jennifer (9), Laura (7), Grant (4), and Kara Janelle (born February 25, 2000).

From Olympia, Washington, **Sandra Lee** writes, "My life has been full of rapid change. I have connected with Landmark Education Corporation, and am transforming my approach to life. It has been amazing. Eventually, I will lead courses for Landmark Education, contributing in a major way to peace on the planet, something I never considered to be actually possible before." Sandra continues to practice massage and bodywork. She does SOMA neuromuscular integration (a type of integrative bodywork), injury work, and visionary craniosacral work. "My skill and awareness have grown tremendously this past year." Sandra will also begin teaching at a massage school soon.

Her son Brandon, now 6, loves kindergarten. "My husband, Dennis, is creating wonderful paintings in acrylic on canvas," she reports.

**Scott Chou** reports that he is joining a newly formed venture capital firm, Gabriel Venture Partners, as a principal. "I'm leaving Onset Ventures, where I was a Kauffman Fellow, a two-year academic fellowship in venture capital. My investments at Onset included Automated Power Exchange, SS8 Networks, 123Signup.com, and VARStreet.com."

**Margaret Carter Ma** writes, "It was a dark and stormy Frosh Camp when the friendship between Margaret Carter and **Lisa Henderson** began in 1982. Little did they know that 17 years later their first children would be born only a day apart. Lisa's daughter, Julia Rafferty, was born June 9, 1999. Not wanting to be left behind, Benjamin Ma was born June 10, 1999."

In Baltimore, Maryland, **Felice Boris-Rudin** has returned to science after an extended hiatus for motherhood, and works as a postdoctoral fellow in the department of neuroscience at the Johns Hopkins University School of Medicine. She writes, "My daughter, Shoshana, is enjoying a normal year of kindergarten after having completed a year of chemotherapy for rhabdomyosarcoma. My little boy, Isaac, loves making loud music and playing with his big sister." Both children adore their father, Nathan, who is an assistant professor in physical medicine and rehabilitation at Johns Hopkins. "I would love to hear from classmates, after having been out of touch so long."



Personals

**Hans Hermans** reports that he and his family are doing well. Hans's brother Erik donated a perfectly matched kidney last September, and Hans is feeling great and starting to get back into shape now that the meds have stabilized. His three children (Hansy, 8, Leslie, 6, and Evan Paul, 4) are looking forward to a family vacation this summer. Hans's company, Hesta Corporation, focuses on Oracle technology and was ranked ninth in the *Philadelphia Business Journal's* listing of the area's 100 fastest-growing privately held firms.

1997  
Emily Chen  
emilyc@alumni.caltech.edu

Hello everyone! As you can see, this is a short report. If you want to be included in the next set of notes, please e-mail me or use the class notes clip-out coupon. We want to know what's going on with you!

**Ann Chen** has just made a trip to Malaysia, Taiwan, and Los Angeles (she does this a couple times a year, way too often for a law student), and continues to pursue her law degree at Vanderbilt University in Tennessee.

**Emily Chen** (your class agent) was crowned runner-up Miss Taiwanese USA. Based on her expressed awareness and representation of Taiwanese American heritage, presentation of talent, and style, she was selected after preliminary interviews as one of 12 finalists to participate in the pageant on February 27, 2000, at the Bonaventure Hotel in Los Angeles. The goal of the Miss Taiwanese USA pageant was to promote Taiwanese Americans' awareness of Census 2000 and to promote Taiwanese heritage and language, as well as to celebrate the new millennium. The pageant was broadcast live, with reruns planned in the U.S. and Taiwan.

**Emily Kai Wai Chiu** is now married to **Chi-Keung Chow**, PhD '95, and resides happily in Germantown, Maryland. They had their wedding ceremony in September 1999 at the Trinity United Methodist Church. Best wishes to the newlyweds.

**Jenny Chu** now goes by her Chinese name of Shiching Chu (to get back to her roots), and continues her medical education at NYU.

**Amanda Eckermann** will make a trip to Germany again this year to start a new project. Things are going very well for her in graduate school at the University of Illinois, Urbana-Champaign.

**Hou-En Han** works for the K-Commerce sales division of the Inference Corporation in Los Angeles. **Frank Ling** continues to do well in graduate school at UC Berkeley, and found using Dialpad pretty neat. (I second this—my conversation with him using Dialpad was crystal clear!)

**Fong Liu** spent a week relaxing in Los Angeles this past March during a transition between jobs. **N. W. G. M. Muditha Kanchana** (aka Kanch) has just switched companies and now works for NVIDIA in the Bay Area.

FOR THE RECORD

Ami Rintoul (rintoul@newmexico.com) sends a correction regarding an item that appeared in the 1990 Class Notes about her "second daughter," Miranda. "I just wanted to let you know that we actually have only ONE child (Miranda, who keeps us busy as if we had two kids!)" and that she's now three years old.

1940  
**STUART A. KRIEGER**, of Los Angeles, has been involved with aeronautics and related fields throughout his career, working on projects ranging from the flying wing to reconnaissance satellites. He was with the Planning Research Corporation, which he cofounded, from 1954 to 1972, and he was chairman of the American Rocket Corporation from 1988 to 1992. He remains interested in astronomy and supersonic aircraft.

1951  
**RICHARD BREWER** has been selected by the Optical Society of America (OSA) to receive its Charles Hard Townes Award "for his outstanding contributions to quantum optics, characterized by originality and diversity, involving the interplay of theory and elegant experiments to elucidate fundamental problems of coherent optical transients, using atoms, molecules, solids and trapped ions." The award consists of a silver medal, a certificate, and \$5,000. After receiving his PhD from UC Berkeley in 1958, Brewer taught at Harvard and UCLA, and then joined the IBM Research Division in San Jose, California. He was an IBM fellow from 1973 to 1994 and has been a consulting professor of applied physics at Stanford since 1977. A fellow of the American Physical Society and OSA and a member of the National Academy of Sciences, he has received the Albert A. Michelson Gold Medal of the Franklin Institute (1979) and Caltech's Distinguished Alumni Award (1994).

1961  
**CHUCK CARRY**, MS, chief engineer and general manager for the Sanitation Districts of Los Angeles County for the last 16 years, is retiring after 39 years with the agency. The office jointly manages 25 districts, and Carry is only the sixth chief engineer and general manager in its 77-year history. Earlier in his career Carry had served as department head for solid waste management, assistant chief engineer, and assistant general manager, and he served as director of technology assessment for the National Commission on Water Quality, in Washington, D.C., from 1973 to 1976. His participation in professional societies has included service as president of the California Association of Sanitation Agencies, plus he served for an extended term on the board of directors of the Association of Metropolitan Sewerage Agencies. He is a diplomate of the American Academy of Environmental Engineers and his memberships include the International Water Association and the American Public Works Association. He is the recipient of the Water Environment Federation's Bedell Award, for his extraordinary personal service to the California Water Environment Association. An alumnus of Loyola University, he has been inducted into the Loyola Marymount School of Engineering's Alumni Wall of Fame for his professional achievements, and particularly for his role in the start-up of the Whittier Narrows Water Reclamation Plant.

1965  
**VIRGINIA TRIMBLE**, MS, PhD '68, professor of physics at UC Irvine, became chair of the Division of Astrophysics of the American Physical Society at its annual meeting in April. She is currently also serving as chair of the Historical Astronomy Division of the American Astronomical Society.

1967  
**GARY G. CHRISTOPH**, chief information officer for the Health Care Financing Administration, writes that after graduating from Caltech he earned a PhD in chemical physics from the University of Chicago. He served as a postdoc at Caltech, then joined the faculty of Ohio State University in 1974 as an assistant professor of chemistry. After achieving tenure, and during a sabbatical at 3M Company, he was recruited by Los Alamos National Laboratory, where he eventually became the head computer systems security officer for the lab's integrated computing network (with 13 Crays). After moving into tech-transfer, he continued his involvement with security through consulting, his activities including researching Medicare fraud and teaching a class on computer security for the French government. In 1997 he moved to Baltimore, becoming the first CIO for the Health Care Financing Administration, which is responsible for Medicare, Medicaid, and a variety of other federal programs. "Last year I received an FCW-100 award for my work as a major agency CIO, and was recently appointed to the IT Review Board, a government-wide IT investment review panel, by OMB. Perhaps the most satisfying aspect of my job is that in just two years I have so far successfully restored some measure of IT managerial and technical credibility with the Hill and OMB to a critical government agency. I am happily married (November 1998), have an 18-year-old daughter by a previous marriage, and am still an active pilot (when I can squeeze in the time—I was a charter member of the Caltech flying club, where I got most of the time for my license), and now own a C-182. I am beginning to bald, am overweight, and work too hard, but then I haven't yet figured out how to be otherwise."

KEEP US INFORMED THROUGH THE CALTECH PERSONALS!

Keep us informed so we can keep your fellow alums informed! If you're a Caltech graduate who received your MS or PhD from the Institute, or an undergrad alum who doesn't yet have a Class Notes agent, the *Personals* is the place to let us know what you've been doing. Please send us news about you and your family, about a new job, promotion, awards—anything you'd like to see printed in the *Personals* section of *Caltech News*. Return this coupon and any additional materials to  
Caltech News, 1-71, Pasadena, CA 91125.

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1931

EARL S. HILL, MS, PhD '34, on December 30, 1999, in Napa, California; he was 92. After serving as an engineering professor at Penn State, Hill joined Exxon Research in Oklahoma, where he helped develop the mass production of penicillin. He continued his research at Shell Development, in Emeryville, California, becoming a noted expert in the processing of sour gases from crude oil. He retired from Shell in 1977, then worked as a consultant for several years. He was a fellow in the American Petroleum Institute and the American Institute of Chemical Engineers. He is survived by Muriel, his wife of 64 years; two sons, Lynn and Alan; and four grandchildren and two great-grandchildren.

1932

WILLIAM A. ADAMS, of Twentynine Palms, California, on October 29, 1999; he was 90. In 1935 he went to work for Procter & Gamble, in Long Beach, California, and retired from the company after 29 years. A pioneer in amateur radio, he had received his amateur's license at the age of 16 and then went on to become a founding member of the Long Beach Amateur Radio Club as well as a member of the San Pedro and Morongo Basin radio clubs. The first president of the Southern California DX Club, he was active in many international radio contests. Predeceased by his wife, Grace, in 1988, he is survived by a daughter, Virginia Bernard; two sons, William and David; and seven grandchildren and eight great-grandchildren.

1933

TRENT R. DAMES, MS '34, of San Marino, California, on March 14; he was 88. Shortly after receiving his master's degree from Caltech, he cofounded the engineering firm of Dames & Moore, which grew into a multinational firm specializing in geotechnical and environmental engineering. Active in the American Society of Civil Engineers (ASCE), he held several national offices and endowed the annual ASCE History and Heritage Award. He was a member of the Associates of Caltech, and he received the Caltech Distinguished Alumni Award in 1993. In 1995 he endowed the Fund for the Heritage of Civil Engineering at the Huntington Library, to establish a civil engineering history research center. (Gifts in his memory may be made to The Huntington, 1151 Oxford Road, San Marino, CA 91108; checks should be made payable to The Huntington Library, with the memo line reading Trent Dames Endowment Fund.) Predeceased by Phoebe, his wife of 44 years, and by his second wife, Carolyn, he is survived by Lucille, his wife of 14 years; two daughters, Joyce and Melissa; a son, Roger; and six grandchildren and four great-grandchildren.

1935

SEIBERT Q. DUNTLEY, of La Jolla, California, on October 22, 1999; he was 88. He received his PhD in physics from MIT in 1939 and during World War II was an associate professor there, working on the development of camouflage techniques for air and sea operations. As an outgrowth of this and other wartime research, he founded the Visibility Laboratory, which conducted research on visibility through ocean and atmosphere as well as digital image processing and the remote sensing of marine resources from aircraft and spacecraft. In 1952 he moved the VisLab to the Scripps Institution of Oceanography, where he remained

as a research physicist and as VisLab director. He was also a professor of physics at UC San Diego, until his retirement in 1977. A fellow and director-at-large of the Optical Society of America, Duntley served as president of the society in 1965 and 1966, and in 1961 the society made him the youngest recipient of the Frederick E. Ives Medal for distinguished work in optics. A member of many national research councils and committees, he published over 200 research papers. He is survived by Mabel, his wife of 62 years; two daughters, Susan McKenney and Nola Pierce; a son, Stephen; and six grandchildren.

EDWARD L. KELLS, MS, of Santa Rosa, California, on January 4; he was 87. A specialist in heat transfer, he designed and developed products and processes ranging from industrial boilers to food-service equipment. After retiring and moving from Illinois, he continued with consulting work until suffering a stroke at age 84. A lifelong student and traveler, he had broad interests in science, history, and the human condition. He is survived by Jane, his wife of 48 years; his son, Douglas; and two grandchildren.

MABRY VAN REED, of La Jolla, California, in June, 1999. He was a member of the Associates of Caltech. After working for the Bureau of Reclamation on the All American Canal from 1934 until 1938 and then at the U.S. Engineer's Office in Los Angeles until 1941, he served as a captain with the Army Corps of Engineers during World War II. Following the war he worked for the Naval Ordnance Test Station (later the Naval Weapons Center), retiring in 1975. He was predeceased by his wife, Grace.

1936

RAYMOND H. F. BOOTHE, MS '37, of Santa Monica, California, on January 30; he was 85. He served in the U.S. Naval Reserve from 1942 to 1945, and during his career as a structural engineer was employed by Holmes and Narver, the Ralph M. Parsons Company, and Bechtel Corporation. He retired in 1983. A member of the American Society of Civil Engineers and the Institute of General Semantics, he was a founding member of the L.A. Chapter of the International Society of General Semantics as well as a longtime active member of the Unitarian Universalist Community Church in Santa Monica. He and his first wife, Dorothy, divorced in 1962, and he was predeceased by his second wife, Betty, in 1989. He is survived by his son, Richard; his daughter, Carolyn Moore; a grandson, Timothy Moore; a brother, Perry; a stepson, Michael Paisley; a stepdaughter, Patti Cuthill; and two step-grandchildren.

CHANNING H. KRANTZ, of Fallbrook, California, on November 17, 1998; he was 85. During his 37 years as an electrical engineer at Douglas Aircraft, he held supervisory positions on various projects. His hobbies and interests in retirement included Jungian psychology, meteorology, and engine mechanics. Predeceased by his wife, Millie, in 1991, he is survived by his stepson, Tim Krantz.

1939

MARK G. FOSTER, PhD, on October 6, 1999; he was 85. A professor of electrical engineering at the University of Virginia for 19 years, he served as a consultant for the American Physical Society and was a writer for *Collier's Encyclopedia*. He was a Phi Beta Kappa and a member of the Institute of Electrical and Electronics Engineers.

Predeceased by a brother, Robert, he is survived by his wife, Louella; a daughter, Mary Ann Wade; two sons, Charles and John; a brother, Kenneth; and eight grandchildren, three step-grandchildren, and six step-great-grandchildren.

1940

DONALD B. CARSON, MS '41, of Fullerton, California, on December 2, 1999; he was 82. He was an engineer for General Electric for 42 years, spending some of those years in the Southwest helping install and maintain large power systems. He is survived by two sons, Mort and Don; a stepdaughter, Gayle; and a stepson, Gary. Geneva, his wife of 31 years, died in February 2000.

ROUHOLLAH KARUBIAN, of Beverly Hills, on February 10; he was 87. He is survived by Toubia, his wife of 60 years; his children, Vida, John Farhad, and Guitta; and nine grandchildren.

1941

CLIFFORD A. TRUESDELL III, MS '42, of Baltimore, Maryland, on January 14; he was 80. After graduating from Caltech he went on to receive a certificate in mechanics from Brown University in 1942 and his PhD in mathematics from Princeton in 1943. He was a member of MIT's Radiation Laboratory from 1944 to 1946. He was then chief of the theoretical mechanics subdivision of the U.S. Naval Ordnance Laboratory from 1946 to 1948 and head of the theoretical mechanics section at the Naval Research Laboratory from 1948 to 1950. In 1950 he became professor of mathematics at the Graduate Institute for Applied Mathematics at Indiana University, and from 1961 until his retirement in 1989 he was professor of rational mechanics at the Johns Hopkins University. The founder or cofounder of four different journals, he also edited four volumes of Euler's *Opera Omnia* and three of Flügge's *Handbuch der Physik* and, in 1963, was the principal founder of the Society for Natural Philosophy. He was the author of 268 mathematical papers in five languages, and he authored or coauthored 27 books, the last of which—*An Introduction to the Mechanics of Fluids*, with K. R. Rajagopal—appeared the week before his death. His many honors included numerous honorary degrees, a Guggenheim Fellowship, the Bingham Medal of the Society of Rheology, and the Birkhoff Prize of the American Mathematical Society. Truesdell was also an authority on the literature, arts, crafts, and music of the 16th through 18th centuries. He is survived by Charlotte, his wife of 48 years; his son, Clifford IV; and two grandsons.

1942

HAZEN H. BEDKE, MS, of Salt Lake City, on December 17, 1999; he was 81. He attended the Scripps Institution of Oceanography for graduate studies, and he served as a meteorologist in the 14th Air Force, in China during World War II. In his later military career he rose to group and wing commander, and he played a significant role in numerical weather prediction. Retiring with the rank of colonel, he moved to Salt Lake to direct the Western Region of the National Weather Service. His many awards for public service include the Presidential Rank Award. He is survived by Jane, his wife of nearly 60 years; four daughters, Carolyn Coulam, Suzanne Bedke, Janelle Bedke, and Rosalin Bedke; a sister, Marian Hoke; and 15 grandchildren.

WILLIAM T. HOLSER, MS '46, of Eugene, Oregon, on December 25, 1999; he was 79. During World War II he served in the Navy in the South Pacific as a lieutenant commander. A research geochemist, he earned his PhD from Columbia in 1950 and later spent 12 years with Chevron Oil Field Research. He joined the University of Oregon faculty in 1970, retiring in 1986 as professor emeritus of geology. An honorary life fellow of the Mineralogical Society of America and a fellow of the American Geophysical Union and the Society of Economic Geologists, he was editor of the *American Mineralogist* 1966–1972 and of the *International Tables of Crystallography* 1963–1965 and 1971–1976. He is survived by Mary Ann, his wife of 45 years; three sons, Thomas Holser, Alec Holser, and Courtney Fisher; two daughters, Margaret Anolfo and Jan Fisher-Baker; a brother, Alexander; and four grandchildren.

LEO STOOLMAN, MS, PhD '53, on March 31; he was 81. He spent his career as an aerospace and systems engineer with the Hughes Aircraft Company. Predeceased by his wife, Alfreda, he is survived by two sons, Ronald and Lloyd, and by two grandchildren.

1944

WILLIAM P. BAIR, of Altadena, California, on April 6; he was 77. A mathematics teacher in the Pasadena school system and at Pasadena City College for 39 years, he served in the Navy in the Pacific and worked for the Southern Counties Gas Company and the U.S. Rubber Company before enrolling at Occidental College, where he earned a teaching credential and an MA in education in 1956. He taught at McKinley Junior High School and Pasadena High School, then took a sabbatical to earn his MBS in mathematics at the University of Colorado. He joined the PCC math department in 1962 and earned his EdD from USC in 1970. Active in administration as well as teaching, he served as chairman of PCC's mathematics and computer science department from 1976 to 1990 and as a member of the Pasadena Schools Federal Credit Union's board of directors for 18 years. He is survived by his wife, Barbara; a daughter, Janice; a son, Alan; and a granddaughter, Willia Drew.

DAVID R. JONES, on August 7, 1999, in Santa Rosa, California; he was 76. He served in the Navy during World War II and then worked for the Standard Oil Company of California, now Chevron, performing research on fuels and lubricants. He rose to manager of the product engineering department at the company headquarters in San Francisco, and retired in 1984 after more than 40 years of service. He is survived by his wife, Roberta; three sons, David Jr., Ronald, and Bruce; three daughters, Elizabeth, Suzanne, and Karen; a sister, Barbara Lucas; and 16 grandchildren and two great-grandchildren.

WILLIAM A. TOOKEY, of San Marino, California, on January 16; he was 76. He served in the Navy as an officer during World War II, and afterward worked for Southern California Edison as an engineer and then a law clerk, while attending law school at USC. Having passed the bar, he went on to practice law for 44 years, retiring in 1994. He is survived by Nancy, his wife of 49 years; three sons, Geoff, Mark, and Morgan; two daughters, Cindy Little and Nancy McClung; and eight grandchildren.



1946

JOHN O. MONTGOMERY, MS, Eng '47, of La Cañada Flintridge, California, on January 3. He served as a weather officer with the Army Air Forces during World War II, as a meteorologist for TWA from 1946 until 1947, and as a consulting meteorologist until 1949. He went to work for Occidental Life Insurance Company of California in 1949, writing its first computer system procedures, and stayed with the company until 1972. He became chief actuary of the California Department of Insurance in 1973. He was a fellow of the Society of Actuaries and the Life Office Management Association and a member of the American Academy of Actuaries, and he organized and chaired the Life Insurance Actuarial Task Force and chaired the Life Financial Ratios Working Group. He was the first to receive both the Robert Dineen Award of the National Association of Insurance Commissioners (1989) and the Robert J. Myers Public Service Award (1995)—Myers being the actuary who set up the U.S. Social Security system. Montgomery is survived by his wife, Jeanette.

1947

GEORGE E. GOMPFF, MS, Eng '49, of Pacific Palisades, California, on November 28, 1999; he was 78. During World War II he served as an officer in the Army Air Forces, first working with wind tunnels at Wright-Patterson, then setting up maintenance schools in North Africa and Germany for the Air Transport Command; although he had held a private pilot's license since age 16, the military preferred to utilize his engineering skills, and he was unable to indulge his love of flying small planes until after his retirement. He remained in the Air Force Reserve, retiring as a lieutenant colonel. After graduating from Caltech, he worked for the RAND Corporation for 14 years, Planning Research for 10 years, and Technology Services Corporation for 12 years. After taking an early retirement because of heart disease, he continued to consult in the field of aerospace, and he participated in a flying club and hiked with the Sierra Club. He was a member of Sigma Xi, Phi Kappa Phi, Tau Beta Pi, and Pi Tau Sigma. He is survived by Mickey, his wife of 57 years, and by two daughters, four grandchildren, and two great-grandchildren.

1948

JOHN J. ATTIAS, MS '49, of Los Angeles, on January 4; he was 76. He spent most of his career at TRW, but also worked at Douglas Aircraft, N.O.T.S., the Donaldson Company, Bechtel, and Hughes, and contributed to a variety of projects including Apollo and the Atlas, Thor, Titan, and Minuteman missiles. For his work on the Lunar Descent Module he was awarded the NASA "Silver Snoopy" Award by astronaut Richard Truly. He was an associate fellow of the American Institute of Aeronautics and Astronautics and a fellow of the Institute of Aeronautical Engineering. A graduate of the UCLA Executive Program, he was awarded a plaque by the L.A. City Human Relations Commission for his work with Project Action in the community of Venice. He is survived by his wife, Ruth; two sons, Thomas and Christopher; a daughter, Barbara; and four grandchildren.

1949

WILLIAM C. ROESCH, PhD '49, of Richland, Washington, on November 13, 1999; he was 76. He spent his career in radiological physics at the Atomic Energy Commission's Hanford Laboratory in Richland, Washington, and he served as manager of the laboratory's radiological sciences program until 1965, when Battelle Memorial Institute took over operation of the lab, which became known as the Pacific Northwest National Laboratory. His Battelle appointment as a senior research scientist permitted him to devote full time to theoretical radiation biology, until his retirement in 1986. Roesch was a mentor for young scientists, and he served in many capacities in the scientific community, representative examples being his membership on the National Academy of Science's panel on Biological Effects of Ionizing Radiation and panel on Reassessment of Atomic Bomb Dosimetry, and his participation in the National Institutes of Health/NCI Radiation Study Section. He was a member of the Radiation Research Society, the American Association of Physicists in Medicine, the American Physical Society, and the Health Physics Society. In 1987 he was a corecipient of the Health Physics Society's Distinguished Scientific Achievement Award. Predeceased by his daughter Carol, he is survived by Rhoda, his wife of 53 years, and his daughters Peggy and Judy.

1958

CHESTER R. BAUER, MS, of Tustin, California, on December 13, 1999; he was 85. He worked for McDonnell Douglas from 1942 until his retirement in 1979. He is survived by a sister, Barbara, and a brother, George.

1964

CURTIS L. ATKIN, of Salt Lake City, Utah, on January 23; he was 57. After graduating from Caltech he went on to receive his PhD in biochemistry from UC Berkeley and to serve a Helen Hay Whitney Foundation fellowship at the Karolinka Institute in Stockholm, Sweden. In 1973 he joined the University of Utah faculty as a research professor of biochemistry, holding appointments in the Division of Hematology, Rheumatology, Biochemistry and Nephrology until 1994, when he retired due to ill health. The focus of his research was Alport's syndrome, the inherited disease that ultimately took his life. He is survived by Elisabet, his wife of 28 years; a daughter, Rita Corwell; a son, Jacob; a sister, Marilyn Allen; two brothers, Dale and Scott; and his parents.

#### A FLOWERY FINISH

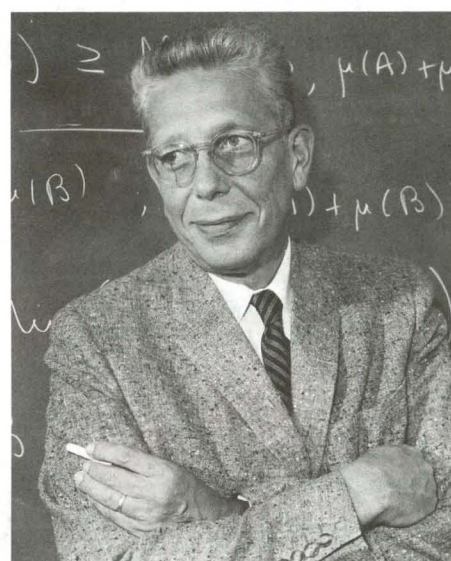
**When will Caltech alums net two genius awards, a million dollars, two radio spots, and a ticket to the Olympics—all in the same year? Not until dolphins leap out of Millikan Pond and frogs float amid fields of flowers. Pure fantasy? Take another look at this issue, including the back-page poster, in which a denizen of Baxter Pond makes a guest appearance in a bed of poppies outside of Avery House.**

## FREDERIC BOHNENBLUST 1906–2000

H. Frederic Bohnenblust, professor of mathematics, emeritus, and former dean of graduate studies at Caltech, died March 30 in Santa Barbara. He was 94.

Born in Switzerland, Bohnenblust earned his bachelor's degree at the Federal Institute of Technology, Zurich, in 1928, and his doctorate at Princeton in 1931. After 14 years on the Princeton faculty and a year at Indiana University, he joined Caltech in 1946 as professor of mathematics, and he remained at the Institute until his retirement. He served as dean of graduate studies from 1956 to 1970, and was also executive officer for mathematics from 1964 to 1966.

A strong advocate of mathematics education, Bohnenblust was featured in a 1966 cover story in *Time* magazine as one of the 10 outstanding university professors in the country. He said in the article that "once you've understood that math is just straight thinking, just plain common sense, then anyone can do it." Bohnenblust also remarked that he knew he had succeeded in making a point when he saw smiles on his students' faces. "How much better that is than a look of astonishment when I've delivered my last sentence."



Frederic Bohnenblust in the 1970s.

Bohnenblust was a specialist in game theory, functional analysis, differential equations, and asymptotic series. He was also an early advocate of the use of computers in teaching and research.

He was coeditor of the *Annals of Mathematics* for 10 years, and was past president of the Association of Graduate Schools in the American Association of Universities. He was also a past vice president and trustee of the American Mathematical Society, and a member of the Mathematical Association of America.

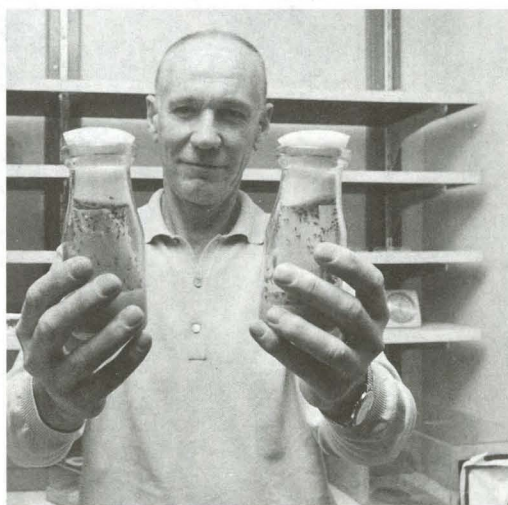
## HERSCHEL MITCHELL 1913–2000

Herschel Kenworthy Mitchell, professor of biology, emeritus, died April 1 in St. Luke's Hospital, after suffering a stroke. He was 86.

A native of Los Nietos, California, Mitchell originally came to Caltech as a senior research fellow, working with geneticist George Beadle. With the Beadle group, he was a key member of the team that established the field of biochemical genetics, and specifically worked on the relationship between genes and enzymes. Utilizing the bread mold *Neurospora*, Mitchell investigated the biochemical pathways of genetic mutations, and he later turned to the *Drosophila* fly to investigate the genetics and biochemistry of development.

He earned his bachelor's degree from Pomona College and his doctorate from the University of Texas. Before arriving at Caltech, Mitchell served as a research associate at Texas, where he worked on the isolation and synthesis of B vitamins and became the first person to synthesize the vitamin pantothenic acid. He also spent three years as a research fellow at Stanford.

The author of more than 120 publications, including the book *Genetics and Metabolism*, Mitchell was also known around campus for his talent as a glassblower and for his enthusiastic participation in sports. He expanded a chemists' baseball team in the Pasadena Recreation Department league into a campus-wide program that also included basketball and volleyball.



Herschel Mitchell in the lab in the 1970s.





Caltech **N**ews