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Caltech News

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In This Issue

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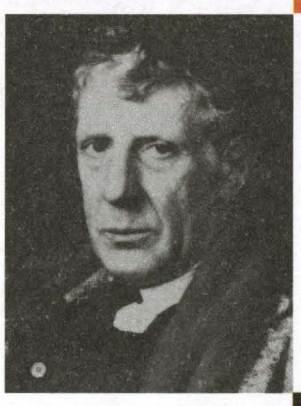

ON THE COVER: Identified Flying Object
Brian Tiemann '99, of Redwood Valley, California, new-minted holder of a degree in engineering and applied science, enjoys a commencement-day high.

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Up Front

The Whos, Whats, and Hows of Whyville

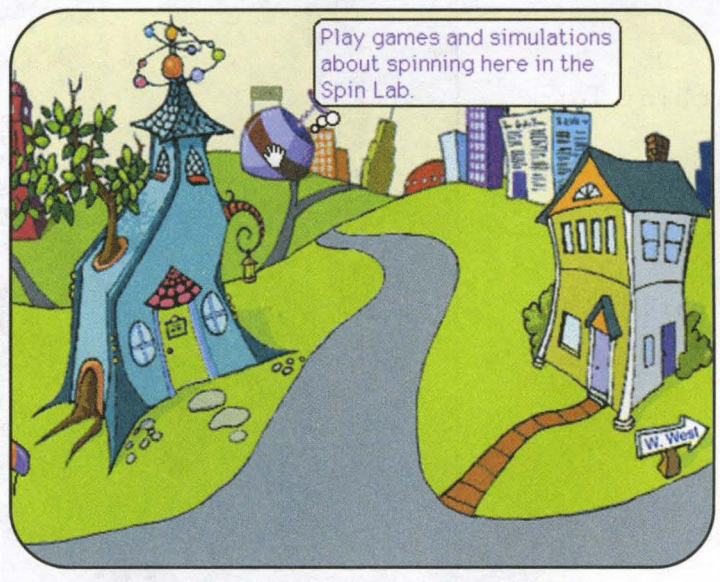
Who can forget about the Whos? Residents of Whoville in Dr. Seuss's children's classic *How the Grinch Stole Christmas*, the Whos were a close-knit community who loved nothing more than the opportunity to frolic about in celebration.

With that spirit in mind, welcome to Whyville, an interactive Web site that celebrates science education. Based on more than 15 years of science education research by the Caltech Precollege Science Initiative (CAPSI), the Whyville community—located on the Web at www.whyville.net—is designed by CAPSI in conjunction with NuMedeon LLC. The production team includes Whyville founder Jim Bower, professor of biology; and alums Mark Dinan '91 and Jen Sun, PhD '96.

Like CAPSI's own approach to science education, the site's concept follows the idea that kids learn science best by doing it. To this end, the site uses games and activities linked to Dr. Leila's (Leila Gonzalez '79) weekly column in the *Los Angeles Times*, "Caltech Connections for Kids." The feature runs throughout the academic year; this fall it will appear opposite the science page in the Metro section.

For each topic, Dr. Leila gives background information, interesting facts, and experiments and activities that children (and others) can do at home. Each topic is housed in a separate building within Whyville. The first such building, the Spin Lab, contains activities related to momentum, resistance, and rotational velocity and inertia.

Other attractions in Whyville include the House of Illusions, constructed for April Fools' Day to illustrate how one's eyes can be fooled by certain three-dimensional images; the *Times* building, which contains current and past "Caltech Connections for Kids" articles; Dr. Leila's House, where members can look at questions other members have asked or submit their own; and the CAPSI house, a building for educators that includes links to other educational Web sites.



SQUARE ROOTS: Whyville Square, pictured at left, is the heart of Whyville, containing the site's four original buildings. Clockwise from bottom left-hand corner: Dr. Leila's House, the Spin Lab, the *Times* Building (in white), and the CAPSI House. (Whyville artwork by Ann Pickard)

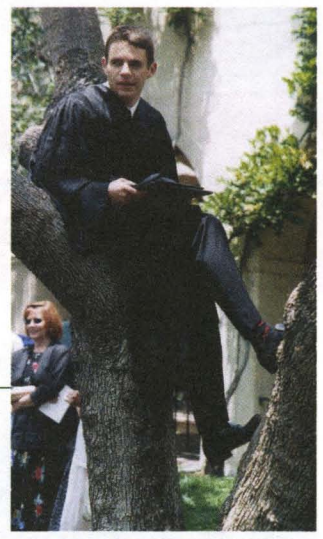
And to make Whyville's citizens feel right at home, the site recently added its newest housing development, the residential suburb of Myville. Here, registered citizens of Whyville can claim a plot of land and build a house that then gets rendered in 3-D.

Citizenship in Whyville is open to anybody. Once registered, members may use all of the site's features and can even win prizes to be used within Whyville. Also, the "city management" sends out periodic e-mail updates to its citizens on new developments in Whyville.

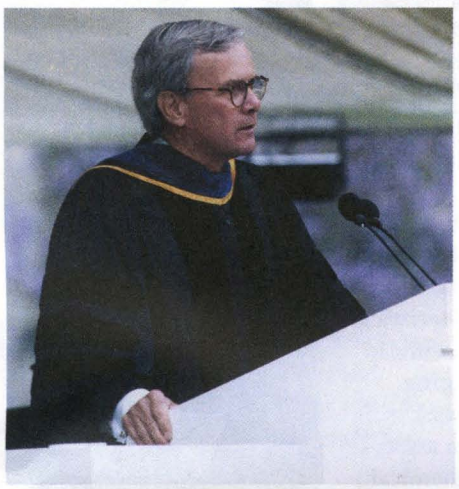
But Whyville is only part of the picture. The articles and Web site are also connected to a set of 10-week science curriculum units developed at CAPSI for grades 7–12. This curriculum, together with Whyville, spans traditional areas linking chemistry, biology, and physics, as well as subjects like the history of science.

Keeping the Soul On-Line

Commencement speaker Tom Brokaw urges graduates to temper technology with humanity



Now what? Radoslaw Osada '99 ponders his next move.



Although Caltech has always had a tendency to end up in the media, on the morning of June 11 the media ended up at Caltech.

For the second year in a row, the Institute invited a media professional to address its graduates. But unlike last year's speaker, TV's Bill Nye the Science Guy, this year's speaker, Tom Brokaw, anchor and managing editor of NBC's weekday news television program *NBC Nightly News*, openly confessed that he might not seem to be the obvious choice for a scientific institution of Caltech's stature.

"I could not be more incongruous as a selection for your commencement speaker, given my math skills," Brokaw said, eliciting chuckles from the close to 500 graduates—including 198 bachelor's degree candidates, 113 master's, 2 engineer's, and 156 doctoral.

But as much as he downplayed his own technical know-how ("frankly, I still don't understand how the picture gets from where I work to your television set"), Brokaw showed that in his 37 years of journalism he *has* learned how to be a diligent student—even of material as arcane as Caltech traditions.

"Think of this moment as Ditch Day II, class of '99," Brokaw said. "Think of this speech as one more set of stacks. If you can figure it out, you'll have a worthy life."

Brokaw also showed himself to be a student of history, as he compared the assembled graduates to an earlier class of hopefuls poised on the brink of a new century. "One hundred years ago, another class of '99 in America was anticipating a new century, rich with the possibilities of the new technologies of that time that were just coming online—the excitement over electrical power, the automobile, the first tentative steps toward flight."

But as Brokaw noted, those developments were only the beginning, and the 20th century saw an explosion of advances in science and technology. But that was not the only explosive trend. "The 20th century—what a triumph," said Brokaw. "And what an ugly scar on the face of history.

"Because the 20th century also encompassed two world wars with millions of casualties, holocausts in the heart of Western civilization, in Southeast Asia and in Africa, killing millions more. An ideology took root that was designed to empower the masses and became instead one of the most ruthless instruments of oppression. Rival nations pointed at each other terrible weapons capable of destroying life on Earth as we know it.

"In the closing days of this momentous time, in the American culture, we have been witness to maniacal homicide committed by school boys that shocked the nation into a dialogue of ill-defined blame—while in Europe the most powerful political and military alliance on the globe made a clumsy but ultimately successful attempt to neutralize a murderous tyrant and in the process set off a refugee crisis of historic proportions."

In an era as beset by problems as it is rich with promise, the Institute's graduates, said Brokaw, have it within their grasp to make a profound impact. "I am here today not only as your commencement speaker but . . . as a person who is in awe of your capacity to change the gears on all the machinery of the world, broadly speaking."

No server or search engine will offer you the rewards of a loving personal relationship or the moral underpinning of a life lived well, whatever the financial scorecard.

But more important than mastering the machinery itself, said Brokaw, is an understanding of the responsibilities such mastery entails and an appreciation of the ideals, beliefs, and commitments that have shaped today's world as it looks ahead once again to the dawn of a new century.

"For all of its shocking and brutal stretches of oppression and extermination," said Brokaw, "the single most powerful idea of the 20th century is personal and political freedom."

And then Brokaw invoked the example of an earlier generation, those Americans who came of age during the Great Depression and went on to fight and win the Second World War, whose sacrifices and achievements he has chronicled in his recent, bestselling book *The Greatest Generation*.

"Some of [these individuals] are here today in this audience and on this stage behind me, although they would not have you know that because they are characteristically modest," said Brokaw. "They prefer to live their lives and let their sacrifices speak for them. . . .

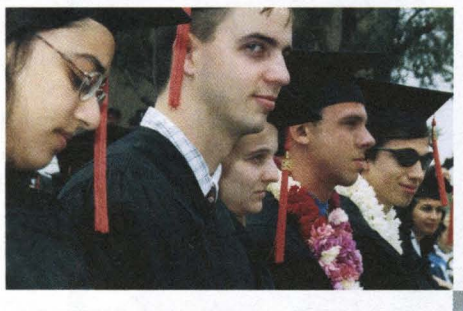
"This generation prevailed through extraordinary acts of courage and heroism by ordinary people," he added. "They did nothing less than save the world and give us what we have today."

And so Brokaw had one final lesson to offer to Caltech's departing students: freedom and technology alone are not enough. "It is not enough," said Brokaw, "to wire the world if you short-circuit the soul." He urged the Institute's graduates never to forget the importance of the simple gestures of humanity, especially in the face of society's massive and ever-increasing reliance on technology. "No piece of software, no server or search engine . . . will offer you the irreplaceable rewards of a loving personal relationship, the strengths and comfort of a real community of shared values and common dreams, the moral underpinning of a life lived well, whatever the financial scorecard."

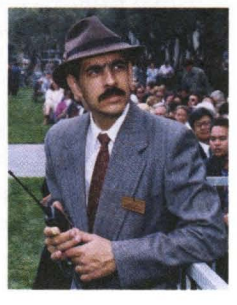
Said Brokaw, "This new technology really is a tool in your hands. And your hands are an extension not only of your mind but of your heart and soul. . . . Taken together, they're a powerful combination. Use them well."

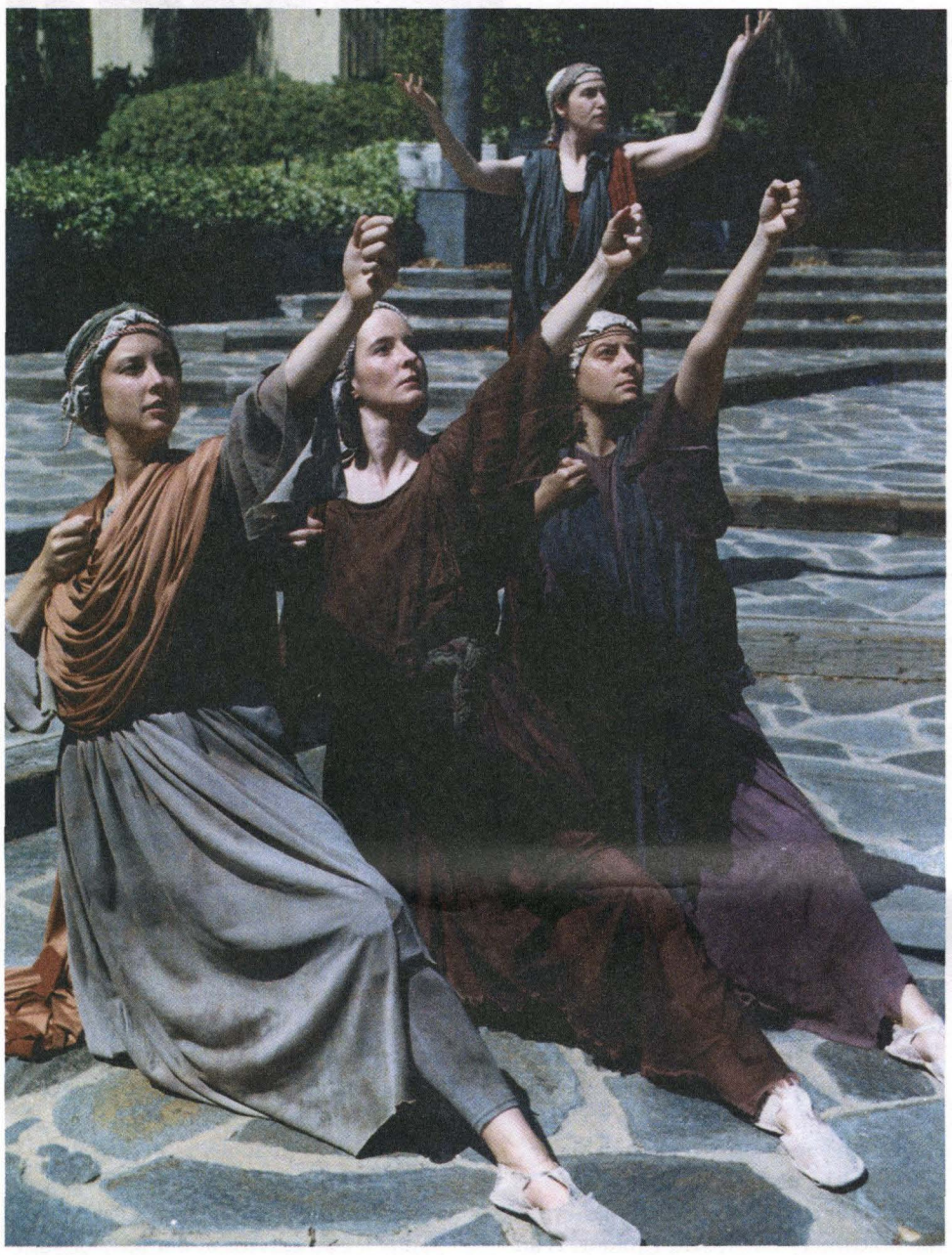
Athough Brokaw addressed grave and powerful issues, his presentation was not without its moments of levity. The first came immediately before his speech when Caltech's a cappella group Ecphonema performed a musical spoof of the NBC theme song.

As for Brokaw's themes, he too struck a light note with his parting words of advice. "In the past I have said, 'It's easy to make a buck; it's tough to make a difference.' And then a father in one of my audiences, who was one of the masters of the universe on Wall Street, wrote me a revision of my line. He said: 'It's tough to make a buck; but if you make a lot of bucks, you can make a difference.' You decide what works best for you."



THE FACES OF COMMENCEMENT: Graduation inspires a variety of looks—in clothes, demeanor, and especially facial expressions. Clockwise from immediate right: Newly minted graduate Alicia Alonzo, PhD '99, looks elated and relieved; Kyle Alvine '99 (second from left) gives a sidelong glance as he awaits his trip to the stage; Tom Brokaw thoughtfully imparts his thoughts; and Ram Basu '84 of Public Events is on the case, using his fierce countenance to keep the rain clouds from last year's ceremony at bay.





It was written more than 2,000 years ago about events that took place more than 1,000 years before that, but the Caltech Theater Arts' spring production of *The Trojan Women* struck a contemporary chord with its emphasis on the innocent victims of war. From left are graduate student in geology Rowena Lohman '98, seismo staffer Karen Kahler, and JPL staffer Marjorie Schmeltz. Behind them, adding her appeal to the gods, is Caltech community member Siobhan Jess.

Amid commendations and recommendations, the Institute is reaccredited

Caltech was recently reaccredited by the Western Association of Schools and Colleges (WASC).

WASC is one of six regional associations in the United States that accredit public and private schools, colleges, and universities. The Western region covers institutions in California and Hawaii, the territories of Guam, American Samoa, the Federated States of Micronesia, the Republic of Palau, the Commonwealth of the Northern Marianas Islands, the Pacific Basin, and East Asia and areas of the Pacific and East Asia where American/international schools or colleges may apply to it for service.

The WASC evaluation team prepared its report for the WASC commission after visiting the Caltech campus in the fall of 1998. The following are excerpts from a letter to Caltech President David Baltimore from WASC Executive Director Ralph Wolf summarizing the commission's comments and recommendations.

The evaluation team found much about the California Institute of Technology to commend. The team found the institution deeply concerned about its students; dedicated to research, teaching and student development with an active learning environment; the faculty are enthusiastic and effective in their efforts to sustain curriculum innovation and improvement. The institution has expanded the diversity of its student body, fostering respect for differences of culture. Additionally, Caltech has committed to integrating technology into every facet of the institution and is now using it effectively in the delivery of instruction. In sum, the team found a bold sense of institutional confidence rooted in a record of academic excellence.

The Commission commends Caltech for its efforts to respond to concerns

Continued on page 14 . . .

National Academy of Engineering names eight faculty and alumni to membership

Institute faculty members John Brady, Wilfred "Bill" Iwan, and William Johnson have been elected to the National Academy of Engineering, one of the highest distinctions that can be accorded an American engineer. Their election brings to 34 the number of faculty who are NAE members.

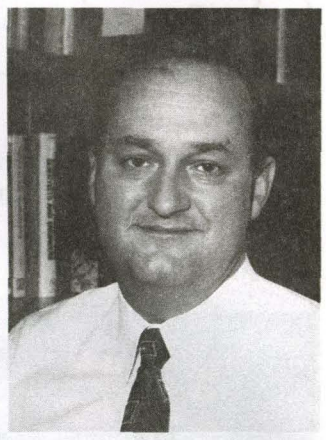
In addition, five Caltech alumni—seven, if you include Iwan and Johnson—were named to NAE membership this year.

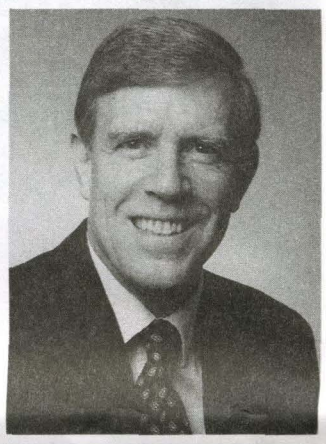
NAE membership honors those who have made "important contributions to engineering theory and practice, including significant contributions to the literature of engineering theory and practice," and those who have demonstrated "unusual accomplishment in the pioneering of new and developing fields of technology."

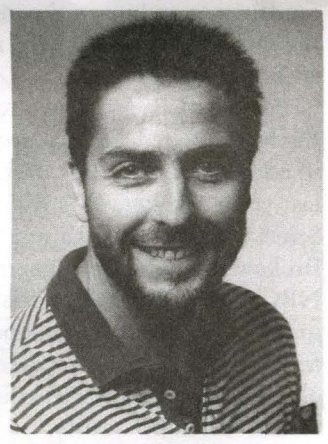
Brady, professor of and executive officer for chemical engineering, studies fluid mechanics and transport processes, with a special interest in problems at the interface between continuum mechanics and statistical mechanics. He was cited by the academy "for work in elucidating the basic mechanics of and developing methods for the simulation of multiphase flows." Brady joined the Caltech faculty in 1985 as an associate professor and was appointed professor of chemical engineering in 1990. He has served as executive officer for chemical engineering since 1993.

Recognized by the academy for his "research on seismic performance of structures, and for leadership in earthquake hazard mitigation improvement of public safety," Bill Iwan '57, PhD '61, joined the Institute's faculty in 1964 as an assistant professor, was appointed associate professor in 1967, and full professor of applied mechanics in 1972. His research interests include modeling of dynamical systems, earthquake response of structures and nonstructural components, and offshore engineering. He currently serves as director of the Institute's earthquake engineering research laboratory, and also served as executive officer for civil engineering and applied mechanics from 1980 to 1986.

William Johnson, PhD '75, joined the Institute faculty in 1977 as an assistant professor of materials science. He was appointed associate professor in 1980 and full professor in 1984, and is currently the Ruben F. and Donna Mettler Professor of Engineering and Applied Science. Johnson was cited by the Academy "for the development of bulk metallic glasses as structural materials." His research interests include amorphous and glassy metallic materials, nano-crystalline materials, and metallic glass matrix composites.







Newly elected to the National Academy of Engineering are, from the top, professors William Johnson, Wilfred Iwan, and John Brady.

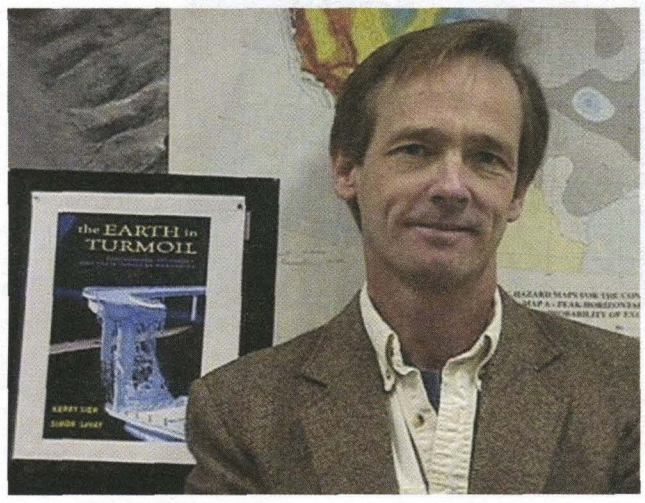
In addition to the Caltech faculty, five Institute alumni were also named NAE fellows this year. Robert Bower '63, PhD '73, professor of electrical and computer engineering at UC Davis, was recognized for "inventing the self-aligned, gate ion-implanted MOSFET and for establishing ion implantation to fabricate semiconductor integrated circuits."

James Demmel '75, professor of mathematics and computer science at UC Berkeley, was honored for "his contributions to numerical linear algebra and scientific computing." Peter Simpkins MS '60, a distinguished member of the technical staff of Bell Laboratories, Lucent Technologies, was recognized for his work on the "understanding and development of processes fundamental to the manufacture of low-loss, high-strength optical fiber."

John Stenbit '61, MS '62, was noted for "contributions to the development of and leadership in the implementation of system architecture of complex military and communications systems." He is executive vice president for telecommunications at TRW Space, Defense, and Information Systems in Fairfax, Virginia.

Finally, Charles Trimble '63, MS '64, president and CEO of Trimble Navigation Ltd., Sunnyvale, California, was cited for his "contributions to navigational systems."

Geologist Kerry Sieh elected to NAS



The earth is in turmoil, and geologist Kerry Sieh is in the National Academy of Sciences.

Professor of Geology Kerry Sieh has been elected to the National Academy of Sciences, one of the highest distinctions that can be accorded an American scientist. One of 60 new members announced at the NAS annual meeting in April, Sieh's election brings to 65 the number of Institute professors who are members of the Academy.

Well known for his work in the geology of earthquakes and especially for pioneering the field of paleoseismology—the history and evolution of ancient quakes—Sieh joined the Institute as assistant professor in 1977. He was named associate professor in 1982, was appointed professor in 1986, and served as academic officer for the Division of Geological and Planetary Sciences from 1989 to 1994.

Sieh's current research interests include active faults in the Los Angeles basin, and the geological history of the San Andreas fault, and he has also studied the activity of large faults in China and Sumatra. A frequent and articulate spokesperson for the field of earthquake science, he has, in addition to many research papers, coauthored two books, *The Geology of Earthquakes* (with Robert Yeats and fellow Institute geologist Clarence Allen) and *The Earth in Turmoil: Earthquakes and Volcanoes and Their Human Impact* (with Simon LeVay).

Holocaust Museum architect James Freed selected to design Broad Center

James Freed, the architect who designed the United States Holocaust Memorial Museum in Washington, D.C., has been chosen to design the Institute's new Broad Center for the Biological Sciences. Freed, a senior partner of the firm Pei Cobb Freed & Partners, was selected from four finalists to design the building.

President Baltimore, a member of the committee that selected Freed, said the Holocaust Museum especially shows the architect's genius in designing a magnificent building to benefit society within a well-established neighborhood of other buildings.

"We were impressed by his flexibility and his ability to design a structure that is at once modern and appropriate to a settled architectural style in its surrounding," Baltimore said. "We were also impressed that he could take our very sketchy program and turn it into a fascinating model."

The committee asked the finalists to discuss their approaches for making the Broad Center blend into the campus surroundings while at the same time "capturing the essence of modern-day technology," developing a design that would comport with Southern California's seismic code requirements and maintain an open modular concept of laboratory space, while incorporating specialized facilities, enhancing and addressing student and faculty life, and addressing community concerns for public space.

The Broad Center will be located on the northwest quadrant of the campus. Measuring 100,000 square feet, the building will include laboratories and offices for 10 to 12 new research teams, as well as conference rooms, a lecture hall, and a seminar room. The building will house several major new research facilities, including an Imaging Center and a Biomolecular Structures Lab

The center is named for Eli Broad, chairman and CEO of SunAmerica Inc. and a Los Angeles civic leader and philanthropist. Broad, who provided $18 million for the building's construction, said he was "very pleased" with the selection of Freed.

Honors and awards

Michael Alvarez, associate professor of political science, and *William Deverell*, associate professor of history, have been selected to receive 1999 Haynes Foundation Faculty Fellowships, Alvarez for his proposal "An Experiment in Democracy: The Blanket Primary in California," Deverell for his proposal (with Greg Hise of USC) "Land of Sunshine? The Environmental History of Greater Los Angeles."

Harry Atwater, associate professor of applied physics, has been elected by the Materials Research Society to serve on its executive committee and council for three years, one year each as vice president (1999), president (2000), and past president (2001). As president he will preside over the society's activities for that year, including two large technical meetings plus the society's workshop series, publications, and other services it offers members.

Jacqueline Barton, the Arthur and Marian Hanisch Memorial Professor and professor of chemistry, has been elected a member of the American Philosophical Society "for her achievements in science."

Seymour Benzer, the James E. Boswell Professor of Neuroscience, Emeritus, has been named a 1998 Ellison Medical Foundation Senior Scholar as part of the Ellison Medical Foundation Senior Scholars in Aging Program. The four-year, $993,000 award will support Benzer's research regarding the discovery of the "Methuselah" gene in fruit flies. This gene, when mutated, increases the fly's life span by one-third, and because humans may carry an analog of the gene, the discovery has interesting implications for future research.

Roger Blandford, the Richard Chace Tolman Professor of Theoretical Astrophysics, has received the Royal Astronomical Society's Eddington Medal for Theoretical Astronomy.

John Brady, the Chevron Professor of Chemical Engineering and executive officer for chemical engineering, has received the Professional Progress Award for Outstanding Progress in Chemical Engineering from the American Institute of Chemical Engineers. Given to a person under the age of 45 who has made a significant contribution to the science of chemical engineering, the award is sponsored by Air Products and Chemicals, Inc.

Peter Dervan, the Bren Professor of Chemistry and chair of the Division of Chemistry and Chemical Engineering, has received the American Chemical Society's 1999 Alfred Bader Award in Bioorganic Chemistry "for his work in developing small molecules that can be 'programmed' to bind to specific pieces of DNA," which represents "an achievement that could someday revolutionize the treatment of disease."

Raymond Deshaies, assistant professor of biology, in July 1997 was awarded the 1997 Burroughs Wellcome New Investigator Award in the Basic Pharmacological Sciences.

Professor of Chemistry *Dennis Dougherty* and Professor of Economics and Social Sciences *John Ledyard*, who is also chair of

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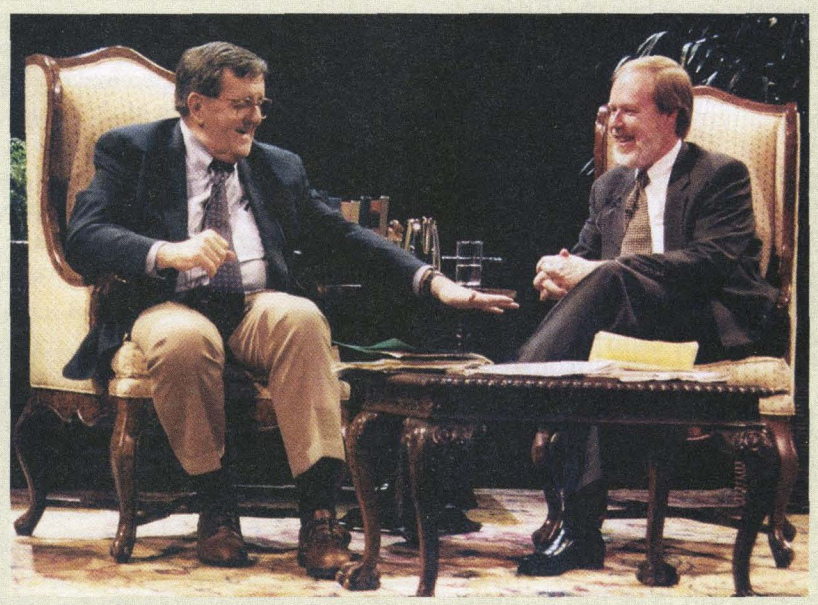


On May 6, Caltech hosted "An Evening with Mark Shields," welcoming the well-known political pundit and columnist to campus. The moderator of CNN's weekly *The Capital Gang* and the liberal half of the political commentary on the PBS nightly *The NewsHour with Jim Lehrer,* the veteran political correspondent (and former campaign manager) entertained his Beckman Auditorium audience with witty anecdotes and insights about life and times in the nation's capital from 1964 to the present day. Shields (left) shared the stage with his interviewer, Doyle McManus, Washington, D.C., bureau chief of the *Los Angeles Times.* The presentation is available on the Web at http:/www.caltech.edu/onlinetheater/.

The more than 17,000 visitors who flocked to Caltech's Linus Pauling exhibit this spring included Arnold O. Beckman Professor of Chemistry and Beckman Institute Director Harry Gray, shown here studying a display of photos and artifacts from the pioneering scientist's boyhood years in an Oregon frontier town. Entitled "Linus Pauling and the Twentieth Century: A Quest for Humanity," the multifaceted exhibit chronicles Pauling's life and career as a scientist and antinuclear activist. It moved on to Washington, D. C., in mid-June, after a month-long run on the Caltech campus.

William Jenkins of Vanderbilt named new vice president for business and finance

William Jenkins has been appointed the Institute's new vice president for business and finance. He comes to Caltech from Vanderbilt University, where he had been the vice chancellor for administration.

Jenkins became vice chancellor at Vanderbilt in 1984, and held an adjunct professorship of management in the Owen Graduate School of Management from 1988 to the time of his departure. As a general officer of the university, he was directly responsible for activities encompassing finance, business, technology, human resources, and facilities; he has also been involved in fundraising, academics, student life, athletics, and legal, community, and public relations. In 1990 he created the Vanderbilt University Leadership Development Forum, which provides leadership training for academic and administrative staff throughout the university.

William Jenkins

He earned his MS and PhD degrees from Purdue University, and his bachelor's degree from Indiana State University.

Before joining Vanderbilt, Jenkins spent seven years at North Carolina State University as assistant and then associate vice chancellor for finance and business. Prior to that he was business manager and assistant to the vice president for campus affairs at Cornell University.

Coauthor of the book *The Eagle and the Monk: Seven Principles of Successful Change*, Jenkins is a recognized speaker, consultant, and authority on the subject of leadership and values. He is also coauthor of *Managing the Hidden Organization* and is author or coauthor of numerous articles in popular, higher-education, and business publications. Honored for his activities in the areas of race relations and the advancement of women, Jenkins is also a Purdue University Distinguished Alumnus.

Jenkins and his wife, Mary Anne, have two adult children.

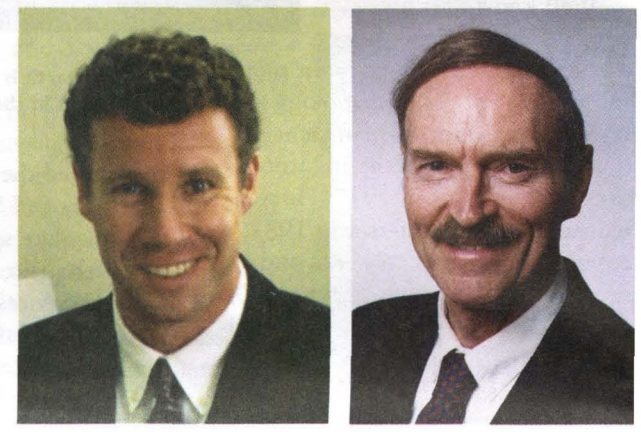
New directors of athletics and performing arts are appointed

The Institute's office of student affairs has announced the appointment of two new directors—Timothy Downes and Darryl Denning. Downes is the new director of athletics and physical education, while Denning has been appointed Caltech's first-ever director of performing and creative arts. Both men assumed their new responsibilities on April 1.

Timothy Downes joins Caltech from Johns Hopkins University, where he had been the associate director of athletics since 1995. He holds a BA from Dartmouth (where he was a four-year starter on the men's varsity lacrosse team and made the 1988 All–New England team) and a JD from Washington and Lee University.

While Downes is a new recruit, Darryl Denning has been a familiar face on campus for almost three decades. He joined Caltech in 1972 as an instructor in classical and flamenco guitar, and was appointed Caltech's music program coordinator in 1992.

The new half-time director position will expand upon Denning's music program administrative duties to include the supervision of activities within the studio arts, the theater arts (TACIT), and the music appreciation programs. Denning will also continue his guitar instruction at Caltech and Occidental College.



Timothy Downes (left) and Darryl Denning are, respectively, Caltech's new directors of athletics and performing arts.

An active performing artist himself, Denning has made numerous solo tours in Europe and the Americas. He has recorded his own compact discs (the latest, *Classical Guitar Artistry*, is available from Tower Records and the Occidental Bookstore), and has appeared on the BBC, Radio Spain, Mexican National Television, and PBS.

Honors . . . . from page 5

the Division of Humanities and Social Sciences, have been elected fellows of the American Academy of Arts and Sciences "in recognition of distinguished contributions to his profession."

Kenneth Farley, associate professor of geochemistry, has been selected to receive the James B. Macelwane Medal of the American Geophysical Union, "which is awarded for significant contributions to the geophysical sciences by a young scientist of outstanding ability."

Peter Goldreich, the Lee A. DuBridge Professor of Astrophysics and Planetary Physics, has been selected by the department of astronomy at the University of Texas, Austin, to receive the Eighth Award of the Antoinette de Vaucouleurs Memorial Lectureship and Medal. "Known as one of the preeminent theoretical astrophysicists in the world," Goldreich is "especially acclaimed for the diverse areas to which he has made fundamental contributions. His work is both mathematically rigorous and resonant with deep physical insight." His many other honors include the National Medal of Science.

Andrea Goldsmith, assistant professor of electrical engineering, has been selected as an Office of Naval Research Young Investigator "for her exceptional promise for an outstanding research and teaching career."

Robert Grubbs, the Victor and Elizabeth Atkins Professor of Chemistry, has won the 1998 prize from Fluka Chemie AG, Switzerland, for developing the reagent of the year, "a novel olefin metathesis catalyst based on a ruthenium carbene complex."

Bruce Hay, assistant professor of biology, in February 1998 was awarded the 1998 Burroughs Wellcome Fund New Investigator Award in the Biological Sciences.

Norman Horowitz, PhD '39, professor of biology, emeritus, has received the 1998 Thomas Hunt Morgan Medal, which "recognizes a lifetime contribution to genetics." The Genetics Society of America has honored him with the award for his "brilliant contributions to genetics in the course of a productive career of over 60 years. His discoveries in genetics are important not only to that discipline, but also to evolutionary biology, and he has contributed importantly to the scientific education of the public."

Alice Huang, senior councilor for external relations and faculty associate in biology, has received the 1999 Achievement Award from the Chinese-American Faculty Association of Southern California, for "her outstanding contribution" to microbiology and "her dedicated leadership in higher education." She was honored at the association's 28th annual convention, where she gave the keynote speech, "New Challenges for Chinese-American Activism."

Emlyn Hughes, associate professor of physics, has received the Richard P. Feynman Prize for Excellence in Teaching "for his outstanding ability to teach the mysterious nature of quantum mechanics to a broad audience, as evidenced by the overwhelmingly positive student feedback from Ph 2, a core course in sophomore physics. By combining a clear pedagogic style with an entertaining delivery, complete with frequent anecdotes on physics and life, Hughes brings a Feynman-like quality to the teaching of this difficult subject." The prize consists of an award of $3,000, matched by an equivalent raise in

Continued on page 11 . . .

This spring, *Caltech News* received a Grand Gold Medal from the Council for the Advancement and Support of Education (CASE) Circle of Excellence Awards in Alumni Relations and Communications. The quarterly was one of six entries—out of the many hundreds submitted in 44 categories—to be honored with the Grand Gold, which is given in selected categories.

LIFE, BUT NOT WHERE WE KNOW IT—
ARE THERE PLANETS OUT THERE WITHOUT SUNS BUT WITH LIFE?

Earthrise, seen from the moon. In a new study, Caltech scientist Dave Stevenson suggests that Earth-like planets that originated within forming planetary systems might populate interstellar space.

Long long ago in a solar system not at all far away, there could have existed about five to ten Earth-like planets in Jupiter-crossing orbits.

Even though they are no longer orbiting their parent star—in this case, the sun— these planets today could harbor life somewhere in interstellar space, according to a Caltech planetary scientist.

In the July 1 issue of the journal *Nature*, Caltech professor Dave Stevenson says in a new study that such objects could be life-sustaining due especially to the molecular hydrogen they accreted when the solar system formed long ago.

Called "interstellar planets" because they would exist between the stars, they have never been directly observed or proved to even exist. But based on what scientists know about the way matter should fall together in forming a solar system, such Earth-like planets could definitely have been formed.

Within our own planetary system over a period of several million years, one of two things happened to these objects: either they slammed into Jupiter and made it even bigger, or else they came so close to Jupiter that they were catapulted by gravity completely out of the solar system, never to return.

Because these bodies formed when the solar system was permeated with hydrogen gas, they retained a dense atmosphere of hydrogen, allowing them to have surfaces with temperatures not too different from Earth, and possibly water oceans.

Stevenson writes that in the absence of sunlight, the natural radioactivity inside an Earth-like planet would only be sufficient to raise the radiating temperature of the body to 30 degrees above absolute zero (that's about minus 400 degrees Fahrenheit). But the expected dense hydrogen atmosphere would prevent the surface from radiating effectively—just like the greenhouse effect on Earth, but more so.

As a result, the surface could have a similar temperature to the current Earth surface, allowing water oceans to form and a surface pressure similar to that at the bottom of Earth's oceans. For this to happen, the interstellar planet would probably need to be at least half Earth's mass.

Therefore, the energy source would be much the same as that which drives geothermal energy and plate tectonics on Earth. It is not known whether geothermal heat alone is sufficent to allow life to originate, and the amount of energy is small compared to sunlight, suggesting that the amount of biological activity would also be small. But the existence of life in such an environment would be of great interest even if the mass of living matter were small.

The heat energy, and especially variations in temperature, could potentially allow life to get going, Stevenson says. "I'm not saying that these objects have life, but everyone agrees that life requires disequilibrium," he says. "So there has to be a way to get free energy, because that's what drives biochemical processes. These objects could have weather, variations in clouds, oceans . . . even lightning."

If life exists on such objects, an open question is how complex it could be, Stevenson says. "I don't think anyone knows what is required to drive biological evolution from simple to very complex systems."

These interstellar wanderers could also have arisen as a natural outcome of the formation of stars other than the sun. In either case, such planets cannot be seen with present technology because they are so dark and cold—at least from Earth's vantage point.

Although these bodies may have warm surfaces, they would appear to us as very weak emitters of long-wavelength infrared radiation, much below current detection limits.

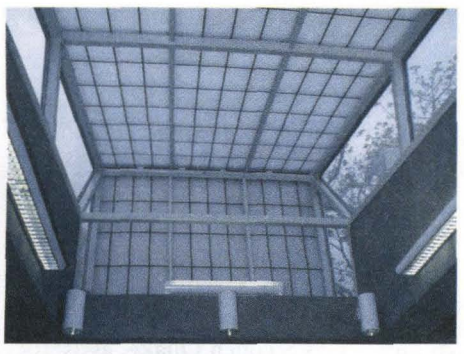
The best bet for even demonstrating that interstellar planets exist is to have some programmed search for occultations, Stevenson says. In other words, the object might pass occasionally in the direct line of sight between Earth and a star, and if instruments were watching, the light of the star might dim or even flicker out for a time.

Programs like this are already advocated for the purpose of looking for planets in orbit around other stars. But looking for interstellar planets would be even harder.

"All I'm saying is that, among the places you might want to consider for sustainable life, you might eventually want to look at these objects," says Stevenson, who is the George Van Osdol Professor of Planetary Science.

"They could be the most common location for life in the universe."

ROBERT TINDOL



The April dedication of the Powell-Booth Laboratory for Computational Sciences unveiled a spectacular renovation complete with a central sky-light crowning the upstairs lounge area (above) and the Immersadesk large screen 3-D projector (below). Virtual passengers included, from left, President Baltimore, the Powell Foundation's Larry Cox, and Professor of Civil Engineering and Applied Mechanics Paul Jennings, PhD '63.

LETTERS TO THE EDITOR

LURIE REMEMBERED

I was saddened to read the obituary of Harold Lurie [*Caltech News*, Vol. 23, No. 2, 1998]. Harold was a cheerful, kind, gracious friend, respected and admired, intelligent, and smart. He wrote a brilliant, original thesis under the late Professor Ernest Sechler. Harold was a native of South Africa, with a crisp, distinctive British accent, which charmed everyone and was especially attractive to females. He was one of the most interesting and colorful graduate students in aeronautics. After graduation, Harold went to work at a job he hated; but the salary and other amenities were so attractive that he did not have the courage to resign. To those in whom Harold confided, he was famous (notorious?) for his efforts to get himself fired for insubordination. Harold was baffled, and often lamented that his stratagems backfired: when he attended a briefing by a higher-up he would rise and say that he had never heard such asinine garbage; but instead of being reprimanded he would be praised for his honesty and courage, promoted and given a salary increase. He was quite discouraged and unhappy for three years, until he was given an appointment to the faculty of Caltech.

Bernard Rasof, PhD '50

CAMPUS CAPER

The news in a recent issue reminded me of a couple of events, one during my undergraduate days at CIT about 69 years ago, and the other as WWII was ending. The first happened as I was doing some welding, trying to make a buck or two on campus. As I looked up, there on the street was a strange automobile with the trunk open, inside of which was a large tank. Curious as always, I went over and spoke to the apparent driver. He informed me that the tank was filled with compressed gas right out of the city gas system. Furthermore, the engine was running on it and a choke was never needed to start it on a cold morning and this was a CIT test development.

The second event occurred because five or six of us Douglas engineers could see that all of that juicy overtime was about to cease and we were still young and ambitious. We formed a group to design and build a five- or six-passenger business airplane, hoping to interest millionaires in financing the project. Led by Ted Smith [PhD '49] and encouraged by Peter Helman, who furnished space at his Culver City airport, we completed one airplane. We enlisted Douglas chief test pilot Johnny Martin in making the first flight and received permission from nearby Hughes Aircraft to use their long runway for that all-important successful first flight. Success was short-lived because we had no financiers among us, and we were forced to sell the design for peanuts to a contractor in Oklahoma. He built a factory there and eventually made a jet version. You may have seen some of them flying; it was a twin-engine high-wing design and was named the Aero Commander. Externally, the airplane was a smaller version of the wartime A-20, of which so many were built on an assembly line at the Douglas Santa Monica factory.

Our experience shows you—start with plenty of money, then build it.

Ray T. Oelschlager '32

Continued on page 16 . . .

New scholarship honors Caltech scholar and student mentor Sunney Chan

Throughout the 36 years that Professor Sunney Chan has been teaching at Caltech, he has developed a special relationship with his students. In honor of his commitment to Caltech, several of Chan's friends and former students recently established the Sunney I. Chan Endowed Undergraduate Scholarship.

Chan, the George Grant Hoag Professor of Biophysical Chemistry, was honored in May at a dinner announcing the scholarship at the residence of President David Baltimore and Alice Huang, Caltech's senior councilor for external relations.

The lead gift for the scholarship came from an anonymous donor, who pledged $500,000. Other founding donors include Thomas Anderson, Caltech's former vice president for Institute relations and his wife Rosalie; Wilson Cho '73; Daniel Kwoh. PhD '79; Joel Kwok, PhD '65; Paul Lee '67, PhD '72, and his wife, Amy Shiu Lee PhD '75; York Liao '67; Andrew Hin Yeung Lo '72; Louise Wannier '78; and Kenneth Young '69, PhD '72.

Kwoh, one of the founding donors, said that the group wanted to honor Chan for the many years that he has spent helping Institute students. "I always had a lot of respect for Sunney because he became master of student houses—an extremely tough job—at the same time that he was actively involved in research. His selflessness always touched me."

Chan came to Caltech in 1963 as an assistant professor of chemical physics, was named full professor in 1968, and was named the Hoag Professor in 1992. He has served Caltech in many capacities over the years, as master of student houses, chairman of the faculty, and twice as executive officer for chemistry. He was named an honorary alumnus in 1985 for his contributions to the educational and cultural environment of the Institute and for his support of student activities.

While Chan said that it was "great" to be honored with the scholarship, he said that he never considered that the help and attention he gave to students deserved special recognition. "There's a human side to being a professor," said Chan. "You don't expect to get rewarded for this."

Anyone interested in contributing to the Sunney I. Chan Endowed Undergraduate Scholarship should call Maureen Savage at 626/395-6947.

Family, friends, and former students of Professor Sunney Chan gathered at the President's Residence in May to celebrate the establishment of an undergraduate scholarship honoring the longtime Caltech faculty member. Those present included, from left (front row) Marianne, Michael, and Irene Chan; President David Baltimore; Sunney Chan; Amy Shiu Lee, PhD '75; Paul Lee '67, PhD '72; York Liao '67; (second row) Louise Wannier '78; Andrew Hin Yeung Lo '72; Chemistry and Chemical Engineering Division Chair Peter Dervan; Thomas Anderson; Daniel Kwoh, PhD '79; Brenda Nunnally; Senior Councilor for External Relations and Faculty Associate in Biology Alice Huang; and Vice President for Institute Relations Jerry Nunnally; (back row) Linda and Gary Dierks.

SURF's director gets her own SURF Fellowship

SURFing has become a way of life for many undergrads at Caltech. To date, 28 percent of all living alumni who received their BS from the Institute have participated in the SURF (Summer Undergraduate Research Fellowships) program.

In some cases, SURFers are assisted through one of many endowed fellowships established by alumni and others interested in the SURF program.

The latest of these fellowships, donated by Carl Larson '52 and his wife, Shirley, has been established to honor Carolyn Merkel—the director of SURF for the past 11 years and a staff member in the SURF office since its inception in 1979.

A fellowship established in her name honors Carolyn Merkel and her 11 years as director of SURF.

The Carolyn Merkel SURF endowment will support one SURF student each year. "I look forward to following the progress, joys, and struggles of these students," says Merkel.

But supporting students is a role that Merkel is already intimately familiar with. Under her stewardship, the SURF program has grown to encompass an unprecedented number of undergraduates, and even branched out when necessary to accommodate other student research needs.

By 1998, the SURF office had expanded to the point where it was coordinating five different undergraduate research programs, and the decision was made to change the name to the Office of Student-Faculty Programs to better reflect its responsibilities.

Through his involvement with the SURF Board (he has been a member since 1992 and served as chair from October '93 to October '95), Larson has witnessed many of these changes and has gotten to know Merkel very well.

"Carolyn has played such a central role in developing the SURF program over the years that it seemed only natural to Shirley and me that a SURF fellowship should be established in her honor," says Larson. "It was a fun and easy decision."

The Larsons are longtime supporters of Caltech. In addition to his interest in SURF, Carl Larson has been on the board of the Caltech Associates for many years and was the group's president in 1996. An executive with Varian Corporation from 1965 to 1978, he joined Versatec, a subsidiary of Xerox, in 1979 and retired from it as vice president in 1987.

L. K. Whittier Foundation makes gift to support Gene Expression Center

The Institute has received a grant of $1,444,000 from the L. K. Whittier Foundation. The award is for support of the L. K. Whittier Gene Expression Center.

Led by Professor of Biology Barbara Wold, PhD '78, the L. K. Whittier Gene Expression Center will utilize unique resources already available at Caltech to initiate a large-scale human gene expression analysis. This breakthrough will be made in the growing field of "functional genomics," a field whose entire purpose is to make new medical and biological discoveries based on the DNA sequence of the human genome.

Mel Simon, chair of the Caltech Division of Biology and the Anne P. and Benjamin F. Biaggini Professor of Biological Sciences, has produced probes for all 40,000 known human genes. By combining this information with what scientists have already learned from the Human Genome Project, the center is expected to produce wide-ranging discoveries in both the medical and biological sciences.

"We hope to make the center a useful tool for all of the biologists on campus, and ultimately for scientists around the world, through our accumulated database of gene expression information," says Stephen Quake, assistant professor of applied physics and another collaborating scientist at the L. K. Whittier Gene Expression Center. "The interesting thing about the gene arrays is that they provide more data than any one person can analyze, and the aggregate sum of the data provides a powerful resource to answer a number of questions about gene function."

The L. K. Whittier Foundation, located in South Pasadena, was incorporated in 1955 by the late Leland Whittier and other members of the Whittier family. The Whittiers are descendants of Mericos H. Whittier, who was one of the first independent oil producers in California.

Alumnus Richard Brewer endows prize to encourage creativity in physics

Nearly 50 years after he left Caltech to begin a career in research in quantum optics and laser spectroscopy, Richard Brewer '51 has decided to honor Caltech freshmen who show great promise in research. Brewer, who received Caltech's Distinguished Alumni Award in 1994, has created a prize to be awarded annually to a freshman who demonstrates outstanding intellectual promise and creativity at the beginning of his or her Caltech career.

In particular, the Richard G. Brewer Prize is awarded to the freshman with the most interesting solutions to the problems used to select the students for Physics 11, a course created by Tom Tombrello, the chair of the Division of Physics, Mathematics and Astronomy, and the William R. Kenan, Jr., Professor and Professor of Physics. As part of this highly selective, one-year course, in which students learn how to evaluate and test research ideas, students spend a summer involved in a faculty research project. The funds from the prize will help pay for the students' summer stipends.

"Caltech greatly appreciates the prize created by Dr. Brewer," Tombrello said. "Although all of the students will get the same stipend, winning the prize is an honor for the student."

Tombrello said that many former Physics 11 students are heavily recruited by faculty members who sponsor Summer Undergraduate Research Fellowships, or SURFs. "We find the early bloomers in Physics 11," said Tombrello. "Many of these kids will go on to make Caltech famous. Physics 11 is one way to recognize really bright people at Caltech and to challenge them in real research."

The first Brewer Prize recipient, Travis Hime, a junior this fall, spent his Physics 11 summer project working on ideas for the formation of the planet Jupiter. Tombrello recently chose Frederik Eaton '02 as the Brewer Prize recipient for the 1999 academic year.

"I was happy to get the Brewer Prize because I put a lot of effort into the Physics 11 problems and it's nice to see that maybe I got something right," said Eaton, who plans to major in either physics or computer science.

Brewer is currently an IBM Fellow Emeritus and a Consulting Professor of Applied Physics at Stanford. He received his PhD in physical chemistry from UC Berkeley in 1958 under the direction of Leo Brewer '40 (no relation) and Edward Teller. He has held teaching positions at Harvard, UCLA, MIT, and the University of Tokyo. He joined IBM research in 1963 and was named an IBM Fellow in 1973.

Former undergrad Richard Brewer, shown here in his graduation-year picture from the 1951 *Big T* yearbook, has now endowed the Richard G. Brewer Prize to promote creativity among current Caltech undergrads in physics.

Brewer is known for his research in the fields of atomic physics, quantum optics, and laser spectroscopy, and has to his credit more than 145 publications in these and related fields. He was awarded the 1979 Albert A. Michelson Gold Medal of the Franklin Institute for his discoveries and contributions to laser physics, and was elected to the National Academy of Sciences in 1980.

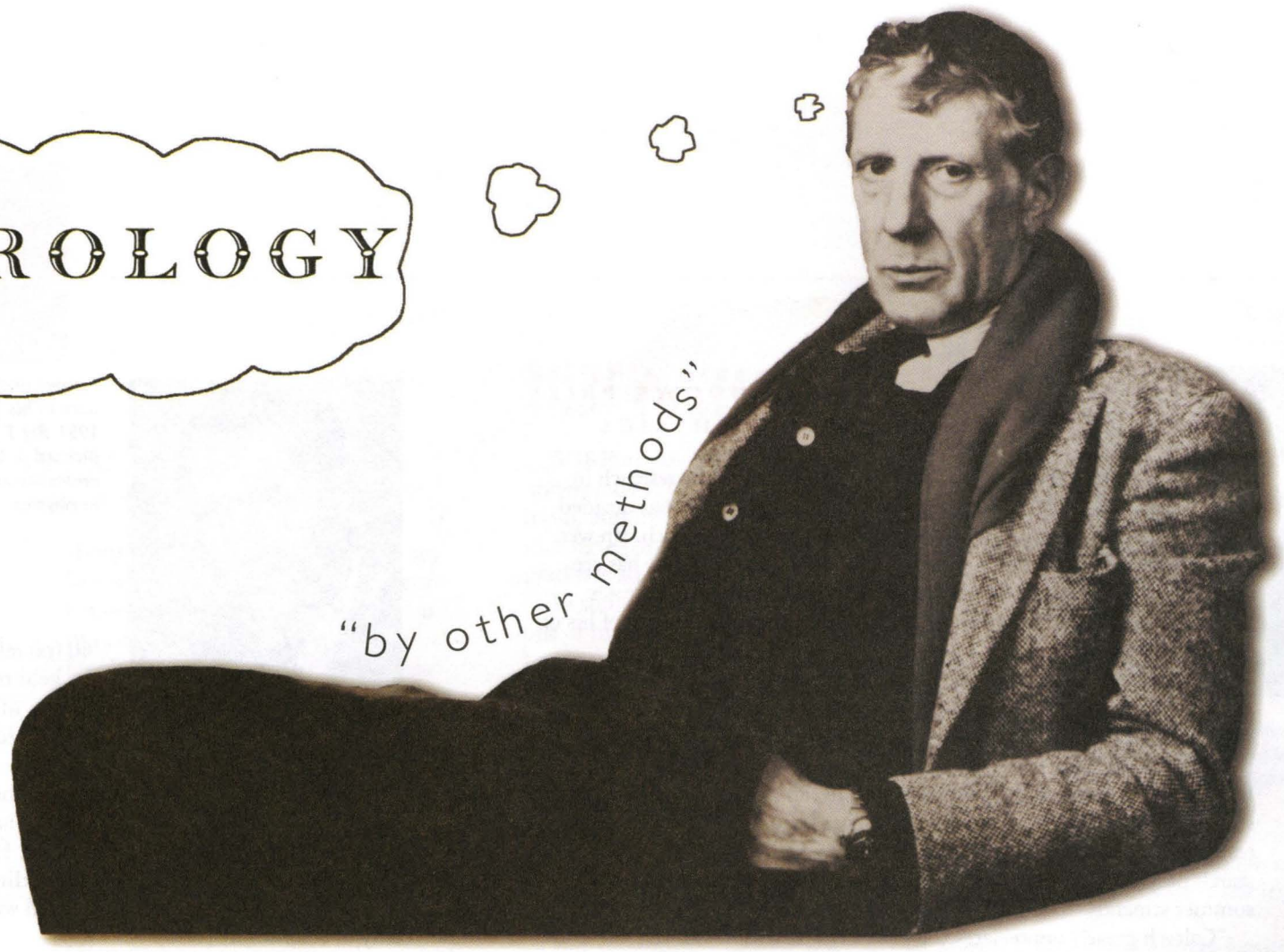
Born and raised in Los Angeles, Brewer says that his romance with science and interest in Caltech began with his older brother, Alexander Brewer '40, who recently died (see Obituaries). "Caltech had a big influence on me because I was exposed to stimulating people like Linus Pauling, Robert Millikan, Lee DuBridge, E.T. Bell, Paul Epstein, and Richard Feynman. These remarkable individuals demonstrated a profound commitment to and love for their work, which they communicated to the student with infectious enthusiasm," Brewer says.

Brewer recalls that "Pauling would have 20 freshmen over to his house for dinner every Sunday, and when it was my turn, I remember finding myself alone with him and wondering what to talk about." But Pauling put him at ease by talking to him on an equal level, Brewer says, and "by discussing a quantum-mechanical electron problem. After dinner, I returned to Dabney House and studied harder than ever."

Regarding the prize he has created at Caltech, Brewer says, "I have fond memories of Caltech and wanted to generate something that would be long lasting. It's nice to establish a prize that will allow the brightest young minds to experience research so it will whet their appetites and perhaps launch them on their careers."

If you're looking for action, on Earth or off, there are few better places to find it than the Big Island of Hawaii, one of the world's most remarkable natural laboratories for the study of both geology and astronomy. This spring, members of the Caltech Associates traveled there to experience firsthand the island's unique volcanic history and terrain under the tutelage of Professor of Geology Jason Saleeby and to learn about the many new discoveries being made at the Keck and Caltech Submillimeter Observatories on Mauna Kea from Ira S. Bowen Professor of Astronomy Wallace Sargent and Professor of Astronomy Anneila Sargent. The Institute support group's itinerary included visits to Mauna Kea, Volcano National Park, and other sites of scenic and scientific interest, including, at right, Lava Tree State Park, a unique fossil forest on the island's east shore, created in the late 18th century when molten rock from a volcanic eruption swamped a grove of Ohia trees and embalmed them in lava. From left John Wilkinson, Thomas Burton '69, Mary Louise Green, John Carney '56, MS '57, geologist Saleeby, and Tyler Matthews '39 examine one of the park's many unusual formations.

NEUROLOGY



An interview with Michelin Lecturer Jonathan Miller

In 1991, British author, television producer, and theater director Jonathan Miller made his Metropolitan Opera directing debut with a dramatically compelling production of Katya Kabanova, *Leos Janácek's musical drama about a dysfunctional family. Despite highly favorable reviews, ticket sales were only 60 percent of capacity. "I feel rather desperate about that," Miller said recently, "considering that an absolutely execrable production of* La Traviata *{by the extravagant opera producer Franco Zefferelli} played to packed houses who invariably applauded as the curtain went up." Desperate or not, Miller (who read natural sciences at Cambridge and was certified to practice medicine in 1959) continues to bring his keen observations of the human condition to the opera, theater, and lecture stage, and to publish books on such topics as the nature of visual perception and the difference between mental and pictorial images. His vision of the arts, and the theater in particular, is firmly rooted in a belief in the power of unflinching observation of reality. "I'm hung up on the actual," he says. "I think that theater has to be a* Gesamtkunstwerk*—it has to be integrated into real life. Otherwise, it's not worth leaving neurology for."*

This spring, Miller came to campus to present the Institute's eighth James Michelin Distinguished Visitor Lecture. The series was established in 1992 by New York designer Bonnie Cashin "to foster creative interaction between the arts and sciences." Shortly before his campus appearance, in a phone conversation from his home in London,, Miller shared some of his views on science, art, and their creative interaction, or lack thereof. Miller was interviewed by Caltech News *writer Marcy Drexler.*

Back in 1982, you described your life to a reporter as "an endless rhapsody of self-doubt." Why?

What I should have been, you see, is a neurologist. I was trained as a neurologist, and then I went into the theater, and if you're brought up to think of yourself as a biological scientist of some sort, pretty well everything else seems frivolous by comparison. Now, this is a sort of silly thing, but nevertheless you can't get rid of it. You spend ten years of your life being trained to do one thing, and you're being taught to think that it's the most serious thing that anyone could possibly do, and then suddenly you find yourself doing something that in some respects is the epitome of frivolity.

But obviously you can't say that directing Shakespeare is a frivolity, unless you think that Shakespeare is frivolous.

It's not that Shakespeare is frivolous, but you spend your time just getting people to dress up in other people's costumes and pretending to be people that they're not, and you think, after the years go by, well, what on earth was all that about?

Surely you've had the experience yourself of being in the audience and being tremendously moved by a performance.

Well, I have, of course. There's one level at which I know it's a perfectly legitimate enterprise. But here I am coming to Caltech, which is a place that has got a very impressive reputation for major, permanent contributions to the body of human knowledge, and then you think, well, you've done a production of *Twelfth Night* or *Hamlet* or whatever, and then, three years later there will already have been twenty more.

But, as you know, in the theater each production is unique.

It is, but not much survives. Productions disappear, whereas if you publish a paper on quantum mechanics, or on the physiology of the red-cell nucleus, it's there.

Many of your projects—I'm thinking of The Body in Question *television series you made for the BBC, and your recent book and museum show,* On Reflection, *about the physiology of visual perception—touch on science.*

They're all connected with it in some way, even the theater work. I spend a lot of my time trying to draw the attention of actors to the minute and subtle details of human behavior, which was the sort of thing I was looking at when I was a neurologist. You look at gait and posture and language and expression and so forth, and that's what you're looking at all the time when you're looking at brain-damaged patients, so that if you are looking at people or trying to persuade people to pretend to be other people convincingly, it draws your attention to what the real behavior is like. So in that sense I feel it's neurology carried on by other methods.

What do you see as the connection between art and science? Is there a role for art in the professional life of the scientist?

I don't think there's any particular reason for encouraging that idea. As we know from the work of certain fundamental physicists, people like Einstein were very dependent upon conjuring up visual images in order to imagine things which otherwise were not easily formulated. But I don't think that the visual arts, or any art, have much to do with science. Science is a self-sufficient activity. I think the passion for bringing the two together arises from the fact that there is some sort of anxiety about scientists being dehumanized or not having some sort of engagement with the ethical or the moral or whatever, but you can't change that by giving, as it were, prophylactic doses of Thomas Mann. Scientists either have an interest or they don't. A lot of high-level scientists are in fact people of almost universal interest. Someone like Einstein was quite clearly a moralist, and he had a very highly developed political vision and was very spiritual in his way, and there are many biologists and physicists of the first order who are like that.

But don't you think an interest in and appreciation for art can be cultivated as part of an undergraduate education?

I'm not certain that it does much good. People are already self-selected by the time they've decided to become scientists. They are people often with a very mathematical, technical view of things. I seriously doubt that you can somehow give these sorts of subcutane-

ous injections of art. People are either interested in it or they're not, and I think when they do get these courses in school, they find them rather burdensome and an obstacle to getting on with science. Don't forget that at least half of the people who take the arts don't like them anyway. They do it as a routine. They can answer the questions and get good results on exams, but then you talk to them and you realize that they have a very automated view of these things. For many people, the arts are little more than a fashionable costume jewelry, which they ornament themselves with in order to give an impressive look of being civilized and successful.

Your estimation of the arts audience's sincerity is pretty low.

I know from many years of watching audiences in expensive opera houses that a very large proportion of the people are there because it's somehow the "done" thing—it carries a great deal of social prestige. If it were really an interest in art, you would find just as large audiences attending performances of Schiller's *Don Carlos* or *Mary Stuart* as you do at *Carmen* or *La Traviata*, but you don't. What people want is not what some would call imaginative and often austere productions but very lavish productions which cast back into the auditorium an image of their affluence. I don't mind people wanting to see *Carmen*, *La Traviata*, and *La Boheme*. I do most of those operas most of the time, but I think there are ways of doing them that actually draw your attention to what they're about, which is human relationships. If they're about furnishings and fabric, you're having your attention distracted, and then it's a spectacle with a sort of musical soundtrack, and I think that's deplorable. The great operas, and I'm thinking of the great musical dramas, draw your attention to what it's like to be human.

How do you feel about your own place in the theatrical world? You have been quoted as saying you felt stuck between the twin idiocies of unquestioning traditionalism and of unquestioning modernism.

When I started out, the only thing I was fighting against was a sort of fatuous traditionalism—but as time's gone on, the opera and the theater have been infected by the same sort of lunatic relativism which has overtaken vast areas of the academy. I spend most of my time trying to find some sort of idiom that is independent of both. The thing about science is

Most of the relativists that go gabbing on about the fact that everything is relative to certain political and social interests are perfectly happy to get onto airplanes in the knowledge that they're going to work.

that it's an accurate picture of the world. Most of the relativists that go gabbing on so fatuously about the fact that everything is relative to certain political and social interests are perfectly happy to get onto airplanes in the knowledge that they're going to work.

So are you sorry you left science?

No, I've had what people would rather glibly call "a rich, full life." Nevertheless, I will always be remorseful about that, yes. It's just simply that I feel I owed myself some sort of achievement in an area that I felt was unquestionably valuable. When you look at the theory of monoclonal antibodies, you know it's right.

Whereas, when you look at one of your opera or stage productions, you're not sure?

It's right at that moment, it's okay, it's fine, it illuminates. The most interesting response I get, the one that pleases me most, is when people say, "I hadn't thought of it that way." Now, that is in a way also what scientists are trying to do—they're trying to get people to see that the world can be represented in an alternative way and that it's right. And if you do a good production, you know that it has actually cast a revealing light on an aspect of human affairs, showing something right about it where previously it was wrong, generalized, and sentimental perhaps.

Speaking of illuminating human affairs, what do you think about the current resurgence of interest in Shakespeare?

Do you think there is one?

There are a lot of movies of the period out or coming out, and Shakespeare in Love *has certainly attracted plenty of attention.*

Well, that's not about Shakespeare, it's about some sort of fictional creature. It uses the name Shakespeare, but it's not about Shakespeare. It's not about anything, really. It has the allure of costume drama with a famous name in it.

Who doesn't demand royalties . . .

Doesn't get them, poor thing. But it also relieves the audience of the necessity of reading Shakespeare. They feel they're acquainted with him without having to read him. I would much prefer they looked at Shakespeare done on a bare stage, you see. What I object to with *Shakespeare in Love* is this idea that the past is a furnishings store. And I think that the only thing that is interesting about the past is exactly what L. P. Hartley said about it: "The past is a foreign country in which they do things differently." And what we read fiction for is first of all to see some sort of commonality between them and us but also to get this rather weird sense that here are members of the same species who acted and behaved and expected so differently from us. But there's no point in doing it if you are just simply beguiled by beautiful appearances and backlight and nice chiffon dresses. That's vulgarity. That's another reason why I have these self-doubts. I wonder, is this a business I really ought to be in?

But you manage to keep on.

I keep my end up.

Honors . . . from page 6

the annual salary of the awardee; it is made possible by a gift of endowment from Caltech Associates Ione and Robert E. Paradise, "in appreciation of Richard Feynman's contributions to excellent teaching."

Matthew Jackson, professor of economics, has been elected a Fellow of the Econometric Society.

The *LIGO* (Laser Interferometer Gravitational-Wave Observatory) project, directed by Barry Barish, the Ronald and Maxine Linde Professor of Physics, has received the 1999 Distinguished Engineering and Science Research Project award from the Engineering Council.

Hideo Mabuchi, PhD '98, assistant professor of physics, and *Rahul Pandharipande*, associate professor of mathematics, have both been selected to receive Alfred P. Sloan Research Fellowships. Each fellowship carries with it a grant of $35,000, to be used "in a flexible and largely unrestricted manner so as to provide the most constructive possible support" of the recipient's research. Sloan recipients are selected on an extraordinarily competitive basis from a group of nominees representing the very best of young scientists.

Nobel Laureate and Arthur Amos Noyes Professor of Chemistry *Rudy Marcus* was honored at the 1998 American Chemical Society's 216th National Meeting as one of the "Top 75 Distinguished Contributors to the Chemical Enterprise" by *Chemical & Engineering News*.

Carver Mead '56, PhD '60, the Gordon and Betty Moore Professor of Engineering and Applied Science, has been awarded the Lemelson-MIT Prize.

James Morgan, the Marvin L. Goldberger Professor of Environmental Engineering Science, has been named the cowinner (with Werner Stumm, professor emeritus of the Federal Institute of Technology in Zurich, Switzerland) of the $150,000 Stockholm Water Prize for 1999, awarded by the Stockholm International Water Institute for substantial contributions "to the preservation, enhancement or availability of the world's water resources." Morgan and Stumm "have for decades been the paramount scientists" in their field. Morgan has also received the National Water Research Institute's 1999 Clarke Prize; the $50,000 award is given each year in the field of water research and technology. "Dr. Morgan's career contributions to the body of knowledge encompassing the many fields of water science and technology have been truly exemplary," according to the Clarke Prize citation.

Anatol Roshko, PhD '52, the Theodore von Kármán Professor of Aeronautics, Emeritus, has been selected to receive the University of Alberta's Distinguished Alumni Award for "his outstanding career and important contributions in the fields of gas dynamics, fluid mechanics, and aerospace engineering."

Professor of Astronomy *Anneila Sargent*, PhD '77, has been elected president of the American Astronomical Society (AAS). Her term as president-elect begins this June, and she will serve as president from June 2000 to June 2002.

Ronald Scott, the Dotty and Dick Hayman Professor of Engineering, Emeritus, will receive an Honorary Membership in the Earthquake Engineering Research Institute "for his very significant contributions to earthquake engineering."

Barry Simon, the IBM Professor of Mathematics and Theoretical Physics and executive officer for mathematics, has received the Technion—Israel Institute of Technology's highest honor, the Doctor Scientiarum Honoris Causa. The conferral took place on June 14. The honorary doctorate is in recognition of his contributions to mathematical physics in general as well as to a variety of specific fields involving quantum and spectral theory, his "influential and lucid textbooks," and his "promotion of scientific cooperation with Israel and the Technion."

Thomas Wolff, professor of mathematics, has been selected a corecipient of the 1999 Bocher Prize, which honors work in the mathematical field of analysis. He was selected "for his contributions to the theory of harmonic analysis."

Life By Chocolate

alumnus Thomas
finds that succ
very sweet ind

Recipe for Success

1 German-born chocolate connoisseur
2 Caltech degrees (1 MS in physics, 1 PhD in physics and astronomy)
4 years experience in consumer-goods management consulting
3 years intense market research
1 commercial airline pilot with an eye for opportunity
100s of hours of travel time
Countless meetings

Combine chocolate connoisseur with the two degrees, and airline pilot, in the mixing bowl of the Caltech/JPL Flying Club. Stir for seven years to create strong friendship. Sprinkle in management consulting experience until Caltech-educated portion starts to form an idea, then gradually add market research. Bake entire mixture in preheated Southern California environment for one year until it forms a unique product. Let stand for one year, adding in travel time and countless meetings, and sprinkling in a liberal dose of marketing and sales strategies. Drop in small boxes and serve immediately to local-area specialty grocers, department stores, and other upscale markets. Stand back and watch the product win acclaim.

Disclaimer—This recipe may not work for everybody, but for Caltech alum Thomas Büttgenbach, the key to orchestrating his success was just a matter of waiting for all of the right ingredients to come together.

In 1998, Thomas Büttgenbach, PhD '93, and his long-time pilot friend, Eric Wierman, started shipping units of Belgian Chocolate Keys, the first product of J. S. Bach Classic Chocolates—the musically themed chocolate manufacturing company they had cofounded in South Pasadena in 1996. Within months, the Chocolate Keys were named L.A.'s Best New Product, and in some markets sales were 200 percent greater than what the owners had projected. And after one year of distribution, the chocolates are now selling in about 250 stores on the West Coast. In fact, in one department store, sales of the Chocolate Keys average around 1,000 units per week. In addition, J. S. Bach's business has expanded to include the selling of chocolate-covered espresso beans, and this October they will introduce their new line of chocolate truffles.

These days, Büttgenbach's life revolves around chocolate. In fact, when it comes to his success and that of J. S. Bach Chocolates, their story could be said to follow a pattern similar to the production of chocolate itself.

BUSINESS AND PLEASURE: In Thomas Büttgenbach's life, work and fun are sometimes interchangeable. Above, he stands with friends at his airline transport pilot test. From left: Eric Wierman, Büttgenbach, former JPLer Sheri Trajillo, and Kevin Condroski, PhD '93. At right, Büttgenbach and Wierman present a scholarship to Bach Competition winner Alison Ahn.

The seed is planted

It's hardly surprising that Büttgenbach chose to manufacture chocolate, since it has been part of his life from the very beginning. Born and raised in Cologne, Germany, he grew up in a city that is one of the endposts of Europe's renowned "Chocolate Belt," a string of chocolate-making cities that span the 100 miles from Cologne to Brussels. In this part of the world, chocolate is big business, and most people growing up there gain if nothing else a deep affinity for Belgian chocolate—considered by many aficionados to be the preferred choice, because of its rich European heritage, pure ingredients, and tightly controlled manufacturing process.

Growth and maturation

Armed with a vordiplom—the equivalent of a bachelor's degree—in physics from the University of Cologne, Büttgenbach came to Caltech for graduate studies in physics and astronomy, designing radio astronomy receivers that were tested and used at the Caltech Submillimeter Observatory on Mauna Kea, Hawaii. But while Büttgenbach's stays in the Aloha State were more educational than recreational, his life at the Institute was definitely not all work and no play. In his third year as a grad student, he got involved with the Aero Association of Caltech (informally known as the Caltech/JPL Flying Club). Over the next two years, Büttgenbach earned his airline transport pilot license, the highest rank a pilot can attain. And he met and became friends with Eric Wierman, a Flying Club instructor and commercial airline pilot.

The friendship continued as Büttgenbach graduated from Caltech and spent a brief stint as a postdoc before joining the Los Angeles office of McKinsey & Co., a global management consulting firm that picked Büttgenbach as one of their first Caltech recruits. Today, McKinsey & Co. recruits heavily from Caltech, a factor that Büttgenbach attributes to the quality and type of education. "The problem solving and other skills you get at Caltech have a direct transference into the world of marketing and management."

During his four years at McKinsey, Büttgenbach worked mainly with consumer goods, gaining a worldwide network of contacts and the desire to market his own products. "I had always been interested in starting my own company," says Büttgenbach. "And at McKinsey, I fell in love with consumer goods and realized that I really enjoyed that a lot more than some of the technology things that were going on."

Büttgenbach used his market research skills to analyze start-up companies such as Snapple, Häagen-Dazs, and the crowning example, Starbucks, all of which had become business successes by capitalizing on the unmet needs of consumers.

"I was very fascinated with these companies," says Büttgenbach. "The idea was to find a market out there that showed the same symptoms as something like the coffee industry did prior to the onslaught of Starbucks, but which had not yet been transformed, because you don't want to be number 28 in the category."

Büttgenbach found his niche within the $600 million gourmet chocolate snack market. He discussed his plans with Wierman, and the two decided to manufacture upscale but not prohibitively expensive Belgian chocolates—priced above the mass-market chocolate bars from companies like Hershey's and Mars, but below the ultra-expensive gift chocolates from companies like Godiva.

Harvesting and marketing

Like workers on the cocoa plantations—which yield the cocoa beans that make chocolate—Büttgenbach and Wierman decided that in order to get their business off the ground, they would have to stake their livelihoods on the harvesting of chocolate (at least in the retail sense). In 1996, Wierman quit his job as a commercial airline pilot, and Büttgenbach left his position as project manager at McKinsey, and both of them devoted all of their time and resources to starting up a chocolate manufacturing company.

With his training in consumer goods, Büttgenbach realized that the key to their company's success would lie in their ability to set their products apart from other Belgian chocolates. He and Wierman needed a distinct image that would identify their products as upscale indulgences while at the same time highlighting Büttgenbach's European background. The answer came in the form of the renowned 18th-century German composer, Johann Sebastian Bach.

But even though the decision to structure the company around J. S. Bach was mainly a marketing decision, Büttgenbach's mother would beg to differ. "She has examined our family history and insists that I'm related to Bach," says Büttgen*bach*. "It's not that hard to believe, since the guy had 26 children."

Bach's prolific achievements aside, the company holds one more thing in common with the composer: the color purple. Purple was apparently J. S. Bach's favorite color, and it seemed the natural choice for J. S. Bach Chocolates.

"Color is very important when you're positioning your brand as we are," explains Wierman. "When you start thinking about consumer behavior, whether it's a conscious or unconscious thing, purple is associated with royalty, with high-end expensive items." The two themes of purple and musical excellence permeate every aspect of Bach's business, starting with the packaging. The bars themselves are shaped into individual chocolate keys before being wrapped in two-toned gold and purple foil and packed four to a box. (The keys come in four flavors—Milk Silk, Hazelnut Trüffle, Strawberries & Crème, and Dark Decadence.) The box itself is made of purple cardboard, and is designed to look like a piano when the lid's up. There's even a perforated pull-out lid-stand to complete the look.

The company's musical connection carries over to the community as well. Bach Chocolate Keys are a popular fundraising item for some local school bands;

A Brief History of Chocolate

For most of its long history, chocolate has been drunk, and it has been drunk bitter.

This is what the Spanish explorer Hernán Cortés and his men found out in the early 1500s when they were offered chocolate for the first time in the Aztec court of Montezuma. The Aztecs, like members of other ancient American civilizations, had drunk their bitter chocolate

Büttgenbach
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BY RYAN POQUETTE

ASTRONOMICAL ACHIEVEMENTS: Büttgenbach and Wierman show off their wares at their original offices in South Pasadena (they have since moved to Huntington Beach), while a memento of Büttgenbach's academic past hangs over his shoulder.

and in support of the Music Teachers' Association of California (MTAC), Bach Chocolates has also created the annual Bach Competition—where kids ages 6 to 16 compete for cash scholarships by playing Bach concertos.

ROASTING

Büttgenbach and Wierman had founded their business in 1996 with their own savings and with the help of a few private investors (among them, members of Büttgenbach's family). But they recognized that they needed more capital to begin manufacture, and so they embarked on a fund-raising campaign that yielded investors (including some Caltech alumni and faculty) and industry allies (including Tom Fey, former president and CEO of Godiva chocolates).

But they weren't home free yet. Just like the cocoa beans that get roasted prior to processing, Büttgenbach and Wierman were definitely feeling the heat.

"We spent a lot of resources and time going to trade shows and talking to around 60 different manufacturers," says Büttgenbach. "We found that 58 of them promised us more than they were capable of doing."

After more than a year of searching for the perfect manufacturing setup for their business, they finally found it at Stollwerck, the sixth largest chocolate manufacturer in the world—whose headquarters are in Büttgenbach's hometown of Cologne. But even though the Stollwerck people said they liked the idea for Bach's products, nobody would sign on the dotted line.

"Normally Stollwerck wouldn't even talk with small start-up companies like us," says Wierman. "And none of the middle managers that we talked with were willing to take the risk."

In the end, Büttgenbach sent a final desperate fax, this time directly to the company's owner, Hans Imhoff, asking if Bach Chocolates could purchase the equipment they needed to make their chocolates. This got Imhoff's attention, and he got in touch with Büttgenbach, telling him that the equipment (which cost $25 million) was not for sale. But Imhoff said that he would be interested in meeting Büttgenbach and Wierman to discuss a rental arrangement. After one meeting, Imhoff decided to do business with Bach Chocolates, and Büttgenbach and Wierman were on their way.

ADDING INGREDIENTS

On their way to the final product, roasted cocoa beans are cracked open and the "nib" inside the bean is crushed until it turns into chocolate liquor, the liquid form of pure chocolate that distinguishes gourmet chocolate from other kinds that use mainly substitutes.

But premium chocolate is not just chocolate liquor poured into a mold. The addition of cocoa butter (itself a by-product of the chocolate-making process) is also important. Cocoa butter is unique among vegetable fats, because it melts at just below the body's temperature—which is why premium chocolate truly does melt in your mouth.

All of these steps take place in a top-secret environment (something that Wierman is familiar with from his days as an intelligence specialist in the California Air National Guard). Because even though all chocolate goes through the same well-known production process, it's the variations within this process that create a distinct, individual product.

"What's interesting here is that a recipe is not a recipe," explains Büttgenbach. "It starts with the quality of the ingredients. It's kind of like saying I need an engine for something. Are you going to start with a lawnmower engine, or are you going to start with an Indy race-car engine? But it's also in the processing. How do you get the perception of silky smooth chocolate? It's more than just, you know, five percent of this, three percent of that, throw it together, mix it up, and you're done. It's quite an art coordinating the chocolate into the process."

To create their recipes for Bach Chocolate Keys, Büttgenbach and Wierman met with the chocolatiers at Stollwerck. Büttgenbach and Wierman knew what kind of flavors they wanted, and Stollwerck had more than 150 years' experience in crafting high-quality recipes. It was a perfect match. And Büttgenbach prides himself on the fact that Bach's products are made with only the best ingredients.

"Our chocolate is absolutely pure. It is quite a bit higher in cocoa content than the average chocolate," says Büttgenbach. "It gives you more cocoa aroma, as opposed to chocolate made with fillers."

A TASTE OF THE FUTURE

From astrophysicist and pilot to management consultant and chocolate maker, Büttgenbach has fulfilled many dreams. So what's next on his checklist? Another company.

Büttgenbach's and Wierman's latest business venture is PassionFood.com, a direct-marketing Web site devoted to providing gourmet chocolates, wines, fresh ethnic foods, and other edibles for which people have a passion, but not necessarily access.

The idea originated when Bach Chocolates started offering samples of their Chocolate Keys. As part of the request form, people provided demographic information and comments. It wasn't long before Büttgenbach and Wierman had amassed a large amount of consumer information.

"At one point, we were receiving around 10,000 e-mail requests per hour," says Büttgenbach. Currently in the start-up phase, PassionFood.com is expected to debut in August.

For more information on getting a chocolate sample of your own, or to find out more information about PassionFood.com, call 888/2JS-BACH, visit them on the Web at http://www.bach-chocolate.com, or e-mail Büttgenbach at ThomasB@bach-chocolate.com.

without sweeteners of any kind, instead adding spices such as chili powder and maize (corn).

Back home, the Spaniards eventually figured out that by adding sweeteners like sugar and vanilla and spices like cinnamon, the chocolate drink was much more agreeable. Although the Spaniards tried to keep their discovery secret, the rest of Europe eventually caught on, and chocolate drinking became fashionable in many British coffeehouses.

With the advent of the industrial revolution in the late 18th century, chocolate manufacturing increased, though chocolate was still being drunk. But in 1828, a Dutch chemist named Coenraad Van Houten invented the process for pressing cocoa butter out of the chocolate liquor, which made cocoa powder drier and easier to pulverize. Shortly after this, Joseph Fry & Sons, a chocolate manufacturer in England, found a way to put the cocoa butter (and sugar) back into the defatted cocoa powder, thereby creating a substance that could be pressed into a mold. The chocolate bar was born, and the balance shifted from drinking to eating chocolate.

The ubiquitous chocolate bar has taken many forms since then, and has been used in many situations. During World War II—in a decision that harks back to the ancient Aztec practice of giving chocolate to warriors preparing for battle—the American military made it a policy to include three four-ounce chocolate bars in a soldier's "D-Ration." This practice still holds today.

Of course, not all of the developments in chocolate production have been beneficial. Chocolate manufacturers learned early on that cocoa butter was expensive, and as a result some have turned to less expensive fillers like sugar to save money. Today, some manufacturers of premium chocolate are worried that they will be undercut by cheaper products with fillers. In addition, many cocoa-producing countries are concerned that increased reliance on products with fillers will cause great economic hardship in already impoverished nations.

At the same time, judging by the success of companies like J. S. Bach Chocolates and other manufacturers of gourmet chocolates, there seems to be a resurgence in both the manufacture and consumption of high-quality chocolate.

Music strings her along

In her element: At age 20, *chemistry major* Candace Chang is a gifted violinst who has successfully tackled some of the most challenging pieces in the repertoire. This summer the concertmaster of the Caltech-Occidental Orchestra will tour Spain as soloist with a chamber orchestra before returning to Caltech for her senior year.

When Candace Chang started playing the violin at age three, she had already been cooling her jets for a year. According to family legend, Chang was barely two years old when she noticed the attention her older brother was getting for his attempts on the instrument. "I bugged my parents for lessons for a year and, for my third birthday, was given a 1/16 size violin," she says. Chang's present proficiency on the instrument is as remarkable as her early determination to get one. This past year, accompanied by the Caltech-Occidental Orchestra, she played the Tchaikovsky Violin Concerto, a work so technically difficult that Leopold Auer, the renowned violinist and teacher to whom the 19th-century Russian composer dedicated the concerto, is said to have returned it to the maestro as "unplayable." In July, Chang will tour Spain as soloist with the Santa Monica Chamber Philharmonic.

For Chang, who will be a senior in the fall, excelling in music coexists nicely with life at Caltech. The 20-year-old chemistry major from La Cañada Flintridge has played with the Caltech-Occidental Orchestra since she was in ninth grade and has known orchestra director Allen Gross since he conducted her in a performance of a Mozart concerto when she was eight years old.

As a teenager, Chang's involvement with music was so intense (she practiced three hours a day on school days, five hours on weekends) that the daughter of a JPL engineer father and a homemaker mother discovered her scientific aptitude virtually by accident. When a planned recital fell through, Chang was suddenly free to compete in the Chemistry Olympiad, a national contest for high school students. She made the national finals and, to her surprise, "got really into science in general and chemistry in particular."

At about the same time, Chang, who had studied at the Colburn School of Performing Arts in downtown Los Angeles since she was nine, was beginning to question pursuing a career in the pressured, competitive music world.

"Most people doing music as a career can't do anything else," Chang now says, paraphrasing Caltech Lecturer in Music James Boyk. "I didn't have that kind of devotion. Science isn't easy, but it may be a little more forgiving than music." Today, Chang says that she has no regrets about her choice. "I know several violinists who are better than I am. But if I do research in science, I can make my mark on the world, more so than with music."

While Chang debates whether to go to medical school or grad school, one thing is certain—she is not closing the door on music. In fact, Chang chose the Tchaikovsky work precisely because of its iconic status in the repertoire. "If you are a scientist and you haven't done quantum physics, people ask 'what are you waiting for?'" she says. "For a violinist, this is one of the concertos you have to play."

As for finding time to practice, Chang's ongoing duties as concertmaster of the Caltech-Occidental orchestra and first violin of the year-old Caltech Piano Quintet supply the motivation. And, undoubtedly, there is the gratification of sharing her musical gifts with family and friends. As a freshman, Chang performed at the retirement dinner for Caltech's outgoing president Tom Everhart; this past June, she played Schubert's Rondo for solo violin and string orchestra (sans string orchestra) at the Alumni Association's Annual Honorary Alumni Dinner on June 14. "I'm open to invitations," she says with a laugh.

In Chang's own life, music making is not only a pleasure but a comfort in the often intimidating environment of Caltech.

"It's one way I can relate to my 'old' life, before college," she says. "This is something I have that I can do fairly well. It makes me feel a little more self-confident."

MARCY DREXLER

Accreditation . . . from page 4

INCLUSIVENESS AND DIVERSITY

The Commission commends Caltech for its commitment to and success in recruiting women graduate students and underrepresented minority undergraduates. It shares the concerns of the evaluation team, however, that "progress is not as positive with underrepresented minorities [at the graduate level], and suggests that Caltech continue to develop strategies to address this circumstance." The Commission agrees with the evaluation team that campus climate plays a major role in attracting and retaining students. With regard to underrepresented minority students at the graduate level, it is important for Caltech to sustain the initiatives it has taken to enhance the social experiences that contribute to high retention levels. The Commission further notes that the number of women faculty members who could be role models to future Caltech women remains small. The Commission encourages Caltech to continue its efforts to recruit and retain qualified women and underrepresented minorities for its faculty as well. This should be part of the larger, ongoing effort described above.

CURRICULUM AND THE QUALITY OF INSTRUCTION

The Commission commends Caltech for its record of academic excellence and strong involvement of graduate and undergraduate students in research. The Commission was particularly impressed, as was the visiting team, by Caltech's response to recommendations made during the last WASC visit concerning the revision of the Science Core Curriculum. The visiting team notes that "the revised (Science) Core represents a milestone achievement that has come after the careful deliberation characteristic of Caltech and has resulted in major changes reflecting the mission and goals. Not only does the Institute now offer students an enriched Core Curriculum (but) . . . the new Core Curriculum has also raised enthusiasm of the faculty." To guarantee Caltech's continued academic excellence, the Commission now strongly endorses the suggestion made by the team that Caltech undertake the revision of its Humanities and Social Sciences Core with the same deliberation applied to the Science Core.

THE HONOR CODE

The Commission agrees with the observations made by the visiting team that "the Honor Code plays a central role in the life of the Institute . . . it honors and furthers the academic mission, is a source of pride . . . encourages students [and the faculty] to think about what is right and wrong [and] it is the key to Caltech's enviable climate of trust." The Commission sees the Honor Code in a state of dynamic equilibrium, i.e., a state that ensures the relevance of the honor code as the Institute evolves over time. As the student body and faculty change, Caltech should, with the same deliberate commitment illustrated in the evaluation of its Science Core, sustain the Honor Code as the centerpiece of its unique spirit of trust. The Commission would like to see Caltech share its vision of the Honor Code with peer institutions, encouraging a mutual exchange that will help it sustain "the most powerful of all traditions [at Caltech]: that students assume collective and individual responsibility for their own affairs."

Alumni Update

"You're pretty smart (for a Gnome)"

The scene is the sprawling grass overlooking the golf course of the Silverado Country Club in Napa Valley. It's a summer afternoon and time for another wine tasting. Hardly the place to find a Techer.

Each winery has a table set up. I am waiting in line, clutching my glass for the next offering of wine. A young gal in front of me has a sweatshirt emblazoned with "Oxy." Using my Caltech-developed sense of logic, I conclude that she is from Occidental, a liberal-arts college only a few miles from Caltech. I carefully prepare my opening line and ask if she had gone to Occidental. Oops, another rejection. As I nurse my wounded ego, an older fellow turns around and says, "Ah yes. The girls of Oxy. I remember them well."

Hmm. Older guy, probably at least 70 years old. Knows about Oxy. I apply my Caltech-educated wits and formulate a question: "Are you a Techer?"

"In my day, we called ourselves Techmen."

The gentleman is Dick Folsom '28, PhD '32. While Dick and I are chatting away, I notice that he is wearing a bolo tie with an owl. An owl is a special symbol to a certain Caltech society of learned men (and women). Before the undergraduate south houses were established in 1931, Caltech had fraternities. A member of Kappa Gamma was known as a Gnome (pronounced "know me"). The fraternity was reformed under President DuBridge's administration as the Gnome Club and continues today. Back in the 1920s, there was at least one other Caltech fraternity, rival Sigma Alpha Pi. I figure he is a Gnome because the club's symbol is an owl on a crescent moon.

"I noticed the owl on your bolo tie. Are you a Gnome?"

"No. I'm a Sigma man. Say, you're pretty smart for a Gnome."

Dick told me that the owl on his bolo tie was the symbol for the Bohemian Club, an organization that has no affiliation with Caltech. On another occasion, Dick did talk about his Bohemian Club experiences. He politely explained that he was included in the club only because they needed a token scientist.

Some auld acquaintances *will* never be forgot. At an annual gathering in California's Napa Valley, Warren Goda is joined by his friend Dick Folsom '28, PhD '32 (next to Goda), and Bob and Helen Dell-Imagine.

When I got home from Napa, my curiosity about Dick Folsom led me to unearth my alumni directory. I eventually discovered that he was president of Rensselaer Polytechnic Institute (RPI) and one of the first recipients of Caltech's Distinguished Alumni Awards.

I asked him about that award several years later. He chuckled and said that he actually was the *first* recipient of the Distinguished Alumni Award. Dick was part of the initial group in 1966, the year the awards were established. He needed to catch a flight back to RPI, so his award came at the top of the ceremony.

For the next several years, I would join a group of friends for our annual pilgrimage to Napa Valley. Each time, I'd call up Dick Folsom and have a speech prepared that explained who I was and how we had met the year before. He never needed any prompting other than that I was that young Caltech Gnome fellow. Over time, I learned more about his remarkable accomplishments. He told me about the beginnings of the electric power industry in Los Angeles, the Last Man's Club of the Sigmas, and other snapshots of his life.

Then one year I read his obituary in the *Caltech News*. I never got a chance to thank him for providing helpful advice honed over decades of experience, for telling stories of historic events in his life in his matter-of-fact style, and for spending a day every summer to be with a young Techer.

Thank you, Dick Folsom. I know you enjoyed the chance to know me, even if you were a Sigma man.

Warren B. Goda

Newly installed Association president Kent Frewing will take over this column in the next issue of Caltech News.

Watch your mailboxes! Association seeks change in bylaws

In 1935, when men were men and giants walked the earth, a small band of alumni incorporated the Caltech Alumni Association. Its stated purpose was to preserve among its members the ties of fellowship formed during student days, to promote the well-being of its members, and to support and advance the cause of higher education. Today the Association's mission and activities are greatly expanded, and the Alumni Association Board will be sending all alumni information regarding changes in the Association's organizational structure that would better support its mission and Caltech, and will be asking you to approve them.

The Association supports Caltech and its current students as well as its alumni in many ways. It assists the Caltech faculty and administration in recruiting and selecting those students for admission who will benefit from Caltech's unique opportunities. It supports those same students and faculty through a mentoring system and financial support of student activities. It organizes panels and seminars where students can interact with alumni and learn from them. It provides opportunities for alumni to interact, continue their education, and share in the exciting activities in the Caltech community, through the Alumni College, Seminar Day, travel programs, and various publications.

These activities are appropriate to a "public benefit corporation," which receives more favorable tax treatment than a "mutual benefit corporation," which is how the Association was historically organized. To become a public benefit corporation will require changes in the Association's articles and bylaws. These will be mailed shortly to all Association members for their approval. The changes will not affect how the Association operates on a day-to-day basis or change its members' role or rights in any substantive way. The board of the Association requests that you support these changes. If you have any questions regarding them or do not receive the mailing by August 1, 1999, please contact the Alumni Association.

Bio-Bytes—Videotapes of Caltech's first Alumni College now available

Videotapes of "The Biological Revolution: Biology in the New Millennium," Caltech's first Alumni College, are now available for loan. Those with Caltech library privileges may borrow the tapes from Millikan Library. The set of six tapes can also be borrowed by completing the adjacent coupon and sending it to the Caltech Alumni Association together with a check for $20.00 to cover the costs of packaging and shipping. The Association is not prepared to loan individual tapes.

Titles contained in the set include "Understanding and Manipulating Genomes" by Elliott Meyerowitz, "How Does the Immune System Work? What is AIDS?" by Ellen Rothenberg, "How Is the Embryonic Nervous System Assembled," by Paul Patterson, and "How We See," by Richard Andersen.

Videotapes of the 1999 Alumni College, "The Universe: Origins and Destinies," will be made available at a later date.

Alumni College Tape Request

To borrow a set of videotapes from the first Caltech Alumni College ("The Biological Revolution: Biology in the New Millennium"), please complete the form below and send it with a check for $20 to the Caltech Alumni Association, Mail Code 1-97, Pasadena, CA 91125. The complete set must be returned within 30 days or the cost of replacement will be charged to your credit card.

Name_____

Address_____

City _____ State ___ Zip Code_____

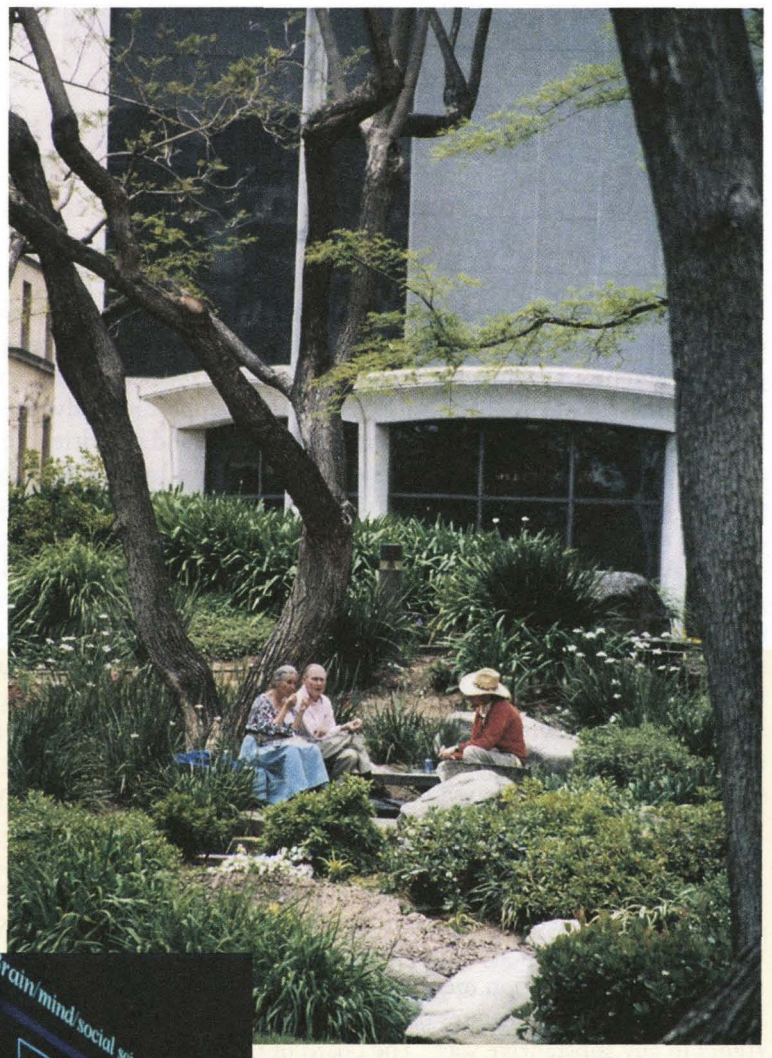
Phone Number_____ E-mail address_____

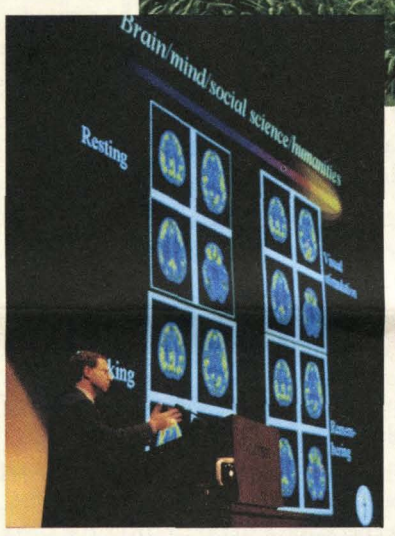
I authorize the Caltech Alumni Association to charge the cost (not to exceed $120.00) of replacing the set of tapes if they are damaged or are not returned within 30 days of the date shipped to me.

Credit Card Type_____ Card No_____

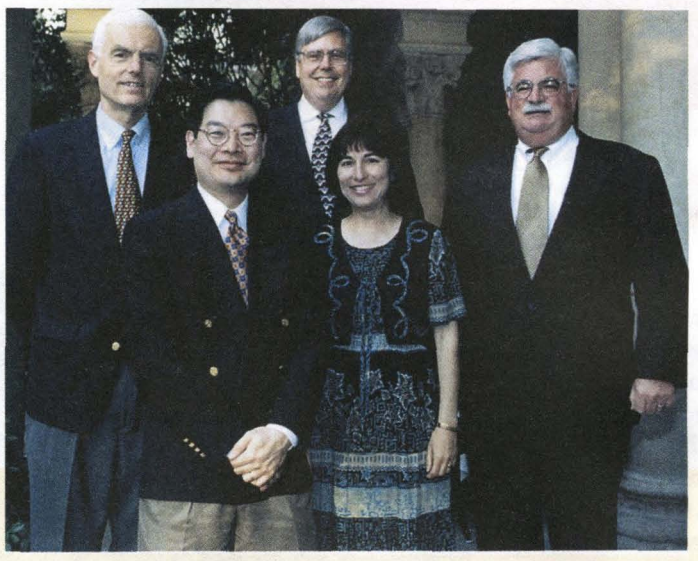
Expiration Date_____

Signature_____

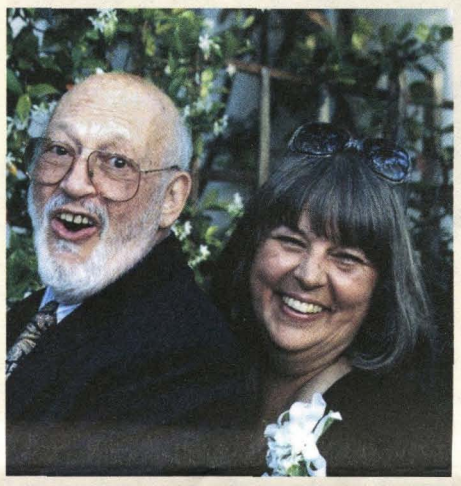


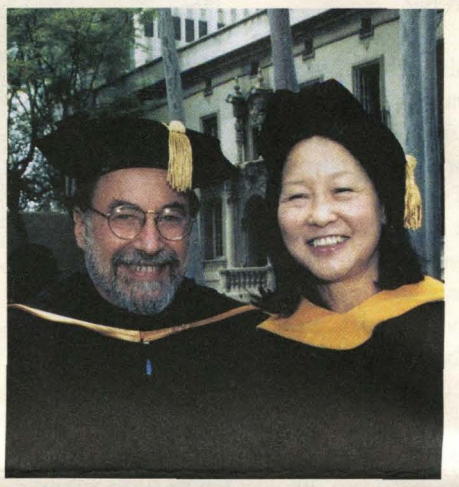


Alumni Activities

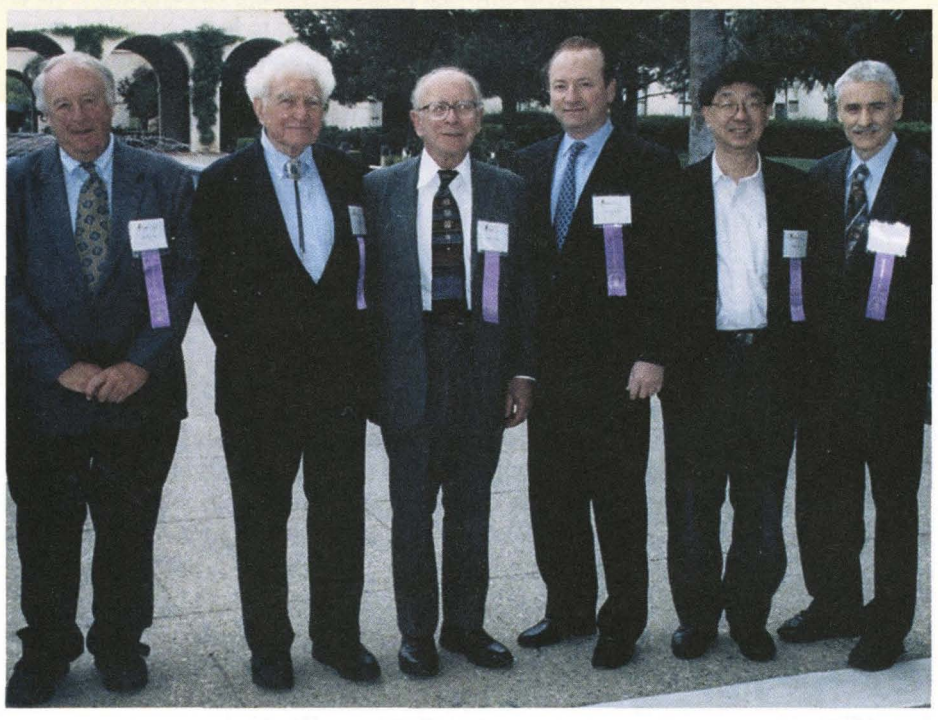


The Association installed its new officers at the Annual Honorary Alumni Dinner on June 11. They are (photo right, from left) president Kent Frewing '61; past-president Warren Goda '86; vice president Blair Folsom, PhD '74; secretary Debra Dison Hall '74, and treasurer Ted Jenkins '65, MS '66.





At its June 11 dinner, the Association also welcomed four new honorary members into the fold. At left, Jean-Paul Revel, Caltech's dean of students and the Albert Billings Ruddock Professor of Biology, acts up with Director of Caltech Theater Arts Shirley Marneus (for a sample of Marneus's recent work—she directed the campus's spring production of *The Trojan Women*—check out page 4); and, at right, Caltech President David Baltimore and his wife, Senior Councilor for External Relations and Faculty Associate in Biology Alice Huang (shown here on Caltech graduation day) commence on their careers as honorary members of the Alumni Association.



Scenes from a Seminar Day. From the top, returning graduates enjoy lunch amid the historic boulders of Throop site; General Session speaker and Caltech provost Steve Koonin '72 updates his fellow alums on "Research Frontiers at the Institute"; and the last class of Distinguished Alumni to graduate in this century pose for their commemorative photo. From left, Donald Turcotte '54, PhD '58, Upson Professor of Engineering at Cornell, was honored for his many theoretical contributions to the earth sciences; Vernon Hughes, MS '42, Sterling Professor of Physics, Emeritus, at Yale, was recognized for his wide-ranging work in atomic physics; Arthur Beck Pardee, PhD '47, professor of biological chemistry and molecular pharmacology at Harvard Medical School, and chief of the division of cell growth and regulation at the Dana-Farber Cancer Institute, was recognized for pioneering cancer research; Robert Merton, MS '67, cowinner of the 1997 Nobel Prize in Economics, was honored for his theoretical work in economics; Henry Yuen, PhD '73, coinventor of the VCR+ and CEO of Gemstar International Group Limited, was hailed for his entrepreneurial achievements; and Leland Hartwell '61, president and director of the Fred Hutchinson Cancer Research Center in Seattle, Washington, was honored for his seminal cancer research.

Letters . . . from page 7

Apollo apocrypha?

This is in response to your invitation in the last issue of Caltech News to send recollections of Apollo Belvedere.

While I was an undergraduate, about 1955, I heard the following story, which I am not inclined to believe.

While Robert A. Millikan was president and Jesse DuMond [PhD '29] was a student, the statue was out in front of Throop Hall. One night DuMond painted its scrotum blue. Millikan's secretary saw it when she arrived for work in the morning, and was horrified at the thought of Millikan's seeing it. She hurriedly assembled a bucket and brush and was busy scrubbing the paint off when Millikan arrived.

Joseph C. Fineman '58

Clock tock

Howdy. Regarding the [Snoopy] clock pictured on page 5 of the latest issue, *Caltech News* might not know what time it is, but I know about the original Throop Clock!

How quickly trivia is lost in the sands of time. That clock originally operated on Throop Hall, Caltech's first building. I arrived at CIT in 1973, after Throop was demolished, at which time undergrad David Drake [BS '74] had scavenged the clock; actually just the mechanism, hands, and most but not all of the Roman numerals. He stored it in a box in the attic at Ricketts House.

A few years later I made a project of building a new face for the clock, recreating the missing numerals, and repairing the mechanism to working condition. When this was completed, we presented the clock to, I believe, the Trustees, who accepted it and decided to mount it on the wall of Kellogg. This was probably in 1976 (not sure). A small plaque explaining the clock and *mentioning* Ricketts House was also installed, but it didn't last long before someone stole it.

Now that Kellogg has been renovated and the clock removed, I wonder where it will go next?

Alan Silverstein '77

Personals

1950
MICHAEL A. HALL, of Yountville, California, writes that he has "left San Francisco and the 8 to 5 to make my own wine in the Napa Valley."

WILLIAM F. JONES, MS, of Sunnyvale, California, has retired as a civil engineer, closing his office and company last year. He and his wife, Brenda, are preparing for a trip through the western United States, and then one to the United Kingdom. Brenda is still active in church affairs.

1955
CINNA LOMNITZ, PhD, a professor of seismology at the National University of Mexico's Institute of Geophysics, in Mexico City, gave the Seventh Mallet-Milne Lecture, in London on May 27. The lectureship is a biennial distinction conferred by the Society for Earthquake and Civil Engineering Dynamics.

HENRY P. SCHWARCZ, MS, PhD '60, the University Professor of Geology in the School of Geography and Geology at McMaster University, in Hamilton, Ontario, has been presented the Fryxell Medal for Interdisciplinary Research. Cited by the Society for American Archaeology (SAA) for "his extraordinary contributions applying techniques of physics, chemistry, and geology to archaeological problems," Schwarcz received the award last March in Chicago at SAA's 64th annual meeting, which also hosted a symposium in his honor on the subject of dating and isotopic paleodiet studies, which are the areas of research for which the award was made. Schwarcz is a fellow of the Royal Society of Canada.

1959
DONALD D. CLAYTON, MS, PhD '62, professor of physics and astronomy at Clemson University, has received the 1998 Jesse W. Beams Medal of the American Physical Society, Southeastern Section, "for his contributions to deciphering the clues about the origin of chemical elements from natural radioactivity in space."

1963
MICHAEL T. FIELD, MS, of Gambier, Ohio, and his wife, Camilla Cai, write that they were married twice, once on July 18, 1997, and again on November 14, 1998. "We got married very quickly and simply in 1997, to satisfy the Norwegian immigration service. It was a legal wedding, but it was not a 'real' wedding, because we did not have our friends there. So we didn't tell anyone until November 1998, when we got everyone together and had our 'real' wedding, and now we are telling you." The first wedding occurred because "in the winter of 1996, Camilla was invited to go to Norway for a year to join a group studying music at SHS, the Center for Advanced Study (Senter for Høyere Studier). After Camilla had known Michael for several months, she asked if he would like to come along. Michael was working at a job he was happy to leave, and said yes." Unfortunately, the Norwegian visa department "seemed to think Camilla was okay," but "they were not so sure about Michael. We had checked off 'cohabitant' on the form." After a couple of weeks of stonewalling, the visa department "sent back a refusal for Michael . . . We had not lived together for two years, we said nothing about getting engaged, and we said nothing about planning to have children (apparently, they had not read the application very carefully)." The couple remarks that they were learning what it would be like to be refugees. Even though SHS, an official agency, was "ticked off" by the situation, it had no influence with the visa department. Neither did the Norwegian state department. "Our options were now very limited, and we both knew there was only one left to try: get married." There was no time to gather friends and relatives, so, "in an extremely brief ceremony," they got married at the town clerk's office in Belmont, Massachusetts. "When we proudly presented our visas at the Oslo airport on August 1, the nice policewoman said, 'Oh, you don't need those. Those are just for people from the east.'" The couple goes on to say, "You might think that getting married and spending a year in Norway would be enough excitement for anyone, but it is not the most exciting thing that happened this year. Thirty-five years ago, Camilla had to give up a baby for adoption. In early 1998, he reappeared. His name is Elliot Polak, and he has lived in Paris since he was twelve. Before that, he lived in upstate New York. His parents are Dutch and Belgian, now American citizens who divide their time between Paris and the U.S. [He] has his own business, translating advertising text, and got married to a charming French woman one week before our November 1998 ceremony. They came to our ceremony, so that we were able to introduce them." Under the sobriquet "Other" they add, "Michael's children are also having adventures. Andrea spent her junior year in southern France (Aix-en-Provence) and finds her last year at Kalamazoo a bit of a comedown. She has gotten very interested in repairing and restoring old books, and had an exhibit at Kalamazoo three weeks ago. Ethan is in northern Tanzania, starting a two-year tour with the Peace Corps, teaching physics."

NICHOLAS TURRO, PhD, of Tenafly, New Jersey, has been honored by the American Chemical Society with its 1999 Award in Colloid Chemistry, "for his contributions to understanding the fundamental properties of colloidal systems—structures that include milk, mayonnaise, paint, and even soapy water. . . . Understanding how individual colloids work means researchers can both modify them in useful ways and find new applications for them." Turro is professor of chemistry at Columbia University.

1969
JOSEPH B. DENCE, PhD, of St. Louis, writes that he is still teaching chemistry and mathematics at the University of Missouri, and that he has recently published his seventh book, *Elements of the Theory of Numbers* (Academic Press, 1999).

JEFF R. LARSON writes: "After finishing a residency in occupational medicine at Johns Hopkins in 1985, my wife, Barbara, and I moved to Seattle in 1996–7 and now back to Minneapolis, where I work for a small multi-specialty group. Any alums in the Twin Cities?"

1973
HENRY C. YUEN, PhD, has been elected chairman of the board of directors of Gemstar International Group Ltd. Formerly chief executive officer of the company, he is coinventor of Gemstar's VCR Plus+ "instant programming system." This permits viewers to record television programs by entering the special numbers printed in television listings.

1974
PHILIPPE J. LEBRUN, MS, of Prévessin, France, is currently working in Geneva. "After more than 20 years of work on superconducting magnets and cryogenics for high-energy particle accelerators at CERN, the European Laboratory for Particle Physics," he writes, "I am now heading the LHC Division, in charge of constructing the main ring of the LHC (Large Hadron Collider)." This is a superconducting accelerator 27 kilometers in circumference "with 1600 high-field superconducting magnets operating in superfluid helium at 1.9 K, which will, upon its completion in 2005, collide intense beams of protons and heavy ions at high energy." He adds that, although built by CERN, a European intergovernmental organization with 19 member states, the LHC is cofunded by the United States, Canada, Japan, Russia, and India, the national laboratories of which are also contributing technically to its construction. The LHC "will be used by the world community of high-energy physicists, thus making it a real world project."

1977
JAMES PANKOW, MS, PhD '79, head of the Oregon Graduate Institute's department of environmental science and engineering, has been honored by the American Chemical Society with its 1999 Award for Creative Advances in Environmental Science and Technology, "for his accomplishments in understanding how car emissions, pesticides, and other pollutants behave in the atmosphere." Pankow lives in Portland.

1981
CLIFF SPIRO, PhD, writes that, after 18 years in the Albany, New York, area, "I have transferred to Cleveland, Ohio, where I will be a general manager of technology for GE Lighting. I will have global technical responsibility for GE's halogen and new white LED product lines."

1984
DOUGLAS R. SCHMITT, MS, PhD '87, professor of geophysics at the University of Alberta, has been awarded that school's Faculty of Science Research Award for 1999, which "recognizes researchers within 12 years of the completion of their doctoral dissertation. Dr. Schmitt's research focuses on the integration of laboratory rock physics measurements and field geophysical observations with application to the temporal monitoring of hydrocarbon reservoirs. He and Dr. Cheryl Schmitt reside in Edmonton with three very busy little boys between 4 and 9: Jamie, Corey, and Ryan."

1985
NABEEL A. RIZA, MS, PhD '90, associate professor of optics and electrical engineering at the School of Optics/CREOL (Center for Research and Education in Optics and Lasers), University of Central Florida, has been named 1998 Fellow of both the Optical Society of America (OSA) and the International Society for Optical Engineering (SPIE). The OSA citation reads "For pioneering and for sustained optical inventions in photonic control systems for phased array antennas," and the SPIE citation reads "For specific achievements in the area of photonic information processing systems, including the invention of scanning acoustic-optic interferometers, wideband acousto-optic signal processors, liquid crystal optical switches and programmable lenses."

1989
STÉPHANE COUTU, MS, PhD '93, an assistant professor of physics at Penn State University's Eberly College of Science, has received a Research Innovation Award from the Research Corporation foundation. "Intended to provide support for research projects of newly appointed academic scientists with truly original ideas," the award will provide approximately $35,000 to Coutu for his project titled "Study of High-Energy Atmospheric Muons."

1992
JOHN D. BOMBERGER graduated from UCSB in August 1997 with a PhD in chemical engineering. "In the following few weeks," he writes, "I moved out east to Delaware to work for DuPont and married Wendy Dong, a former Caltech undergrad. We now live happily with a crazy puppy and two talking parrots just outside of Wilmington."

1993
ERIC W. WEISSTEIN, MS, PhD '96, a research scientist at the University of Virginia, has recently published a 1,969-page mathematics encyclopedia, the *CRC Concise Encyclopedia of Mathematics* (CRC Press, Boca Raton, Florida, 1998). A CD-ROM version will be available by June, and portions are available on-line at www.astro.virginia.edu/~eww6n/math/.

1997
JUSTIN DU BOIS, PhD, of Boston, has been honored by the American Chemical Society with its 1999 Nobel Laureate Signature Award for Graduate Education in Chemistry, "for outstanding research, including new ways to make pharmaceutical drugs, that he performed as a graduate student" while at Caltech. Du Bois is currently a postdoctoral chemist at MIT.

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.

Name_____

Degree(s) and year(s) granted_____

Address_____

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Is this a new address? _____ Day phone _____

Occupation_____

NEWS_____

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Class Notes

Meetings and greetings at the Half Century Club Luncheon were among the festivities that marked the 50th reunion of the class of '49. Top photo, George Bowen (at left) greets Claude Lane, with Howard Cohan in the background. Below, with Henry Fasola (far right) at his side, Roy Gould focuses his camera. Behind them (from left) are Larry Nobles, Bob Fisher, Neal Hurley, and Robert Terriere, and between Fisher and Terriere, a mystery alum (in shades), who is hereby invited to come forward and identify himself.

1949

Half Century Club
Hugh Carter
555 San Antonio Avenue
San Diego, California 92106-3467
hcarter1@home.com

The big news for our class was the 50th reunion, highlighted by a dinner on May 13th at the Athenaeum that was attended by 134 classmates. Prior to dinner, we attended an alfresco reception at the home of President David Baltimore and his wife, Alice Huang. Caltech Archivist Judith Goodstein addressed the dinner group with a detailed recitation of important Caltech events and milestones. There was much reminiscing and an opportunity for each classmate to briefly share with the group. We then sang the Caltech song, "Hail C.I.T.," composed by Stan Barnes's father, who also attended Caltech.

Joe Dobrowolski and his committee, which included **Bill Simons**, **Roy Gould**, **John Heath**, **Fred Selleck**, **Will Webster**, and **Don Hibbard**, get credit for a well-organized reunion weekend. **Dick Morgan** was chair of the reunion gift. Joe reminisced about how he came to Caltech. "In September of 1945 I was in the separation line at Fort Lewis, Washington, returning my gear, including a 45-caliber pistol, gas mask, and other articles. . . . The last officer in line asked what I was going to do after the army." Joe said he was going to the University of Washington to study civil engineering, whereupon the orientation officer began to extol the attributes of Caltech. After finding that Joe had "almost all A's," he encouraged Joe to attend. "It took some brushing up and the addition of a missing course in chemistry, then I took the exams and was admitted to Caltech. It would be great to find out who that officer was, a presumed Caltech grad, who changed my life!"

Following registration Thursday, a large group took a VIP tour of JPL. Visits to the museum, the high bay assembly plant, and mission control were interesting and exciting. The mission control is a glittering array of computers, large-scale graphics tracing the mission data on several satellites, and flashing lights. **Dave Hayward** noticed one controller intensely studying a worn book. "It was *Windows 95 for Dummies*," Dave related with a laugh. JPL has responded to congressional pressure for cost savings, and we saw many examples of their new objective: "faster, cheaper, better."

The activities on Thursday and Friday were followed by the 62nd annual Seminar Day, which allowed another chance for reminiscing and fellowship. Our class was inducted into the "Half Century Club" at a luncheon hosted by the Alumni Association. Fifty years ago, in 1949, Harry Truman was president; *All The Kings Men* was Best Picture; Arthur Miller won a Pulitzer Prize in drama for *Death of a Salesman*; and Aly Khan married Rita Hayworth. On his honeymoon, Khan drove a Citroen just like **Hank Fasola**'s. Hank said, "This car was very advanced and included front wheel drive, torsion rod suspension, overhead valves, and removable cylinder sleeves to make repairs quick and efficient. Its design was way ahead of its time." Our graduating class, originally numbering 213, was represented by 64 Techers and 60 spouses and friends.

Now, some class updates. **David Hogness** has shifted to emeritus status after 40 years at Stanford in biochemistry. He and his wife, Judy, celebrated their 50th wedding anniversary in France's Dordogne region, joined by their two sons. His new email address is polenta@cmgm.stanford.edu.

Carl Price plans to return to Southern California after retiring from Rutgers this summer. "My favorite song over the holidays was 'I'm dreaming of a warm Christmas.'" **Art (Bam) Spaulding** has been retired since 1986 "like so many in the oil industry. I've resumed my musical career after an interruption of 48 years and now play the sax and clarinet in two swing bands in Ventura. Sure beats sitting around drinking gin."

David Baron is semiretired after 20 years as a real estate broker. "I purchased a motor home seven years ago and take two-to-three- month trips in varying areas of the United States exploring out-of-the-way places." **Forrest Allinder** took umbrage at my report that he is retired and wrote me that "Regarding being retired—that's just not true." He continues his work for Sinclair Oil in Salt Lake City as vice president, supply and distribution. Sorry, Forrest.

John Marshall was married last January to a nurse whom he met while in the hospital in 1992, recuperating from a prostate cancer operation. Since his retirement in 1995, he has been involved in volunteer work; singing in the church choir and the symphony chorus; working with a seniors' group and a hospital auxiliary. His new house, into which he moved in June, is in Mary Esther, Florida; what an interesting name.

Stan Barnes concluded his fourth four-year term on the California Water Commission in March. The commission's objective has been "California water for people (in the broad sense) in concert with the environment. If we can't make it work well for both, it will not work well for either in the long term." Stan closes with the observation of the rule regarding the drinking of martinis: "If you drink martinis, limit yourself to two at the most. (The problem, of course, lies in remembering the rule after having had the second martini)."

John Heath retired in December 1991 after 22 years with Marshall and Stevens, where he was senior vice president. He enjoys gardening and growing orchids. "We filled in the swimming pool and converted it into a gazebo and room for 60 roses. Last September Nancy and I took a two-week tour of Turkey and visited ruins thousands of years old: I highly recommend such a trip and it's very reasonable compared to Europe."

Ernest Blair retired in 1986. "I lost my beloved wife in 1994, but keep busy with my hobby of collecting antique mechanical music machines. I also collect automatic pianos, nickelodeons, organs and orchestrations, etc." He attends conventions of such associations as the Musical Box Society International and also those of his World War II Army Air Force outfits.

Allan Saunders reports that "I turned my outfit over to my two sons a couple of years ago and have been slowly retiring from being on a consulting basis with them. All is going well." **Bernard Rudin** has retired from IBM after 47-plus years in computing.

John Kariotis still lives in Pasadena, and his email is jkariotis@earthlink.net. Along with sailing various boats, he is still active in his practice of structural engineering and hopes to "wind it down and ride my bicycle in Montana in the summer." John teamed with Steve Barnes and **Mihran Agbabian** '48 and obtained a substantial grant from the National Science Foundation for a project that included the construction of a five-story building in the structures laboratory at UC San Diego, which conducted extensive destructive testing leading both to contributions to earthquake science and to structural-code revisions designed to mitigate earthquake damage to buildings. John is now involved in a research project at UC Irvine related to structural wood panels. He has written many technical papers and conducts seminars for structural engineers.

Richard Schoen retired in 1994 from the National Science Foundation after 23 years. "I am enjoying retirement by traveling, visiting the constantly changing exhibits in the Washington museum, and reading at the Library of Congress, the Archives, the National Library of Medicine, etc." E-mail: rschoen@erols.com. **Kenneth Gardiner** says, "All is well with me and my family and I keep busy with many things: wildflowers, photography—all digital printing for the last six years, and helping out with a senior center computer center." E-mail: kwayneg@worldnet.att.net. **Daniel Kings**'s e-mail is dwking2420@aol.com and **Milton Andres**'s is jmandres@alumni. caltech.edu. **Robert Darrow** and his wife write, "To the fellows of Ricketts House class of 1949, thanks for the silver wedding gift 50 years ago. It is still appreciated." **Robert Sinker** can be reached at bobpatsinker@juno.com. He is retired and enjoying "boating, water skiing, snow skiing, traveling, and other activities."

Manuel Bass now lives in Fullerton and relates, "Having done some volunteer teaching while employed, I have gone back to school to get a teaching credential after retirement. I have a year to go. I am now much more knowledgeable, somewhat less hopeful, and dedicated to a true (systemic) reform movement, if I can find one. A large part of my education entailed class observation of my professors and fellow students at CSU Fullerton. Without any disparagement implied, I confidently assert that the world of learning for most people is not best reviewed through a Caltech lens."

Our distinguished classmate Paul Saltman continues to stack up honors and awards. He has recently been honored with the Paul Saltman Chair at UC San Diego, established by his friends, along with UC faculty and administration, and has been made an honorary alumnus of UCSD (Paul was named a Caltech Distinguished Alumnus in 1973).

The years 1998 and 1999, to date, have seen the deaths of **Davenport Browne**, **Edwin Dolan**, **William Doolin**, **Andrew Harris**, **Merle Morgan**, and **Clyde Seitz**, bringing the total number of our deceased classmates to 43. Rest in peace.

1955

John Andelin
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703/243-7181
jandelin@cais.com

Thanks to those who sent in some grist for my mill. (So what is grist anyhow? Do you eat it? Use it in an industrial process? Does it need an environmental impact statement?)

Several classmates have, in letting me know about their lives, paid particularly high compliments to some of our Caltech teachers. I should pass these on—thanks, Bob Sharp; thanks, Kent Clark; and thanks, David Elliot. We wouldn't be who we are without your patient, inspiring mentorship. And now, the news.

The physicians in our class seem to be better correspondents, on average, than those of us in other fields. **Francesco Beuf**, MD, still practices pediatrics in Boulder, and is vice-chairman of the Independent Practice Association and assistant clinical professor at the University of Colorado School of Medicine. He's married to Penni Pearson, an artist, with three kids, two step-kids, and two and a half (three, by the time this is published) grandkids. Not content with that, he still competes in vintage races in his 33-year-old 427 Cobra. Vroom. **Vince Marinkovich**, MD, wanted to put in a plug for Alumni Seminar Day, reminding us that next year will be our class' 45th(!) anniversary. **Harvey Frey**, MD, made good on his prediction last year and actually got his JD degree. He immediately started setting up an "HMO Patient Advocacy League" (initially for L.A., eventually for . . . ?).

Some folks just glory in their retirement, past or recent. **Bob Christian** says that he's enjoyed retirement in Florida for the last five years already, and keeps getting better at it. **Frank Mastroly** "finally" retired from Northrop Grumman in February, and is catching up on housecleaning, gardening, and travel. He spends some time in Palm Desert at a condo he owns jointly with his sister. Now he's looking for volunteer opportunities, hoping to use his computer skills. Another new recruit to the ranks is **George Madsen**, who left Huitt-Zollars (HZ), formerly Williamson and Schmid, in January (yes, that's **Dick Schmid**, our own friendly geologist). George is now working as a consultant on civil engineering litigation cases. He has two daughters and four granddaughters.

Tom Noonan retired from SUNY at Brockport in 1995 and moved south to Charlotte, North Carolina. ("After 27 years in Rochester, New York, I never did get used to it.") He's teaching part-time—sometimes official students, sometimes his two grandchildren. Along the way, **Rick Jali** worked for "several" aerospace companies, served in the Peace Corps in Malaysia, and eventually retired from Boeing in 1989. He's lived in Mammoth Lakes ever since (who wouldn't, if given a chance), skiing, backpacking, bicycling, and volunteering (e.g., Boy Scouts, local environmental causes). Just before retiring in 1993, **Chalon Carnahan** spent four "interesting" months at the Paul Scherrer Institute in Switzerland (numbered account? yodeling lessons?). Since then, he and his wife, Mardel, have sold their home, demolished their old vacation house in Capitola, near Santa Cruz, and built a new house on the same property. He says that retirement is just fine, as is the time they spend with their children, Kim and Lee.

Dick Piccolini retired from Rohm and Haas this year, after 40 years. His career ranged from bench chemist to managerial positions in research and in corporate development (details on request). He recruited chemists and engineers from Caltech and UCLA, and was an interface for sponsored research in the chemistry department. He's been a contributing editor to the ACS publication *Chemtech* for years. Dick says that he's still doing some technology consulting. Bringing us up to date, he reports that he was married to Virginia in 1959, and has two sons, John and Jim. **Hunter Paalman** quickly turned the shock of being retired—when Dow Chemical downsized six years ago—into the "glee of making it out of the rat-race and the frustrations crafted by short-sighted MBA types." (Any Caltech MBAs reading this are, presumably, not short-sighted.) He also notes that it was nicely timed for the booming stock market. Hunter and Nancy settled into retirement by gardening, cross-country skiing, hiking, and traveling hither ("tracking down great reds in the wine country") and yon (mostly Europe). Their daughter, Debbie, is a nurse, and their son, Mark, editor of *The New Anatomist*. He closed his update with best wishes "to all you P-80 swiping, Oxy tiger-napping, bonfire stoking, InterHouse creators of yesteryear." (Didn't I hear that InterHouse was also retired? A victim of its success?)

Ed Seidman is both retired and not retired. He lost an election, so is no longer a trustee on the Deerfield Village Board; independently, he left his position as chair of the county's Solid Waste Agency. Retired? Not quite. Still at Abbott Labs, and still working on Y2K (insert Y2K joke of your own choosing here). And, of course, there are always more elections. Ed and his wife, Judie, have recently welcomed two new grandchildren. **Dick Nielsen** is also in the not-quite-retired category. He says that low commodity prices lead to low mining company profits ("in the dumpster"), which ain't good for steady work. Dick consults with companies looking for gold and copper in the Andes, and "dodges bandits in Mexico." When not exploring or defending himself, he generates and distributes funds for graduate student research (via his professional organizations).

Carl Bowin has been wrestling with gravity throughout his career, using it to peek at the earth's internal structure, and he's shared this geo-vision with his technical colleagues along the way. More recently, he's reached out to a wider audience, preparing a public-access cable TV series, *Science and Cape Cod*.

Don Roberts says that his life has been "fantastically better" since May '97, when he "graduated from a treatment center for alcoholism, a familial disease I didn't escape." He became voluntarily unemployed last year, to get caught up on "decades worth of stuff," but hasn't really retired ("not enough money"). He says he's looking for a high-paying part-time job for a 64-year-old pediatrician (presumably in or near Pocatello, Idaho, where he lives). To quote once again: "Obituaries from Caltech are reminding me of our mortality, so I hope to be contacting old friends soon."

Ralph Miles kept JPL honest for years, and continues to teach and publish, developing unusual (and correct) arguments about statistics and risk analysis. He added a wolf to his family a few years ago, keeping it with others in an appropriate habitat, not at his home.

Many classmates seem to say, "So what's news about me?" For those of you who think you've no news to share, tell us your thoughts when the calendar rolls to 2000, or what you're likely to be doing at three in the afternoon (any afternoon and, for that matter, any time), or whether you're looking for things to do or are already too busy (doing what?).

Et moi? My wife and I have helped lots of kids from low-income neighborhoods with their science fair projects. As a result, I'm trying to convince educators that the traditional science fair (independent, original research) may be useful for kids like we probably were (though I never did one myself), but they're often counterproductive for students with little personal interest and no support at home (i.e., perhaps 80 percent of the students). Anyone have any evidence to support or refute? I also recently joined the Board of the Arlington (Virginia) Community Foundation. It's a constructive way of giving away others' money, it keeps me in touch with my local community, and it nicely complements my wife's involvement in the affairs of refugee families in the greater Washington area. (Given the range of cultures our families come from, we get to celebrate at least four distinct New Year's Days each year, and innumerable holidays and festivals.)

The best to you and your family on whatever important holiday is coming up for you!

1959

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This is my first column as class agent. It's taken me awhile to accumulate enough news for a column as most of our class has either not responded or sent back postcards with "no change" on them. However, there were several who did respond, and I appreciate that. If you have some news that isn't included here, please contact me at pharrima@nsf.gov. I'll start with myself. Although I graduated with a BS in physics, I moved into the area of genetics as a graduate student (it was Max Delbrück's influence at Caltech). I've been program director for genetics at the National Science Foundation in the Washington, D.C., area for the last 22 years. My wife, Jenny, and I have been married for almost 40 years. I haven't made it back for any class reunions, because the time of the reunions coincides with the busiest time of my grant-making activities, but I have made several trips to Caltech on business for site visits (as you can guess, Caltech is very competitive at getting grants). Now to get to the news I've received.

Almost half of our class has retired, if the cards I've received are a random sample, and I guess many of the rest of us are trying to figure out how they managed it. **Deloyce "De" Alcorn** retired from JPL, and he and Pat are currently on their fifth year of circumnavigation of the world in a 30-foot sail boat. He wrote from Thailand that he expected to be in the Mediterranean by April of 1999, "wind and weather permitting."

Dick Baugh and his wife, Marcia, are both retired now. He worked for Hewlett-Packard for 37 years. One of his main activities now is writing articles on outdoor survival and experimental archaeology. He also has a small business (Beavertooth Tools) manufacturing knives and a woodworking tool that he developed. "Recent trips to Nepal have been real eye-openers."

Keith Brown Jr. retired in 1995 after 30 years of university teaching in Brazil, and is now most active in systems ecology and conservation in Brazil. He hasn't visited Caltech since 1964 but still has fond memories of the place. He has four married children and five grandchildren. All of his children have graduate degrees, and all of the family is musical.

Doug Christman retired in 1995 from the automotive business after 30 years with General Motors and moved to Tennessee. He and his wife, Dianne, celebrated their 40th wedding anniversary this last year. They have a son, Stephen, who is a professor of psychology at the University of Toledo.

Frank Cormia '60 retired three years ago from his job as manager of industrial engineering for Alcoa's Tennessee operations. He and his wife, Mary (Oxy '58), have been traveling to locations like Scandinavia, Russia, and Australia during the past year.

Kirk Polson is in his eighth year of retirement "and enjoying every moment." He and his wife have been doing extensive traveling; they studied dolphins at Midway Island on their last trip. He's playing "good" tennis and attending tournaments (as a spectator) in London, Paris, New York, and Melbourne.

John Price retired from NOAA (National Oceanic and Atmospheric Administration) in 1996 and recently moved to Boulder, Colorado.

David Kipping mentions that he worked for several large companies in Silicon Valley, such as Hewlett-Packard, and a number of smaller companies. He later became an independent consultant, specializing in Windows software development. In 1993 he and Rosalind, his wife of 20 years, moved to Hailey, Idaho, where he is semiretired. He does consulting and some teaching at the local college, and takes advantage of the skiing, hiking, camping, and biking opportunities in the area.

Richard Montgomery doesn't mention whether he's working or retired, but states that his claim to fame is that his step-step-grandson is backup center for the Denver Broncos.

Melvyn Cheslow left the physics world after only four years and moved into the transportation field. He's been providing advice to the U.S. Department of Transportation on the application of new computing and communications technologies to automobiles, highways, trucks, and buses. He's been happily married for 38 years to his wife, Elaine, and has three children.

David Luenberger is a professor of engineering and economic systems at Stanford University. During the last year he was awarded the Rufus Oldenburger Medal by the American Society of Mechanical Engineers for pioneering work related to modern control theory.

Jim Uleman (Ex '61), a physics major at Caltech, went on to get a PhD in social psychology at Harvard. He is currently professor of social psychology at New York University, and a fellow of the American Psychological Society and the American Psychological Association.

Robert Lange has been a physics professor at Brandeis University since 1965. Most of his efforts are currently devoted to science and environmental education—creating development projects in East Africa, Boston, and eastern Europe.

Bernard Malofsky retired from Loctite Corporation, where he served as vice president for research and development. Now he has his own consulting business in adhesives, sealants, coatings, and composites.

Bob Blandford received a PhD in geophysics from Caltech in 1964. He's currently working for the Air Force in AFTAC on CTBT and coming up with inventions for personal computer diaries.

Gordon Hughes received his BS in physics, and his MS and PhD in electrical engineering, all from Caltech. He worked on magnetic recording technology for 35 years in the computer disk drive industry, but recently entered academia as the associate director of the Center for Magnetic Recording Research at the University of California, San Diego.

Eldridge Moores has been on the faculty of the University of California, Davis, for the past 32 years. He and his wife, Judy, celebrated their 34th wedding anniversary in June. They have three children and one grandchild. In 1996 he was president of the Geological Society of America. The book *Assembling California* by John McPhee gives a good description of Eldridge's approach to geology, as McPhee describes following Eldridge to various sites illustrating the geological history of the West Coast.

Karl Knapp lists his address in Indonesia, and his job as director of the Australian Centre for Automotive Management in Adelaide, South Australia. Sounds like a long commute.

Gerhard Klose says he has no major news, but has been at JPL for over 27 years and is still having fun.

Dick Gustafson has been working with the Laser Interferometer Gravitational-Wave Observatory (LIGO) at Caltech, on leave from the University of Michigan (as Dick puts it, "Maybe you can go back"). LIGO is designed to test predictions based on Einstein's theory of gravitation.

One member of our class mentioned to me that "We believed that brain power was everything. After I graduated I observed people who were a lot less smart than I making exceptional contributions to life, and I saw very brilliant people who continually made their lives and those of the people around them miserable. I'm not as impressed by brains as I was when I was twenty years old." That resonates with me, and I welcome any comments any of you may have on what you've learned in the 40 years since we've graduated from Tech.

1966

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I'm maintaining a class of '66 Web site at http://alumnus.caltech.edu/~class66/. The following updates are from that site. Please visit the site, and while you're there, think about sending me news on what you've been up to these last 33 years.

Jerry Yudelson has lived and worked in Portland, Oregon, since 1991. He has a recent MBA (University of Oregon) and is currently PE and corporate marketing director for Glumac Interna-

AND A ONE, AND A TWO . . . Ray Richards '40 (far right)—a member of the Caltech bands' sax section since 1987—rehearses for his appearance as guest conductor with the annual Bandorama concert, which took place on May 15 in Beckman Auditorium. This year's event celebrated conductor William Bing's 25th anniversary as director of the Caltech bands, and featured a new work composed by JPL staffer Les Deutsch '76, PhD '80 (third from left, playing flute). Deutsch also lent his considerable musical talent to playing the trumpet and piano. Finally, Paul Asimow '93 (not shown), who will return to campus this fall as assistant professor of geology and geochemistry, was also a guest conductor during the concert.

tional, consulting engineers, with offices in Los Angeles, San Francisco, Sacramento, Portland, Seattle, and Madrid. He ran for Congress in Orange County in 1988, a spirited but unsuccessful race. He's been married for 12 years to Jessica Stuart, a casting director and former film and stage actress, and has studied and practiced meditation and yoga since 1974. Jerry welcomes calls from classmates in the area or those passing through Oregon.

Joseph Tymczyszyn says, "I work for Boeing, helping China improve the safety of their airline operations. So far I've made 22 trips to China, and can speak about 1,000 words of Mandarin (can't read or write though)!" **Phil Coleman** writes that he has no major news to relate. He is still alive. One kid is fully fledged. One close. Most days work is fun.

Jim Austin reports that he is now working for Tandem Telecom Network Solutions in Omaha, Nebraksa. "We build software for cellular phone service providers. When you use your cell phone, you are likely using our software, whether you know it or not. My primary responsibility is simulation and modeling of computer and communication systems. Do you know of any other alumni doing something similar with whom I might compare notes? I am new to the telecom industry, so every day is a learning experience."

Ron Douglass sends word that he reached the 30-year mark with IBM and decided that enough was enough, so he retired as of 12/31/97. For now, he is busy with church work and endeavoring to catch up on a backlog of "someday" items that kept getting put off when he was working for IBM. His family is staying in Poughkeepsie, New York, for the time being.

Jon Callender writes that he is a senior project engineer at Kennecott Utah Copper Corporation, in charge of remediation projects near the Bingham Canyon Mine. He is currently trying to solve a particularly thorny groundwater problem.

David Lischinsky says, "Here's some news of me. For the last few years I've been working independently as a software consultant and teacher and living in Palo Alto with my family—wife, Dedra, son, Adam, eleven, and daughter, Chloe, four. In July, we fly to Paris to start a year-long stay in France, living near Antibes on the French Riviera. One reason for going this year is for Adam to take part in the international chess scene—Cannes is an important chess city, and Adam is one of the top five players in the U.S. for his age. Chloe will amuse herself as usual with her friends, only they will be French little girls in tasteful pinafores. Dedra will learn all about French landscaping and *la haute cuisine*. I hope to connect with some chamber music players in France for weekly string quartets—something I've been doing often here in the Bay Area. I also plan to play a lot of tennis and enter a few chess tournaments myself (I am one of the top two chess players in my house). This is planned to be a relaxing, delightful year—I hope work will not get in the way."

Jeff Pressing writes that he is still playing lots of tennis, but mainly Royal Tennis now (known as Real Tennis in the United States), which turns out to be a vastly more challenging game intellectually, and also great exercise. Jeff is with the department of psychology at the University of Melbourne, Australia.

Gordon Myers writes that he retired from IBM at the end of March and looks forward to traveling with his wife, Diane. "It was a great 30+ years, starting with work on the Apollo and Space Shuttle programs, and finishing with the creation of the IBM Global Services business, which has driven so much of the growth of IBM over the last eight years. When I tire of travel, I plan to get involved with science and math education in the schools. I may someday even try my hand at teaching. It would be great to see any of my former Caltech friends—if you are in the New York area (we live in Stamford, Connecticut), give me a call at 203/322-6054."

Ron Constable writes that he is currently manager of avionics flight testing for the F-22 program at Lockheed Martin, which is why he will be moving back to Southern California after nearly eight years in Georgia (near Atlanta). He is looking forward to being dry again.

Phil Laipis writes, "I am still professor of biochemistry and molecular biology at the University of Florida. I recently added associate chairman to my list of duties, as well as serving as scientific director (i.e., I pick software) for the biological computing facility. I teach undergraduates, graduates, and a few classes to medical and veterinary students, while keeping a research lab group going. Research areas include anzymatic studies on carbonic anhydrase and phenylalanine hydrosylase, in vitro replication systems for adeno-associated virus, and mitochondrial genetics. I manage to spend some time in the lab, but, as usual, the pile of paper on my desk gets higher with each year and I find myself writing and teaching, not doing."

1970

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We sent postcards to the 155 graduating seniors and got back exactly 15 (including mine) for a neat 10 percent response rate. Unfortunately, there were only five of those cards with notes on them (including mine). So, when **Jeff Richardson** asks why I manage to volunteer for everything, the answer is that I'm one of only 3 percent of the graduates of our class who bothered to send back a note. I suspect most of us do better with e-mail than postcards. If this is the case, and you'd like to see your name in print in this column, please drop me a quick e-mail at wgbradley@pol.net.

Mike Stefanko finally figured out that crime *does* pay as he writes, "For the past two years I have been forming a Research Unit in the Office of the District Attorney, County of Orange. I analyze various criminal justice statistics and evaluate several specialized programs. I am on the Alumni Association Board of Directors and have several positions at the district and council levels of Boy Scouts. My oldest child just graduated from the University of Redlands."

Glenn Prestwich continues to sing first tenor and recently "moved to the University of Utah as Presidential Professor and Chair of Medicinal Chemistry in July '96." He also won the American Association of Colleges of Pharmacy's Paul Dawson Biotechnology Award in 1998, and has started two biotech companies—Clear Solutions, for drug delivery; and Echelon Research Labs, for drug discovery.

Bob Drean has become a commuter. He writes, "The surprise is that after 27 years I am no longer with Hughes—because Raytheon bought us. As chief system engineer of our space systems business unit in Denver, I spend half of my time in California where the satellites are built and half at home where the ground systems are put together."

Ed Musgrave '80 writes, "I have three sons, ages 12, 14, and 17, and this June, I start my term as a member of the Lake Country Democratic Central Committee."

Personally, I've been back in Pasadena for 17 years now, the last nine of which I have been commuting down to Long Beach Memorial Medical Center where I do magnetic resonance imaging. Now that my oldest child (of four) is applying to college, I realize that it was either a lot easier to get into schools like Caltech 30 years ago—or maybe we were smarter than we thought we were.

1985

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I had a baby and quite a few things slipped (including this column!). Most of your news from 1998 involved relocations, changes in job status, marriages, and births of children, which I've put in alphabetical order by your last name when you were a student. If you sent me info that contained personal history, I included it, even if you indicated you didn't feel it was newsworthy. I know that I have lost track of so many people that even job changes that are years old are still new to me. So, here goes.

Lew Aronson writes, "I worked in Alexandria, Virginia, for a couple of years, where I met my wife, Jenny. I started a PhD program at Stanford in applied physics in 1987. Jenny and I were married the next year, and I eventually managed to graduate by 1992, just as our first daughter, Nina, arrived. At about the same time I started my current job at Hewlett Packard Labs, where I do research on fiber-optic transceivers. Two years later we had our second daughter, Heidi, followed by twin sons, Tommy and Joey, two years after that. Today we live in Los Altos, California (near Palo Alto). Our life is very busy but very satisfying as well."

Mike Barela writes, "I am working at the U.S. Embassy in Helsinki, Finland, as the security engineering officer. I travel regionally in support of embassies in the Baltic and Nordic countries. I share this adventure with my wife, Traci, and daughters Kathryn, 8, and Laura, 4. When I have free time, I enjoy editing my Web site on lymphoma: http//www.alumni.caltech.edu/~mike/lymphoma.html."

Bill Callahan writes, "Now I live in Franklin, Massachusetts, which is also a nice town, though different from NoHo. I volunteer for a coffeehouse that puts on folk music once a month in town. I'm married to Ann Marie Callahan and have a house with two dogs and two cats and no children (yet!)."

Joe Cheng writes, "After Caltech, I worked in the defense industry for a few years before I got an MBA from UCLA in '93. In the last few years, I've been traveling to Asia about every two months on business trips for my former employer, Quarterdeck. In July 1998, I joined Storactive, a startup company, as chief operating officer. In August '98, I celebrated the fifth anniversary of my wedding to Kenita on a hot air balloon. Please drop me a line anytime at jcheng@alumni.caltech.edu."

Robert Golden writes, "I'm still with Pilot Chemical, where I have worked as a research chemist for five years since receiving my PhD from UC Irvine." **Eloise King** reports that "I'm happily residing in Carlisle with Kent and our three children, Emma, 5; Claire, 3; and Simon, 2 months. My e-mail address is eloise_young@ alum.mit.edu."

Kurt Lemke moved to Oxford, England, to accept the position of director of European and Middle Eastern operations for Safeco Technologies, Inc. He currently holds three patents in telephony.

I, **Leslie Lippard**, after working as an engineer for 10 years in Southern California, tired of the industry dependence on big government projects. I moved north to Oregon to get my MBA and then returned to California to work as a management consultant for a small firm called Strategic Decisions Group. In October, I gave birth to a son, whom my partner, Allyson, and I decided to name Nicolas.

Sean Moriarty writes, "It's been five years since my wife, Denise, and I moved to Colorado so that I could attend law school. We live in Broomfield, which is between Denver and Boulder, and really enjoy living in Colorado. The only drawback is the distance from friends and family back in California. Our lives have been busy. For the past two years I have been practicing law at a Denver law firm. By the time you read this, I will be working on legal and business development issues for Geneva Pharmaceuticals, Inc., a manufacturer and distributor of generic drugs. Denise and I are proud parents of a baby girl, Erin Colleen, born January 28, 1998, and a healthy, happy baby. As any other parent already knows, our lives have been altered in ways beyond my predictions. The year is only now settling down to resemble anything close to our normal routine. Our new normal consists of less sleep, more neighborhood walks, and many toys."

Karla Peterson writes, "I work for the Hubble Space Telescope. My husband is **David Sahnow** '84. There is no new news for me in the last six years (same address, same job, same husband—I'm so boring)."

Aaron Roodman recently relocated to Stanford, California, where he is an assistant professor at SLAC. He's married to Eva and has two daughters, Ronit, 6, and Shoshana, 3.

Ketan Shah writes,"I moved back to the UK in July of '98 and am currently looking to start my own business in the City." **Rex Wang**, after six years

of engineering, attended Stanford GSB to get an MBA. He then moved on to management consulting and is currently working for a software startup in Silicon Valley. He is married to Tina King and lives in Belmont. **Minami Yoda** is living in Georgia and says "Hi."

Well, that's all the news for this column. Many of you sent address updates, which I have passed on to the Alumni Association. **Bill Callahan** expressed interest in getting an e-mail distribution list, which I'll try to put together. If you don't want your information to be included, please let me know that when you send address information. Hope the year ahead brings you all the best!

1990

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Hello, class of 1990! I thought I'd start with a "brief" autobiography, which grew to be quite lengthy . . . After Tech, I came to Santa Barbara to work for Green Hills Software (www.ghs.com). I spent eight years as a software engineer and one year in technical marketing. Green Hills is an OEM (original equipment manufacturer) of an "embedded software development environment"—software "tools" that allow other companies to develop their own "embedded" software. During my tenure as a programmer, I was in charge of the product line for the NEC V800 family of embedded microprocessors. Green Hills was founded by Techers and we still go back to Tech to recruit.

About two years ago, I took a beginning acting class with the Santa Barbara City College Theatre Group (SBCCTG), and I've been hooked since. I went on to take their first and second intermediate acting classes, and I took their advanced and final acting class this past spring. I've been very involved with SBCCTG's last five productions, including *Private Eyes* and the award-winning production of *Shadowlands*. Backstage, I was production stage manager for *On Golden Pond,* ran sound and music for *The Compleat Works of Wllm Shkspr* [sic], and conjured up all the thunderous crashes and howling wind as sound designer for *The Tavern,* where I also served as the assistant stage manager. In March, I played an 18th-century Chinese businessman in *The Waiting Room*, a very bold and provoking play about the price of beauty throughout history. During the opening weekend, **Dave Carta**, **Pete Morcos** '91, **Dave Proctor**, **Dean Oliver**, and **Steve Olafson** all came here to see the play, and we had a great time at the mini-reunion.

But enough about me. The following is news from your e-mails and postcards, in alpha order. Oh, one final word before the news: What is the meaning of life for you? Write me.

Dwight Berg (dwightberg@csi.com) is living in Orange County with his wife, Shannon. He has just accepted a partnership offer in a development firm that constructs educational facilities for public schools, charter schools, and private schools. The only prank he has to report is that on April 1, 1996, a school in Yolo County was named after him (or so everyone at his office thinks).

Dave Carta (dcarta@ucsd.edu, david.carta@cubic.com) is alive and well and still playing Frisbee. He got his PhD from UC San Diego. Occasionally he has driven up to Santa Barbara for his Ultimate tournaments or to see my plays and crash at my place. He's working for Cubic, a company that makes "smart cards." **Ben Chew** (BChew82233@aol.com) is alive and well.

My first roommate in Ruddock, **Robert Coker** (rfc@physics.Arizona.edu), spent two years after Tech at JPL working on "the DSN," then went to graduate school at the University of Arizona in the physics department. He hopes "graduation is sometime before the end of this coming summer" and is now job hunting. His general subject is "computational/theoretical astrophysics." He is using MHD code and analytical work to explain our galactic center.

David Edwards (edwards@math.udel.edu) is an assistant professor in the mathematical sciences at the University of Delaware. He and his wife, **Jackie Holmes** '91, live in the Baltimore area. **Eric Fong** writes, "I am a post-doctoral fellow at Stanford in the department of molecular and cellular physiology. My wife is a resident in radiology at Stanford."

Robert Fox (theophan@ix.netcom.com) writes, "After four years as a GaAs process engineer for Rockwell at a wafer lab in Newbury Park, California, I am moving to take a position with M/ACom in Lowell, Massachusetts. After the first of the year, I will be a senior process engineer at their GaAs fab. The company specializes in custom RF devices."

Eric Hassenzahl (erich@fiori.org) reports, "I have two new cats, Sven and Olaf." **Amanda Heaton** (amanda.a.miller@us.pwcglobal.com) e-mails, "The biggest recent event in my life is that I married Alan Miller, June 7, 1998, and changed my name to Amanda Ayres Miller. Job-wise, I'm working at Applied Decision Analysis, a small company that was recently acquired by PriceWaterhouseCoopers. Our company does quantitative management consulting, building computer-decision analytic models and market-forecasting models to help companies make decisions about capital investments, resource allocation, product design, and marketing. And for ancient history, I got my PhD in EE (information systems) at Stanford in 1994. Don't worry—they still haven't let me touch a soldering iron! My project was actually more like applied statistics than EE."

Kathleen Kraemer (kraemer@buast7.bu.edu) is alive and well. The Del people would like to hear more from her. **Brendon Lasell** says, "I'm teaching at Saint John's College in Santa Fe." **Howard Lee** (howard_Lee@notes.seagate.com) now lives in San Jose and works for Seagate Technology, Inc. They make disc and tape drives the last time I checked.

Jennifer Low (jennalow@alumni. caltech.edu) says, "I just completed my MD-PhD degree from Georgetown and am now an internal medicine resident at UC Davis in Sacramento. Still married (five years) to **Dean Brittle** '92, who is doing independent computer consulting. I expect to know where I'll be doing a medical oncology fellowship after residency in another month or two."

Steve Ludtke is at Baylor College of Medicine, and would like to pass on his two e-mail addresses: sludtke@bcm.tmc.edu and stevel@alumni.caltech.edu.

Charlotte Manly (cmanly@alumni. caltech.edu) notes, "Since I just graduated and moved, everything the new *Alumni Directory* has on me is wrong except for my e-mail address. I received my PhD in cognitive science from Brown this May. They even let me give the graduation speech, despite my 'nerdly' background. I started a postdoctoral position last August at NIH, where I'm learning neuroimaging techniques, among other things. It's a lot of fun."

Mike Masonjones (mcmj@blazetech.com) is happily married to Heather and they have three kids, the last time I counted.

"Airman" **Pete Morcos** (morcos@blarg.net) left Microsoft, flies, and is in the computer science MS program at the University of Seattle. He would drag **Matt Durasoff** '93 from Seattle to Santa Barbara to enjoy SBCCTG's productions. He highly recommends the board game *The Settlers of Catan*.

Joel Norris (jnorris@ucar.edu) pens, "I have begun the second year of my postdoctoral fellowship at the National Center for Atmospheric Research and am now looking for a faculty position." **Dean Oliver** (deano@tsoft.net) is alive and well. **David Risher** graduated from the University of Minnesota with an MD and is now doing a residency in internal medicine there. **Edward Ratner's** new e-mail address is ratner@california.com.

Mike Salisbury (salisbur@parc.xerox.com) states, "After Caltech I went to the University of Washington for graduate school in computer science. I received my PhD in 1997 and came to work at Xerox PARC." **David Stevens's** e-mail is 8386stevens@netw.com. **Jeanette Woo** (jwoo@west.raytheon.com) is alive and well also here in Santa Barbara. She recently bought her first home!

1991

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These notes were accumulated over a period of time, so some of them may be a bit dated. Please e-mail notes for future publication to me at scott@excitecorp.com.

Stella and I got married last summer, in the house we bought in Woodside, in the Bay Area. I have been working at Excite (a search engine on the Internet) for the past three years, where I am an applications architect.

Haris Catrakis '91, PhD '96, has been appointed assistant professor of mechanical and aerospace engineering at UC Irvine. His research is on turbulence and mixing at high Reynolds numbers with applications to flow control for aerospace and marine vehicles. Haris received the National Science Foundation Career Award.

Mark Lyttle recently won the Danish National Indoor Ultimate Frisbee Championship with his local team, Copenhagen Flying Circus. Mark also plays internationally, both indoor and outdoor, for Club Fenris. He is currently working as a materials research scientist at Riso National Laboratory in Denmark, where he recently published an instructional manual, "The Neutron Texture Diffractometer at Riso National Laboratory." Other papers published during the past year include "Complementary Microstructural Characterization by Scanning and Transmission Electron Microscopy," and "Hot and Cold Deformed Aluminum: Deformation Microstructure and Recrystallization Behavior."

Jinnha Jim finished getting a PhD in physics at Harvard. **Golda Bernstein** reports that Trusty has become president of his own Internet company (no one knows he's a dog, though). **Mark Markarian** remarks that he is glad he took that one class on radio frequency engineering.

Sandor Nagy is back in the U.S. after four years in Europe working for GE. **David Park** sent in a business card stating that he is a captain and F/A-18 fighter pilot in the United States Marine Corps. **John (Hoang) Pham** is back in Alaska attending graduate school in electrical engineering at the University of Alaska, Fairbanks. He misses sunny Southern California in the winter.

Christopher Pluhar has been in graduate school in earth sciences at UC Santa Cruz. And **Bill Swanson** is still in the Navy attending naval postgraduate school, going for a masters in mechanical engineering. He is now married to Tanya and has a 2-year-old daughter named Jessica.

1998

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Welcome to the first alumni notes column for the class of 1998. Unfortunately, most respondents missed the point of the column, which is to tell everyone what they're doing after graduation, not to simply update addresses in the database! So I made a list of "who's doing what" based on people's e-mail addresses, and hope for the best in terms of accuracy. By the way, anyone who did not return the little postcard, or otherwise indicate they wanted to be included in this column, was left out.

A lot of us are toiling away in graduate school: **Kai-hsu Tai** in biochemistry at UCSD; **Maura Raburn** in electrical engineering at UCSB; **Mason Porter** in applied mathematics at Cornell; **Natsuko Kagawa** in mechanical engineering at Berkeley; **Jeffrey Huynh** in electrical engineering at Stanford; **Daniel Hennessy** in physics at Carnegie Mellon; **Kulvinder Gill** in physics at UCSB; **Eric Dennis**, also in physics at UCSB; and **Karen Bletzer** in mechanical engineering at Stanford.

Also in graduate school, fields unspecified, are **James Turner** at Scripps; **Ronak Bhatt** at MIT; and **Wes Salzillo** at UCSD.

Rowena Lohman is off to Antarctica again and also enjoying grad school in geological and planetary sciences, even though she's still at Caltech. Fay Peng, who is in graduate school in biomedical engineering at Johns Hopkins, says she misses Caltech a lot. And I am in grad school at Princeton in electrical engineering, enjoying East Coast life and spending weekends in New York City—only an hour away by train.

Those toiling away in the paid sector include: **Edward Yu** at Oracle; **Andrew Silverfarb** at Lincoln Labs; **Lisa (Ngo) Chang**, a biologist at Glaxo-Wellcome, a pharmaceutical company in Research Triangle Park, North Carolina (Lisa was married to Daniel Chang, class of '95, on June 28, 1998); **Emil Kartalov**, working in the applied physics department at Caltech; **Wei-Hwa Huang**, contracting for the Joint Chiefs of Staff (I think that means he's a spy); and **Judy Green**, working for the "gub-ment" in Maryland (probably also a spy).

More working stiffs: **John Grossman IV**, at WebTV; **Mark Chen**, working for the "now-infamous Long-Term Capital Management, L.P., and we're making headlines again"; **Eric Cheng-Feng Jan** at Allied Signal; and **Kristie Armentrout** at Tektronix (she says, "Portland is great. Life is lonely").

Those who have chosen less conventional pursuits include **Chris Walker** (kickin' it in Palo Alto); **Tony Tran** (chillin' in Portland, Oregon); **Paul Storaasli** (maxin' and relaxin' in L.A.); **Heather Kelin Ryan** (hangin' in San Mateo, California); **Vale Murthy** (throwin' his hands in the air in Morristown, New Jersey); **Blake Jones** (doin' a G Thang in Redwood City, California); and **Armando Durazo Jr.** (doin' somethin' somewhere).

Finally, there's **Jake Christensen**, who is presently putting his chemical engineering degree to good use teaching third grade English, math, and science in Jawalakhel, Kathmandu, Nepal. Jake recently spent three weeks hiking in the Himalayas, but has no plans to climb Everest and expects to return to the States "sometime next century." Now, that's how a class note should read.

Obituaries

1927

THEODORE H. COMBS, of Arcadia, California, on March 15; he was 92. He was renowned for his dedication to Caltech. After graduating from the Institute, he worked at a variety of jobs, including chief usher at the Los Angeles Coliseum, high-school algebra teacher, college-yearbook publisher, and assistant city engineer for Upland, California. During World War II he served as a colonel in the U.S. Army Corps of Engineers in both Germany and the Philippines, and in August 1945 he was on his way to participate in the invasion of Japan when the atomic bombs were dropped on Hiroshima and Nagasaki. "The landing would have been much rougher than we anticipated in planning," Combs told *Caltech News* in 1992. "If we had invaded, I'm confident I wouldn't be here today." After the war Combs made roof trusses and aluminum containers. A member of the Breakfast Forum, a group of 50 men who met twice monthly at the Athenaeum, he had served at one time or another as Caltech's director of corporate relations, director of alumni giving, and secretary to the board of trustees. He had served in addition as secretary to the Caltech Corporation and as executive director of the Associates. He also wrote histories of the Association, the Gnome Club, of which he was a member; the Caltech Y; Tournament Park; and the Nelder Grove, a stand of Northern California redwoods that had been given to Caltech. He was an avid violinist, and he traveled widely with friends and family, over the years visiting all seven continents. He is survived by his third wife, Viva; two daughters, Marian Combs Nichols and Johanna Boyle Leh; a son, James Boyle Jr.; and seven grandchildren and four great-grandchildren. A scholarship fund has been established at Caltech. Those wishing to contribute should write to the Theodore C. Combs Scholarship Fund, 105-40, Caltech, 1200 East California Boulevard, Pasadena CA 91125.

DONALD R. THOMPSON, of Ontario, California, on March 4, 1998; he was 92. After graduating from Caltech he joined the California Fruit Growers Exchange, which later became Sunkist Growers; he worked in research and development at the Ontario plant. Eventually becoming products manager of marketing and sales, he traveled widely in Japan and Asia. In 1963 he left Sunkist and served as European manager for the California-Arizona Citrus League, receiving in 1975 from West Germany's secretary of agriculture a citation and bronze medal for his work protecting and preserving citrus fruit during shipping and distribution. In 1976 he returned to the United States and represented Sunkist before the California Citrus Quality Council. In addition, he served from 1945 to 1961 on the board of the Ontario-Montclair School District, including as president from 1952 to 1956. He is survived by a daughter, Diane Halderman; a son, Fielding; a brother, Robert; and five grandchildren and four great-grandchildren.

1930

ROLAND C. HAWES, of Monrovia, California, on January 12; he was 90. A pioneering spectroscopist, he worked for National Technical Laboratories (later Beckman Instruments) and from 1956 to 1969 was vice president for research and development at Cary Instruments, which is now a division of Varian Associates. He designed the Beckman IR-2 and IR-3 infrared spectrophotometers and the Cary Model 14 spectrophotometer, among other instruments, and following his retirement in 1972 he remained a consultant in the field for 10 years. His research papers are housed at the Smithsonian Institution, in Washington, D.C. An active resident of Monrovia for nearly half a century, he served on the city's planning commission and on the board of directors of Santa Anita Family Services. He is survived by Mary, his wife of 12 years; a daughter, Katherine Miller; and four grandchildren and three great-grandchildren. A memorial fund has been established at Caltech. Those wishing to contribute should write to the Roland C. Hawes Memorial Fund, 105-40, Caltech, 1200 East California Boulevard, Pasadena CA 91125.

1934

CARROLL C. CRAIG, of Los Angeles, on November 18, 1998; he was 86. After serving as a lieutenant commander in the Navy during World War II, he founded Fidelity Manufacturing in Los Angeles, which manufactured the cut film holders for photographic negatives; he sold the company in the early '80s. A world traveler, he was a member of the Adventurers' Club of Los Angeles, serving for a time as its president. His travels took him to every continent, including Antarctica, which he visited in his early 80s on a Russian icebreaker. He is survived by his wife, Erna; her children, Alice Zrodlo and Leo Bidstrup; his children, Tim Craig, Tami Roth, and Marcy Lamprinos; and his five grandchildren and great-granddaughter.

CARLOS C. WOOD, MS, MS '35, of Napa, California, in October 1997; he was survived by his wife, Madeline.

1935

ROBERT P. JONES, on December 31, 1998; he was 85. After graduating from Caltech he went to work for the Standard Oil Company of California, which later became Chevron. His career with Chevron lasted 42 years, and he rose to the position of vice president for communications. After World War II, during which he served as an officer in the South Pacific in the U.S. Navy, he and his family moved to San Mateo, California, near Chevron's headquarters in San Francisco. He retired from Chevron in 1978 but remained active in the San Mateo community. His wife, Betty, died in 1985, and he married Lorraine Hallendorf of San Carlos in late 1985. Their greatest love was travel, and together they sailed on 28 cruises and visited over 60 countries, their last trip being a 56-day cruise from Florida to Los Angeles via Cape Horn. He is survived by his wife, Lorraine; his sons, Robert and Christopher; two grandchildren; his stepdaughter, Teresa Hallendorf Desmaris; his stepsons, Len, Tom, and Jim Hallendorf; and two stepgrandchildren.

1940

ALEXANDER F. BREWER, of Anacortes, Washington, on December 27, 1998; he was 81. A pioneer in the field of microwave technology, he was educated in electrical engineering at Caltech, then continued as a graduate student at Stanford (MS '42). At the beginning of World War II, he worked on radar by joining the Stanford group, headed by W. W. Hansen and E. Ginzton, in their move to the Sperry Gyroscope Co. in New York (1942–46). With Russell and Sigurd Varian, who developed new klystron microwave oscillators and amplifiers, they invented pulsed-Doppler radar as well as a portable radar relay link. The group received a Navy citation for the success of this work in the war effort. Subsequently, these inventions were to be used in satellite communication, airplane and missile guidance systems, and telephone and television transmission, to name a few. Ultimately, Brewer was granted six patents in this area. After the war, at the Hughes Aircraft Co., he headed the missile electronics section and systems research section (1946–53), and later became business manager for the microwave tube division and the industrial products group (1959–61). With the Stromberg Carlson Co., he founded and directed Electronic Control Systems, Inc., which produced numerical machine tool controls and other automation products (1953–59). In later years, he assumed executive and consulting roles for TRW, Lear Ziegler, the Rand Corporation, the USC Information Science Institute, the National Science Foundation, and the National Academy of Engineering. Predeceased in 1983 by his first wife, Barbara, he is survived by his wife, Darla; his three children, Gregory (BS '68), Pamela, and Douglas; seven grandchildren; and his brother, Richard G. (BS '51).

SHANG YI CHEN, PhD, on February 23, 1997.

SIDNEY W. FOX, PhD, of Mobile, Alabama, on August 10, 1998; he was 86. After earning his doctorate in biology under the tutelage of Thomas Hunt Morgan, he did postdoctoral work in the laboratory of Linus Pauling, who remained a lifelong friend and mentor. Fox first worked at Cutter Laboratories, isolating vitamin A from shark livers to enhance the night vision of pilots, then left to establish a protein-chemistry clinical laboratory at the University of Michigan Medical School. He later returned to Oakland, California, where he performed research on fish-meal protein for a local fishery. In 1943 he accepted a tenure-track position to teach protein chemistry at Iowa State College, where he remained for 12 years and worked in the areas of protein-sequence determination, cancer assays, and peptide synthesis. In 1955 he became director of Florida State University's Oceanographic Institute. His research into the origins of life and cells led to the creation of the NASA-supported Institute of Molecular Evolution, which nine years later he moved to the University of Miami, where he remained for 25 years and where his research group performed the first analyses on moon rocks, looking for precursors of life. He moved to Southern Illinois University in 1989 and in 1993 to the University of South Alabama's department of marine sciences, where he continued his work as a distinguished research scientist. His wife of 60 years, Raia, died on March 17, 1999; he is survived by his three sons, Larry, Ron, and Tom, and by four grandchildren and two great-grandchildren.

1941

WILLIAM F. CHAPIN, of Laguna Beach, California, on October 30, 1998; he was 78. After graduating from Caltech he worked in magnesium processing for Permanente Metals Corporation in Cupertino, California. He joined Fluor Corporation in 1944, retiring in 1982 as vice president of project management. Active in Caltech affairs, he served on the Alumni Association's board of directors and on the Alumni Fund council. He was a life member of the Caltech Associates. Also an active member of the American Institute of Chemical Engineers, he had served as president of the petroleum and petrochemical division and in 1976 was elected a Fellow of the AIChE. He enjoyed skiing and scuba diving, and was a member of the first group of American recreational divers allowed to dive off Bora Bora. He also enjoyed backpacking in the Sierra Nevada, and was active in the Boy Scouts. He is survived by Roberta, his wife of 53 years; two sons, Douglas and Bruce; and five grandchildren. A third son, Charles, died in Vietnam.

JOHN G. PALMER, on July 26, 1994.

1942

H. GEORGE OSBORNE, of Fullerton, California, on January 12; he was 83. Known as the "father of the Santa Ana River project," the key component of the flood-control system for Orange County, California, Osborne served for many years as chief engineer of the Orange County Flood Control District. After graduating from Caltech, Osborne studied at Harvard and Cornell. He also served in the Pacific on a destroyer escort during World War II and later retired from the Naval Reserve with the rank of commander. In 1947 he went to work for the Southern California Water Company as a water-supply engineer, and in 1950 for the Orange County Flood Control District as a civil engineer, later becoming district chief. In 1962 he initiated what became the biggest flood-control project in the United States, which resulted in the 550-foot-high Seven Oaks Dam near the headwaters of the Santa Ana. In 1974 he was named the first executive director of the county's environmental protection agency. He retired in 1980 and went into consulting. He afterward headed the Santa Ana River Flood Protection Agency, a group advocating completion of the flood-control project, and he was chairman of the county planning commission in 1985 and 1989. Since 1988 he had represented the city of Fullerton on the board of the county water district. In 1992 the county's environmental headquarters in the city of Santa Ana was renamed the H. George Osborne Building. Osborne is survived by his wife, Dorothy; a daughter, Georgia Stone; six grandchildren; and two sisters, Marion Findley and Dorothy Cole.

WALTER S. SPUHLER, MS, on June 10, 1996.

1944

The following alumni were members of CAVU, a group of students during World War II who received certification in 1944 after completing an accelerated training program in meteorology, and who referred to themselves as Ceiling and Visibility Unlimited.

NATHAN L. ANDERSON, on December 25, 1996.

HOWARD F. DEVANEY, on February 2, 1995.

GEORGE M. GRISSOM, of Hayward, California, on October 7, 1998; he was 78. After serving as an air force meteorologist during World War II, he attended the University of Texas, graduating with honors in 1948 with a degree in business administration. He and his wife moved to California, living in Hayward since 1956. He was sales controller for the Pacific Division of Moore Business Forms when he retired in 1980. He is survived by Carmen, his wife of 52 years; two daughters, Kathleen Meyer and Monica Kilwine; a son, Mark; and three grandchildren.

MALCOLM B. JOHNSTONE, in April 1993.

1946

BERNARD B. LEVITT, MS, Eng '47, of Ventura, California, on December 5, 1998. He is survived by Isabel, his wife of 53 years, and by three children and six grandchildren.

1947

DAVID L. JUDD, MS, PhD '50, of Berkeley, California, on November 23, 1998; he was 75. A longtime teacher and researcher at UC Berkeley, he was a physicist and an expert in fusion-reactor theory who until his death was actively involved in the attempt to generate electricity from fusion. During World War II he served as a lieutenant in the U.S. Navy, working in Los Alamos, New Mexico, on the Manhattan Project. He is survived by his wife, Martha; two sons, Bruce and Ralph; and two grandsons.

1949

WALTER J. HIRSCHBERG, MS '50, of Carlsbad, California, on November 8, 1998; he was 75. He had immigrated to the United States in 1940 and served in the Navy during World War II. After receiving his degrees he instructed for a time at Caltech and became vice president of Essex Electronics. In 1969 he moved his own company, ACDC Electronics, to Oceanside, California, where he served as vice president of new product development until retiring in 1988. He was a member of Tau Beta Phi, a senior fellow of the IEEE, a past president of the Carlsbad Rotary Club, and charter president of the Oceanside/Carlsbad Toastmasters. A self-taught musician, he enjoyed playing for friends, family, and, on occasion, the local Women's Club. He is survived by his wife, Sylvia; a daughter, Marianne; a son, Jim; three grandchildren; and a sister, Rosi Cohen.

1951

JOSEPH M. CARTER, MS, on November 8, 1993.

1952
JAMES E. SMITH, MS, on March 29, 1996.

1954
JOHN N. KIDDER, of Hanover, New Hampshire, on November 21, 1998; he was 66. An expert in the field of color and vision science, he was a professor of physics at Dartmouth College and served as chair of the physics and astronomy department from 1983 to 1990. After graduating from Caltech, he received his PhD from Duke University in 1960, then spent two years at Yale as an Air Force Postdoctoral Research Associate. He joined the Dartmouth faculty in 1962. He was an NSF Faculty Fellow at Imperial College, London (1971–72), and an Academic Visitor at the Center for Human Information Processing at UC San Diego (1987–88). The author of numerous papers and articles on color and optics, Kidder was a member of the Optical Society of America, the Association for Research in Vision and Ophthalmology, the American Association of Physics Teachers, the Inter-Society Color Council, and Sigma Xi. He is survived by his wife, Joan.

1956
STEPHEN H. NATHANSON, of Wellington, Nevada, on November 12, 1998; he was 62. After graduating from Caltech, he received his MS in civil engineering from Oregon State College (now University) in 1958. He worked at the Arctic Research Lab in Alaska for four years, then became a commercial fisherman in 1962, with Halibut Cove, Alaska, as home base. He sold his salmon fishing permit in 1993 and his boat in 1995, and in semiretirement became active in the tourist industry. An avid flier, he was a licensed sailplane instructor and was learning to fly powered aircraft. He was flying with his instructor over Yerington, Nevada, when their Cessna 150 was struck by a Cessna 185; both planes crashed and there were no survivors. He is survived by his wife, Karen; a daughter, Patricia Hadley; and two sons, Robert and Thomas.

1960
MEREDITH "FLASH" GOURDINE, PhD, of Houston, Texas, on November 20, 1998; he was 69. A renowned scientist and inventor with 70 patents to his name, he was during his undergraduate years at Cornell a track-and-field star, who at the 1952 Olympics in Helsinki, Finland, won the silver medal in the long jump. After graduating, he served as an officer in the U.S. Navy, then attended Caltech on a Guggenheim fellowship. Having earned his doctorate in engineering science, he worked as chief scientist at Curtiss Wright Corporation's Aero Division, as laboratory director at Plasmadyne Corporation, and as a senior research scientist at Caltech. In 1964 he obtained venture capital from Wall Street and founded Gourdine Systems, Inc., a Livingston, New Jersey, research and development company for which he served as president and chairman of the board. In 1973 he founded Energy Innovations in Houston, where he served as chief executive until his death. His research focused on ElectroGasDynamics, which is the process of converting energy in compressed gases directly into high-voltage electricity, and among the major licensees of his technology are Caterpillar Tractor Company, Sherwin-Williams Company, Foster Wheeler Corporation, and GTE. Other endeavors of his companies included deterring air pollution, creating high-powered paint-spray systems, and developing a means for eliminating fog. In addition, Gourdine served on President Nixon's Task Force on Small Business, President Johnson's Advisory Panel on Energy, and New York Mayor John Lindsay's Task Force on Air Pollution. He is survived by his wife, Carolina; his son, Meredith Jr.; three daughters from a previous marriage, Teri Bruce, Traci Lynn, and Toni Lynn; five grandchildren; and a sister, Charlotte Williams.

1978
GEORGE D. PENROD, of Portales, New Mexico, on October 23, 1998. After Caltech, he studied astronomy and astrophysics at UC Santa Cruz. He worked for the Lick Observatory, and then as microcomputer manager for the Portales Community Services Center. "He leaves behind his beloved Nira Buccini and grieving parents, James and Dolores Penrod."

1984
HOWARD D. STONE, MS, PhD '88, of Plainsboro, New Jersey, on November 12, 1998; he was 37. An assistant professor of physics at Princeton, he was very involved with the L3 experiment at the Large Electron Positron (LEP) Accelerator in Geneva and had a continuing interest in quantum chromodynamics. "Stone, a perennially popular professor, taught at Princeton from 1992 until June of last year, when declining health forced him to stop working." He is survived by his wife, Clarisse.

1986
DANIEL S. BRIGGS, BS '87, on July 4, 1998; he was 34. An avid sky diver, he died in a skydiving accident near Chicago. After receiving his two bachelor's degrees from Caltech, he attended New Mexico Tech in Socorro, earning his master's degree in 1990 and PhD in 1995, both in physics with an astrophysics concentration. He held a two-year postdoctoral position at the U.S. Naval Research Lab in Washington, D.C., and then began a second postdoc at the National Center for Supercomputing Applications in Champaign-Urbana, Illinois. His many interests included juggling, origami, martial arts, collecting and rebuilding pinball machines, motorcycling, Contra Dance, American Square Dance, English Country Dance, playing the hammer dulcimer, playing the flute, Morris Dance, cats, science fiction and anime films, and participating in Renaissance Faire and Society for Creative Anachronism events. He loved children, especially his nieces and his nephew, and delighted them with his juggling, stilt-walking, and sleight of hand. He took up skydiving around 1992 in New Mexico and pursued it with enthusiasm, jumping over 500 times and earning a D class "master" license. Many of his jumps were "canopy relative work," in which he created formations with other divers, and he was a member of Diamond Quest, which performed such jumps. He is survived by his sisters, Jeanne Woodliff, Glennis Briggs, and Laughlin Divine; by two nieces and a nephew; and by many friends.

THE GRAD WHO FELL TO EARTH—

The radar image on our back cover, obtained by the SIR-C/X-SAR imaging system that flew aboard the space shuttle *Endeavour* earlier this decade, is a portion of a larger map of the Los Angeles basin. To the northeast (upper right-hand portion) lie the San Gabriel Mountains, with JPL in the foothills. Southwest of the lab, the Rose Bowl is shown as a small white circle, northwest of the Caltech campus. The black areas on the mountains are fire scars from the Altadena fires of 1993. To the south (bottom portion of the map) lies the Whitter Narrows Recreation Area, and to the west downtown Los Angeles. The dark line crossing the map just north of campus is the 210 freeway. Some city areas such as beautiful downtown Burbank (extreme northwest) appear red due to the alignment of streets and buildings to the incoming radar beam.
Spaceborne Imaging Radar-C and X-Band Synthetic Aperture Radar is part of NASA's Mission to Planet Earth.

ELEANOR SEARLE 1926–1999

Eleanor Searle, Caltech's Edie and Lew Wasserman Professor of History, Emeritus, died April 6. She was 72.

A scholar in medieval history, Searle held the distinction of being the first woman at the Institute to receive a named professorship, to which she was appointed in 1988. She joined the Division of the Humanities and Social Sciences at Caltech in 1979, after 10 years on the faculty of UCLA.

Searle was the first woman to study at the Pontifical Institute of Mediaeval Studies in Toronto, where she received her DMS degree (Doctor Mediaevorum Studiorum) in 1972 and an honorary DLit in 1993. She earned a BA, magna cum laude, from Radcliffe College in 1948. She had been a visiting fellow at Cambridge University and a fellow at the Australian National University's Research School of Social Sciences. She had also been a senior research associate at the Huntington Library since 1959.

Searle was a fellow of the Medieval Academy of America, and served as its president in 1985–86. She was also a fellow of the Royal Historical Society and of the Society of Antiquaries of London, and was honorary vice president of the Battle and District Historical Society.

Eleanor Searle on the Caltech campus in the early 1980s.

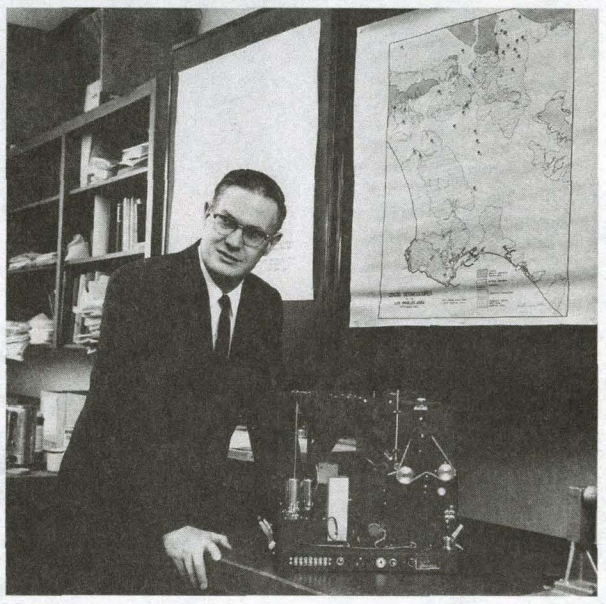
The author of four books on medieval subjects, Searle is remembered by her Caltech colleague Professor of History and Social Science Phil Hoffman as "one of the best medieval historians in the world. Her books are very well known among medieval scholars," said Hoffman, adding that his favorite, *Predatory Kingship: The Creation of Norman Power 840–1066,* published in 1988, is accessible to nonspecialists as well and "is something people could read and find enjoyable."

Eleanor Searle is survived by her husband, Leonard.

DONALD HUDSON 1916–1999

Donald Hudson '38, PhD '42, professor of mechanical engineering and applied mechanics, emeritus, died on April 25. He was 83.

A pioneer in the field of earthquake engineering, Hudson developed or codeveloped a number of instruments used in the study and analysis of seismic motions. These devices provided information vital in designing quake-resistant buildings, bridges, and dams.



Donald Hudson in 1962 with a strong-motion accelerator that would be installed in the then-new Millikan Library.

Born in Michigan, Hudson graduated from Pasadena High School and after earning all his degrees from Caltech joined the faculty as an instructor of machine design in 1942 and became an assistant professor in 1943. He was named a full professor in 1955 and retired with emeritus status in 1981.

His major programs of investigation included dynamic measurements in the field of vibrations and experimental stress analysis, general analysis in structural dynamics and vibrations, and analytical and experimental methods in earthquake engineering and engineering seismology.

During World War II, he worked on projects involving rocketry and underwater ordnance development through the Navy's Office of Research and Inventions. His other professional activities outside Caltech included a stay at the University of Roorkee in India, where he developed its postgraduate program in mechanical engineering; and a tour of Central and South America with UNESCO to improve earthquake safety.

In 1973, Hudson was elected to the National Academy of Engineering. He was also a fellow of the American Society of Mechanical Engineers, and a member of the American Geophysical Union, the Seismological Society of America, and the Earthquake Engineering Research Institute. He coauthored two important textbooks with George Housner, PhD '41, a longtime colleague at Caltech. These are *Applied Mechanics–Statics* and *Applied Mechanics–Dynamics*.

Caltech News