

# Caltech *News*

Volume 26, No. 4  
August 1992



## *Commencement 1992*

Confetti floated down from the roofs as Caltech's 460 newly minted graduates, their families, and friends broke into the applause that has traditionally signaled the finale to the Institute's commencement exercises. After hosting a 9,000-strong crowd, the Secret Service, and a very public centennial service in 1991, Caltech moved its graduation ceremony back this year to the kinder, gentler setting of the mall in front of Beckman Auditorium, where the graduates marched secure in the knowledge that the whirring video cameras and beaming faces were trained almost exclusively on them. No one seemed to be wearing a broccoli corsage, and no student accepting an honor from Dr. Everhart followed up the presentation with a whispered request for permission to embrace Caltech's president.

The weather did its part as well to reaffirm the return to tradition. "It was," said one onlooker, "a typical warm, California surfin' day."

But if Caltech's commencement once again seemed typical, Caltech's departing students were repeatedly reminded that they were not. Speaking before a crowd somewhat smaller than last year's, commencement speaker David Gardner, the recently retired president of the University of Califor-

nia, told the graduates that special gifts, education, and privileges brought with them special responsibilities.

"Some of the most critical and influential individuals during your lifetime will be those who understand science and technology," Gardner said. "It will be your task to explain and articulate the vast power which science and technology have acquired over our lives and our futures. . . . This is an arena in which you will have a splendid opportunity to move beyond the generations that preceded you."

The previous evening at the Senior Banquet, the Class of 1992 had heard Dean of Students Chris Brennen sound a similar theme. Brennen, who retired this year as dean after four years on the job, wished his last class a warm farewell and then spoke about the scientist's role in global society, telling the students that "those of you who are graduating with special technical expertise have it within your power to influence not only the material well-being of the people of the world, but also their much larger future." (Excerpts from the Gardner and Brennen talks appear on pages 6 and 7.)

Bachelor's degrees were awarded to 191 students this year, and 132 graduate students received master's degrees, four, their engineer's degrees, and 134,

their PhDs. The Milton and Francis Clauser Doctoral Prize, given each year "to the PhD candidate whose research is judged to exhibit the greatest degree of originality," went to Institute alumna Michelle (Misha) Mahowald BS '85, of the Division of Biology, who received her PhD in computation and neural systems for a thesis entitled "VLSI Analogs of Neuronal Visual Processing: A Synthesis of Form and Function."

The Frederic W. Hinrichs, Jr., Memorial Award, presented each year to a graduating senior "who, in the opinion of the undergraduate deans, has made the greatest undergraduate contribution to the welfare of the student body, and whose qualities of leadership, character, and responsibility have been outstanding," was presented to Randall William Stevenson, who picked up his degree in engineering and applied science at the same time. Junior Aimee Smith, an applied physics major, was awarded the Mabel Beckman Prize, given each year to a junior or senior woman "in recognition of demonstrated academic and personal excellence, contributions to the Institute community, and outstanding qualities of character and leadership."





## CAMPUS UPDATE

### *Kiewiet to serve as new dean of students*

On August 1, political scientist Rod Kiewiet took over as Dean of Students from Chris Brennen. A life-long baseball fan, Kiewiet's past experience in student affairs was, he says, "as a utility



Rod Kiewiet

infielder." He now looks forward to playing a larger role, as "coach."

"I see the job as one of being an educator outside of the classroom," says Kiewiet. "I'll be counseling students on academic affairs, and be working with David Wales, the Master of Stu-

dent Houses; Kim West, the Director of Residence Life; and the Associated Student Body's Board of Control to facilitate student activities and to head off problems before they reach a crisis stage."

Kiewiet has considerable experience in student affairs. He served as chairman of the faculty's Student Housing Committee for three years; on the Undergraduate Standards and Academic Honors Committee for six years—three as its chairman—and on the committee investigating the possibility of a new student house. Kiewiet has also served on the administrative affirmative action committee and the faculty's convocations committee.

A graduate of Yale, where he received his PhD in 1980, Kiewiet joined the Caltech faculty as an assistant professor in 1979. He became an associate professor in 1982, and a full professor in 1989. In addition to writing numerous articles, Kiewiet is the author or coauthor of two books: *Macroeconomics and Micropolitics* and *The Logic of Delegation*, for which he won the American Political Science Association's 1992 Gladys M. Kammerer Award for the "best political science publication in the field of U.S. national policy."

Kiewiet's current research is on municipal bonds, and he hopes to start a study on the voting patterns in the Russian Congress of Deputies. Although he won't be teaching his usual classes this fall on Congress and the urban economy and politics, Kiewiet will continue work with his graduate students.

"The key thing I want to concentrate on as dean," says Kiewiet, "is to help students take advantage of all of the opportunities, especially the educational opportunities, at Caltech. In the course of dealing with issues, we don't want to lose sight of the overall goal—the students' college education."

"I feel quite comfortable in accepting the position because of the job that Chris Brennen has done in the last four years," says Kiewiet. "If I could approximate the job he did, I'd be very happy. He did a terrific job."

### *All invited to Sharp celebration*

A gala in honor of an individual whose career has been perpetually on the rocks will take place on campus Friday, October 9, under the auspices of the Division of Geological and Planetary Sciences. The man of the hour is, of course, Robert P. Sharp, Sharp Professor of Geology, Emeritus, chairman of the geological and planetary sciences division from 1952 to 1968, and the only Caltech faculty member ever to hold a professorship named after himself. All who are interested are invited to attend this informal celebration.

The event will get under way in Beckman Auditorium at 4 p.m. with a series of short talks about Sharp by his colleagues and friends, as well as by Caltech students, staff, trustees, and some of the 16,000 alumni who know him best. Festivities will then move outdoors and continue on into evening with a buffet and socializing on the Athenaeum lawn. The event's organizers are Sharp's fellow geologists Barclay Kamb, Lee Silver, and Clarence Allen, and division chair David Stevenson. For information, or to reserve tickets for the outdoor buffet, please call Priscilla Piano at 818-356-6109.

### *SURF Seminar Day coming up*

The Institute's 14th annual SURF Seminar Day will be held Saturday, October 17, starting at 11:30 a.m. with an informal luncheon in the Beckman Institute courtyard. SURF students will make presentations on their summer research projects in various classrooms on campus, beginning at 1:00 p.m. For more information, or to make reservations, please contact the SURF office at (818) 397-2885.

Educator's pointer in hand, QALCIT director and Clarence L. Johnson Professor of Aeronautics Hans Hornung explains the workings of the T-5 hypervelocity shock tunnel—the only one of its kind in the U.S.—on the occasion of its dedication in Guggenheim Laboratory in June. Built with contributions from the U.S. Air Force, Rocketdyne, and Rockwell International—all of whom had representatives on hand to see Hornung put T-5 through its paces—the tunnel is designed to simulate the high-temperature, high-pressure conditions that space vehicles face on reentry into Earth's atmosphere and will also be used in the design and testing of the engine and other parts of the national aerospace plane. The shock tunnel's special housing on the roof of Guggenheim was built with funds provided by the Braun Foundation.



Seminar Day talks by, among others, Associate Professor of Chemical Engineering Frances Arnold; Associate Professor of Computation and Neural Systems Christof Koch; and Assistant Professor of Computer Science Stephen Taylor drew enthusiastic audiences.







Harrison Schmitt, as he delivered the day's keynote address

## New science, old friends, and "Earth, Moon, and Mars" come together at Seminar Day

There has always been a touch of the superachiever's science fair about Caltech Seminar Day, and this year's event, with its showing of such state-of-the-art technology as the Intel Touchstone Delta Supercomputer and talks on topics that ranged from the fearsome complexity of insect nervous systems to volcanism on Jupiter's temperamental moon Io, was no exception. The 1,450 alumni who turned out on May 16 to discover for themselves what their alma mater had done for science and engineering lately seem to have mostly had a fine time, getting their first look at one of Seismo's latest gadgets—the Caltech-USGS PC-based display of real-time earthquake data, better known as CUBE—visiting such perennial favorites as the Institute's gem and mineral collection, and crowding into Beckman Auditorium to hear Caltech alumnus, former astronaut, and former senator from New Mexico Har-

rison Schmitt, BS '57, offer up a vision of humanity's interplanetary future in the form of a keynote address entitled "Mission to Earth, Moon, and Mars."

Speaking with the authority of one who for a brief period in 1972 actually *was* the man in the moon (Schmitt was the last man and only scientist to walk the lunar surface as a member of the crew of Apollo 17), the Caltech-trained geologist told his audience that a golden age of space exploration and settlement, as well as the preservation and renewal of Earth's biosphere, are all within reach if humanity only musters the wisdom and will to grasp the possibilities that lie ahead in what Schmitt called "the third Millennium."

"The overall political backdrop against which new challenges in space will be addressed during the 1990s and early decades of the Third Millennium appears to be coalescing into three major themes," Schmitt said. He iden-

tified these as "empowerment of people, stewardship of Earth, and, indeed, settlement of space."

As the 20th century nears its close, Schmitt noted, these themes have become increasingly intertwined. "For example," he said, "education constitutes possibly the most critical single issue within the theme of empowerment of people. . . . Dreams and facts of space will help to reinforce the most important human foundation upon which the future rests: education."

As for stewardship, Schmitt said, "energy makes up the most significant component of the theme of stewardship of Earth. . . . Prudence clearly demands that we find acceptable alternatives to fossil fuels as quickly as technically and economically feasible."

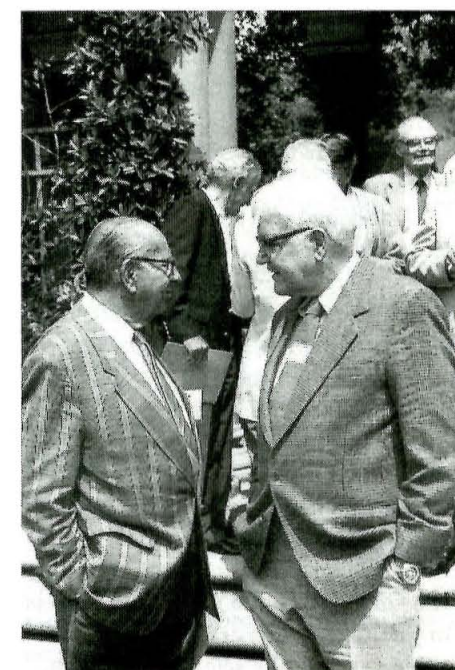
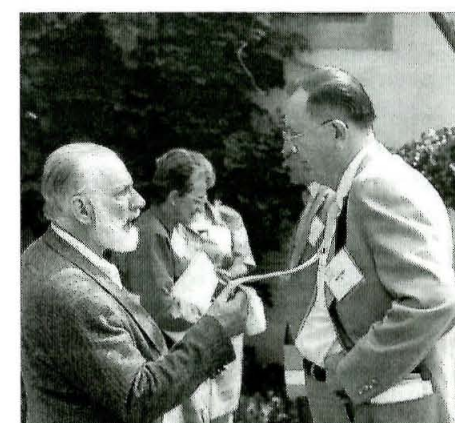
Finally, Schmitt said, "the theme of settlement of space [has] moved from the pages of science fiction to the speculations of futurists and the reports of strategic planners."

"Because of the central and closely related roles played by education, environment, and space in our children's future, a specific commitment to that future might be focused on the turn of the Third Millennium. This rare milestone looms less than eight years away, and the potential has grown for a Millennium Project that will match both society's needs and its capabilities."

"An appropriate, affordable, and self-sustaining Millennium Project for Earth could culminate in the establishment of a permanent human outpost on Mars by 2010. This goal can have two primary objectives: the eventual human settlement of the planet Mars and the provision of abundant and environmentally acceptable energy on Earth."

Linking these objectives, Schmitt told his audience, would be the establishment of a mining colony on the moon, with the aim of extracting helium 3 for use as a clean, plentiful energy source on Earth. "Although nature has not provided access to com-

Finally able to take a break after an active year of planning and organizing, class of '42 Reunion Chairman John McClain (top photo) posed with (left to right) Doris Everhart and his wife, Esther, on the Athenaeum steps at his class's Reunion Dinner on May 14. The Half Century Club luncheon the next day drew 56 class members, among them Ken Urbach, shown here seizing a moment with—and the tie of—former classmate and 50th Reunion gift chairman Dwain Bowen, and (bottom photo) Bill Van Ness (left) and Charles Rutherford. Among the 265 luncheon attendees were members, wives, and guests of the classes of '37 and '32, seated at special reunion tables, as well as Al Morrison, '21, the earliest class representative in attendance. Also holding reunions this year: the classes of '47, '52, '57, '62, '67, and '82.



From left, Irving Reed, BS '44, PhD '49; Robert Parks, BS '44; Robert Hall, BS '42, PhD '48; Mark Wrighton, PhD '72; Chia-Chiao Lin, PhD '44; and Ozlres Silva, MS '66, were honored as recipients of the 1992 Distinguished Alumni Award.



Continued on page 10



## FRIENDS

### *\$2 million gift to Caltech from HHMI*

Caltech has received a five-year, \$2 million grant from the Howard Hughes Medical Institute (HHMI) to support initiatives in precollege and undergraduate science education. The grant is part of the HHMI Undergraduate Biological Sciences Education Program, which in 1992 awarded 42 institutions a total of \$52.5 million.

Portions of the HHMI grant will be used to enhance the Summer Undergraduate Research Fellowship (SURF) program, and the Minority Undergraduate Research Fellowship (MURF) program, an initiative that provides research opportunities similar to those of SURF for minority students from other institutions. Part of the funding will also be used to develop computer-based instructional materials for visualization of concepts in structural biology. These computer programs will illustrate topics in atomic, macromolecular, and organismic structure, cell biology, neurobiology, and primatology. After the programs are developed on high-end graphics workstations, they will be translated for use in more generally available systems such as the IBM-PC and Macintosh personal computers and made available to students at other institutions at a nominal cost.

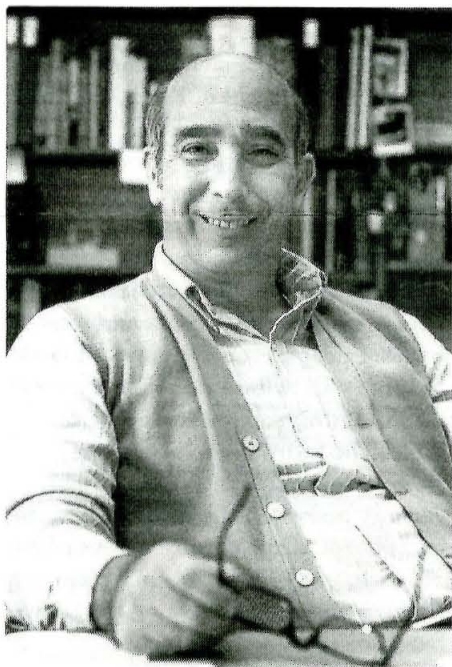
Other uses for the funding include the acquisition of new equipment to expand the use of computers for undergraduate instruction in the above areas, and the support of precollege and outreach programs in which Caltech plays a role. Among these are a summer science institute aimed primarily at 11th grade, college-bound students; the development of a high-school biology curriculum; and a hands-on pre-service science course for elementary-school teachers.

Established in 1953, the Bethesda-based Howard Hughes Medical Institute employs scientists in cell biology, genetics, immunology, neuroscience, and structural biology. Hughes investigators conduct medical research in HHMI laboratories at outstanding medical centers and universities nationwide. In 1987 HHMI established a grants program to help strengthen education in biology and related sciences, complementing its medical research activities. The emphasis of the grants program is on graduate, undergraduate, and precollege and public science education.

### *Caltech SEPP program receives new Mellon grant*

Caltech has received a \$400,000 three-year grant from the Andrew W. Mellon Foundation, for training and research for the Institute's program in science, ethics, and public policy (SEPP), beginning in the fall of 1992. The SEPP program was initiated on campus five years ago by science historian Daniel Kevles, the J. O. and Juliette Koepfli Professor of the Humanities.

Since its establishment in 1987, SEPP has emphasized three major, connected activities—faculty research and writing in relevant topics; educa-



**Daniel Kevles**

tion in the field through undergraduate courses and training of selected graduate students and postdoctoral research fellows; and a regular public seminar series featuring speakers from on and off campus, followed by audience discussions of the issues involved.

In recent years, SEPP has brought distinguished visiting scholars to teach in areas such as science and national security, technology in relation to women's issues, medicine and public health, and physics and science policy in Europe. In 1989-90, SEPP cosponsored a series of seminars on social, moral, and policy questions arising from the human genome project that led to a recently published book entitled *The Code of Codes: Scientific and Social Issues in the Human Genome Project* (Harvard University Press, 1992), coedited by Kevles and by Leroy Hood.

During the next few years, SEPP research and teaching activities will emphasize the examination in historical perspective of intellectual property rights involving living organisms; the genetic and environmental causes of cancer; and environmental issues such as global warming, ozone depletion, the destruction of the rain forest, and the loss of biodiversity.

### *New Luce graduate fellowships awarded*

The Henry Luce Foundation of New York City has funded two new Clare Boothe Luce Graduate Fellowships for Caltech female graduate students through a \$100,000 grant from the Clare Boothe Luce Fund, Luce Foundation chairman and CEO Henry Luce III, has announced. The foundation has now funded seven such fellowships at the Institute in the past three years.

The two grants, to be awarded solely on the basis of merit, will support one woman starting graduate studies in the fall of 1992, and one woman beginning in the fall of 1993. Recipients may pursue PhD degrees in the divisions of Physics, Mathematics and Astronomy; Chemistry and Chemical Engineering; Engineering and Applied Science; or Geological and Planetary Sciences.

The Clare Boothe Luce Fund is administered by the Henry Luce Foundation, established in 1936 by Mrs. Luce's husband, Henry R. Luce, the late cofounder and editor-in-chief of *Time* magazine. Under the terms of Mrs. Luce's will, the fund was created "to encourage women to enter, study, graduate, and teach in certain scientific and technological fields in which they are underrepresented." Mrs. Luce established the fund "in recognition that women have already entered the fields of medicine, law, business, and the arts, and in order to encourage more women to enter the field of science."

### *Cadence makes major software gift*

Caltech has received leading-edge electronic design automation (EDA) software valued at over \$6 million from Cadence Design Systems, Inc., of San Jose, California. The technology, which represents the largest software grant to the Institute this year, is being deployed across multiple disciplines on campus, including the divisions of Engineering and Applied Science, and Physics, Mathematics and Astronomy, as well as the computation and neural systems group.

Under the grant, students will be provided with access to a full array of Cadence's advanced design tools and



**Bob Jolls, Cadence's senior vice president for marketing, with President Everhart.**

solutions, including technology focused on integrated circuit (IC) design, printed circuit board and electronic systems design, analog design, and computer-aided engineering.

Cadence Design Systems, Inc. is a leader in the design, development, and marketing of software solutions for the design of integrated circuits and electronic systems. Created to support leading educational institutions with real-world commercial software design applications, the Cadence University Program currently supports over 270 institutions worldwide, with the donated and supported software valued in excess of \$100 million.

### *Gifts by will*

*Trusts and bequests provide welcome support to Caltech's operating and endowed funds.*

There are 270 individuals known to Caltech who have allowed their names to be listed on the Torchbearers' Honor Roll. This is an Honor Roll naming those special people who participate in the Institute's life income program and/or have provided for Caltech in their estate plans. It was created as a means of letting alumni, faculty and friends know how much their gift is appreciated before it actually comes to the Institute.

If you would like more information about wording for bequests to the Institute or need information about participating in a life income plan, please write to: Caltech Office of Gift and Estate Planning, Caltech 105-40, Pasadena, CA 91125.

Or you may call (818) 356-2927.

### *Braun Memorial Fund established*

Caltech has established a memorial fund in honor of John G Braun, member of the Caltech Board of Trustees since 1959, who died in June after a long illness. Contributions may be sent to: Charlene Chindlund, Caltech Office of Memorial Funds, Caltech 105-40, Pasadena, CA 91125.





**Taking time out from attending the Global Forum, graduate students Sakae Suzuki and Mitra Hartmann tour the Big Island, Ilha Grande, off the coast of Rio de Janeiro.**

sphere countries whose industrialization has led to world-wide pollution. The have-nots are countries mostly in the southern hemisphere that want to industrialize and exploit their natural assets, but are being urged by the haves to undertake expensive environmental-protection measures.

Suzuki believes that the big gap that exists between northern and southern countries must be reduced. "The underdeveloped countries need to acquire the technology and knowledge to carefully manage their forests and resources."

Biotechnology, Hartmann says, is an area that clearly shows the division between north and south. "Large transnational companies sometimes exploit the resources of developing nations," she adds. "Frequently these countries receive little or no compensation for their contributions."

Hartmann cited an example from the June 1992 issue of *Science*. "In 1954, two cancer-fighting drugs were extracted from the rosy periwinkle plant, which grows in Madagascar. Millions of dollars were made by a U.S. drug company, but Madagascar did not receive any part of the profit."

But a recent agreement between a U.S. company and Costa Rica may be a model for future agreements. "Merck [a large drug company] has agreed to pay one million dollars to Costa Rica's National Institute of Biodiversity for the right to test plant and animal extracts for use in drugs," says Hartmann. "If a marketable product is found, Merck will own the patent rights, but will pay royalties to Costa Rica."

Sakae and Mitra came back with some ideas of ways that members of the Caltech community could immediately start helping the environment. "People need to change their lifestyles," says Sakae. "Daily lifestyle matters a lot—driving less, reusing things more, and eating less wastefully."

Mitra adds, "People should lobby their local government for safe and clean public transportation. Consumers can support environmentally conscious companies by 'voting' with their dollars. Big institutions have a large amount of inertia, but customers' dollars can encourage companies to find cost-effective ways to follow environmentally sound policies."

Although Suzuki and Hartmann have now returned to their studies (Sakae is researching Van der Waals forces in neutral clusters in atoms, and Mitra is studying issues of sensory-motor control in the cerebellum), both will continue their work with the Environmental Task Force, a student- and staff-run environmental watchdog group at Caltech, in an effort to change local life styles. Sakae and undergraduate Robert Rickenbrode have also agreed to serve on another environmental group—they have been appointed by President Everhart to the newly formed Administrative Committee on the Institute Environment, which will be chaired by James Morgan, the Goldberger Professor of Environmental Engineering Science.

## Report from Rio—Caltech students reflect on their experiences at the Earth Summit

By Betsy Woodford

Last June, the United Nations' Conference on Environment and Development—the "Earth Summit"—focused attention on the environmental future of the earth. In Rio de Janeiro more than 100 world leaders met to discuss governmental actions, and approximately 10,000 environmentalists met in another part of the city, at the Global Forum, to learn about private programs.

Four Caltech students—graduate students Sakae Suzuki and Mitra Hartmann, and seniors Philip Cofield and Robert Rickenbrode—joined the crowds at the Global Forum. They spent 12 days going to talks at 20 nearby auditoriums and attending symposiums in 35 tents, one of which was dedicated to an open forum that featured speakers such as oceanographer Jacques Cousteau, presidential candidate Jerry Brown, former Congress-

woman Bella Abzug, and representatives from the World Bank and Conservation International. The students browsed through the huge exhibit areas (containing 675 booths), where organizations distributed literature, solicited donations, and sold their wares. And they found time to take in the local sights and visit the conference's after-hours programs of music, dance, and theater. The students' expenses were paid by the Caltech Y, the dean of students, the graduate office, and Caltech's Centennial Committee, which sponsored the Visions of a Sustainable World symposium at Caltech in October 1991.

Suzuki and Hartmann, who stayed on campus this summer, recently discussed their impressions of Rio and the Global Forum.

"We saw many parts of Rio during our stay," says Suzuki. "We stayed at

a Catholic retreat center, which was a forty-five-minute bus ride from the forum. The daily drive took us through hills, green lands, banana plantations, and through the *favelas*, the shantytowns, which are not on the regular tourist routes."

The contrast between the dilapidated *favelas* and the slick exhibition booths made a lasting impression on Hartmann. "Families live in shacks the size of single exhibition booths," she said. "The homes were patchworks of wood, plastic, clay, and newspapers. The booths, however, were made of molded plastic and metal, and had access to electricity and clean water. The visual contrast between the slapped-together mosaics of color of the shanties and the glistening white plastic of the booths was striking."

In Rio itself, daily life was altered during the summit. "In order to prevent crime during the conference," says Suzuki, "there were soldiers with rifles at many locations around the city. The local people we talked to said that the city had been cleaned up a lot for the meetings. The children who usually live on the streets were nowhere to be seen. Many locals were unhappy that the summit was being held in Rio. They felt that the residents were getting nothing in return for all the money that was being spent by their government to put on the conference."

This contrast between what are commonly called the "have" versus the "have-not" nations was an issue often repeated during the summit. The haves are the wealthier, northern-hemi-

**More than 600 booths at the Global Forum showcased the activities of environmentalists from around the world.**



Photo by Sakae Suzuki



## Gardner: "This is the world that awaits you"

I wish to offer a few thoughts on today's science and the decisions our society will be making in tomorrow's world. It is a cliché that we live in a technological world. If your education here has done nothing else, I'm sure it has convinced you of the centrality of science and technology to everything we do as a society—our politics, our government, our recreations, our economy, our transportation, our communication, our literature, and our art—the list could go on. Most of you will have many opportunities over the course of your career to prove the truth of that saying yourself. . . .

Three or four centuries ago, science was at the margin of the cultural and intellectual activities of the West. Today, it has moved closer to the center. To practice science right now is to be involved in one of the great defining activities of the age. . . .

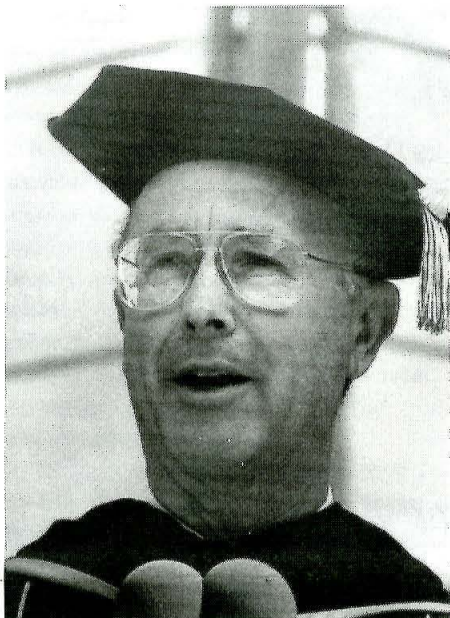
But science and technology are not the only revolutions under way in our world. Everyone knows about the unforeseen and truly stupendous social and political changes that have occurred during the last two to three years. The demolition of the Berlin Wall, the emergence of the Eastern bloc countries, the breakup of the Soviet Union; the demand for human rights around the globe—these breathtaking changes are reported in newspapers and on television every day. Their profound political and social consequences are understood by some and at least vaguely apprehended by most. The point is that we are living in a time of concentric revolutions, each of which sends out ripples that in turn affect all the others. It would be hard to imagine a more demanding, or a more exciting, time to be alive.

This is the world that awaits you as you now prepare to leave these precincts. We would expect every graduate here today to succeed in his or her professional field—physics or engineering, or whatever. But those of you who have enjoyed the privilege of being educated at Caltech and have learned from some of the world's most talented and intellectually gifted individuals, should aim even higher than that.

Si Ramo, one of the nation's most distinguished scientists, and a Caltech PhD, has written eloquently about the role of scientists and science in our society. "In the period ahead," he says, "as in the past, every country will continue to characterize its problems as social-economic-political, not technological. However, the separate facets will intersect, and technology-based influences will be found plunk in the middle of each intersection. . . ."

This means that some of the most

critical and influential individuals during your lifetime will be those who understand science and technology. It will be the task of your generation to see that the defining activity of our age defines us in ways that also expand and honor our humanity. It will be your task to explain and articulate the vast power which science and technology have acquired over our lives and our futures. And it will be in a very special way your task to deal with the increas-



David Gardner

ing penetration of technology into all aspects of our society.

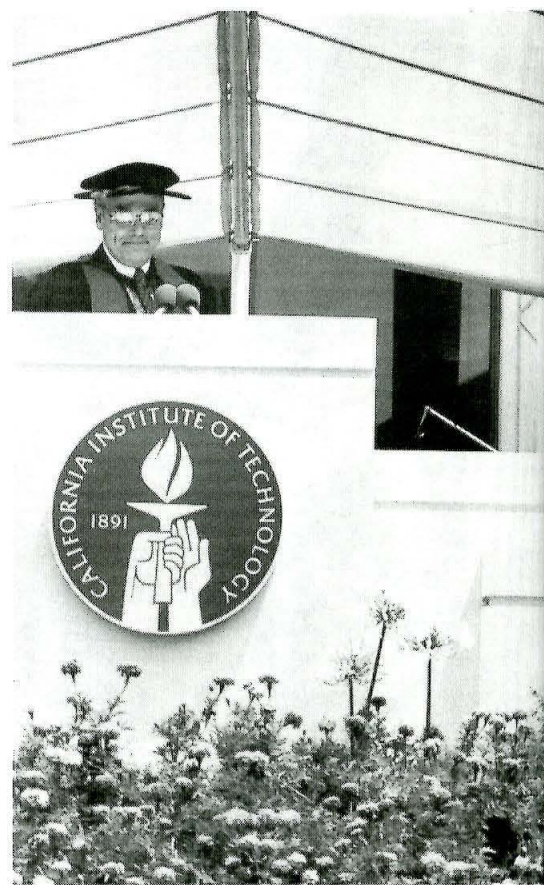
This is an arena in which you will have a splendid opportunity to move beyond the generations that preceded you. If you look around today at the people who are involved in governing our country at just about every level, you will find that, for the most part, they are not scientists and engineers. Whatever the reasons—and I leave the explanations to the future sociologists among you—the less-than-vigorous participation of scientists and engineers in public life is a major problem for our society, in my view, and I hope that you will take seriously the opportunity to help turn this situation around. In particular, there are enormous opportunities for people with scientific backgrounds to lead the effort to make science education in our schools as excellent as it ought to be, and as effective as it ought to be for the sake of our futures. . . .

Society has every reason to expect much of you. In particular, it has the right to expect you to be thoughtful and vocal participants in the national debate about science policy and how our nation can turn much of our science and technology from its war-making capabilities to more direct humane benefit. It would be a great loss for our country if you became passive bystanders, content to understand but unwilling to act. It would be especially ironic in light of the contributions this community of learning has made to our knowledge about the world and how we can make it a better place for all. You need to be a part of the conversation, not just listening on the fringes.

The Greeks had a myth for just

about every human experience and activity. The myth most commonly associated with science is that of Prometheus, the Titan who defied the gods by stealing fire from the heavens and bringing it to Earth for the benefit of humankind. As punishment for his theft, he was chained to a rock and subjected to constant torture. When we think of Prometheus, most of us think of him as a proud and isolated figure, forever bound, forever defiant.

But the story of Prometheus does not end on that cold and lonely rock. Ultimately he joined the company of the immortal gods on Mount Olympus. The Greeks, that most civic-minded of peoples, recognized that Prometheus and what he represented did not belong at the fringes of human society but at



Caltech Trustee Jewel Plummer Cobb and Institute Vice President and Provost Paul Jennings were among the faculty, administrators, and trustees who marched in this year's academic procession.

its center. They raised an altar to him, honoring him as the father of the sciences and the arts.

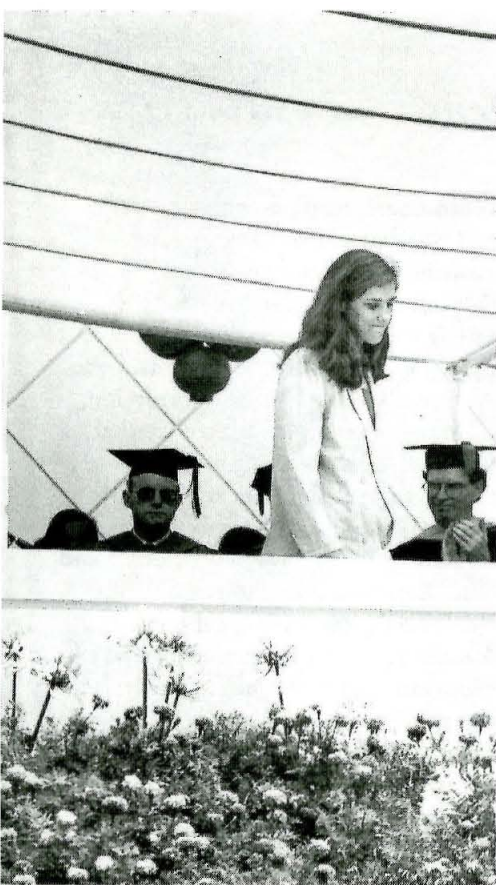
Like Prometheus, scientists in our day must continue bringing down the fire of discovery. But they must also be part of the society they are so dramatically changing. It is that broader vision that I wish to urge on you today as one worthy of your energies and gifted potential.

But a commencement address should not conclude facing the past but looking forward to the future. For that, let me return once again to Si Ramo. In the technology-driven world of the future, he has said, "the worth of people combining wisdom with imagination will rise." We urgently need such people—individuals who can put their scientific and technical knowledge at the service of a noble vision. I hope—and more, I believe—that the Class of 1992 will be well-represented among those future leaders, whose wisdom will give sound direction to the soaring grace of their imagination.

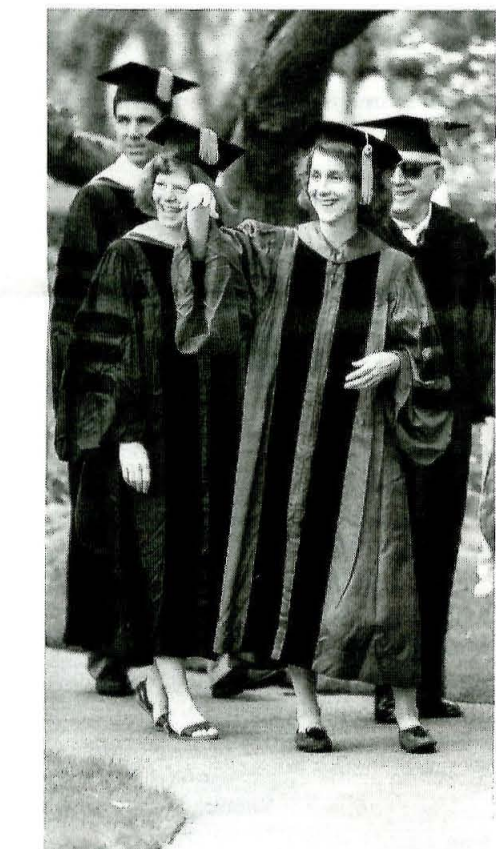
**Sheltered scholars no more, members of the class of 1992 (from left) Eric Stout, Emmeline Naranjo, and Christopher Ho consider how they will respond to that first call from the Annual Fund.**





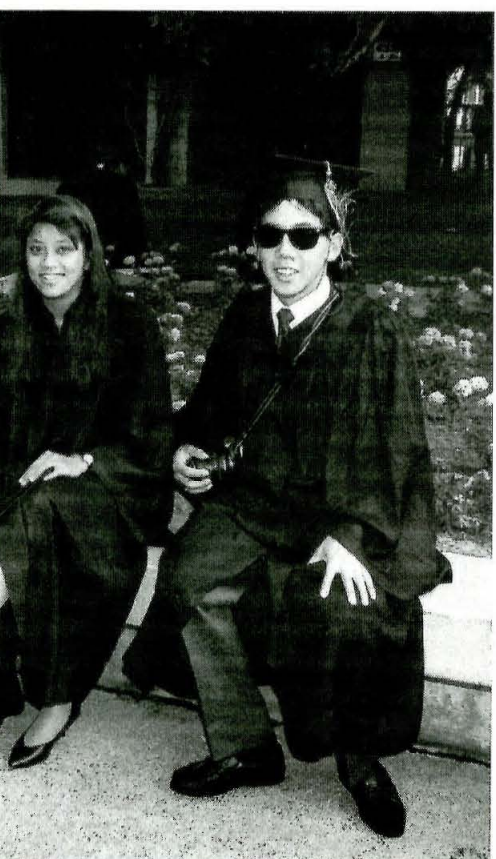


Left, above: Dressed in civilian clothes, junior Almee Smith '93 leaves the platform after accepting the Mabel Beckman Prize from President Everhart, as Master of Student Houses David Wales and Vice President for Student Affairs Gary Lorden applaud her achievement. Below: Kal Zinn, assistant professor of biology; Mary Lidstrom, professor of applied microbiology; Pamela Bjorkman, assistant professor of biology; and Lee Silver, the Keck Foundation Professor for Resource Geology fall into line.



## Brennen: "Concern for humanity must remain the guiding principle"

As I reflect on the last four years and on my memories of the Class of 1992, what will come to my mind first will not be your obvious academic achievements. Rather, what I will remember is your concern for your fellow students and your ability to govern yourselves. Remember to treasure those freedoms and nurture the responsibilities that come with them, for they are perhaps the most enduring legacy which you can take away with you when you graduate tomorrow. If we taught you only of the enormous potential of science and technology, we accomplished nothing if we did not also teach you that the only things which matter in the end are care for one's fellow men and women and the ability to work for the benefit of society. You have often heard me repeat the adage that grades have a half-life of about six months. On the other hand, a little extra time spent cementing a friendship or reaching out to comfort or aid someone in need can generate rewards that will last a lifetime. We hope that you have all been enriched in this way during your time at Caltech. In the same vein, I hope that all of you (if you have not already done so) will set aside a small part of your life to help those who may be physically, intellectually, or psychologically less fortunate than you. I can assure you that should you choose to do so, you yourself will be the greatest beneficiary. Perhaps you will come to understand me when I say that I learned more of lasting value from my mentally handicapped sister Paula than



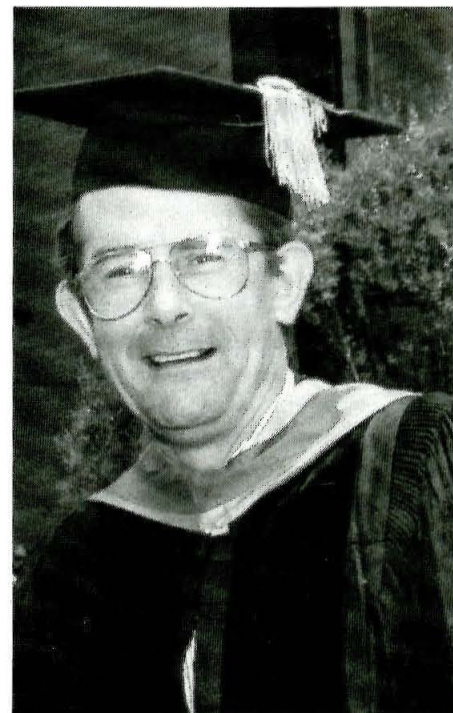
I have from all the Nobel prize winners that I have known.

In your science and engineering careers, it is equally important to remember that concern for humanity must remain the guiding principle. A few years ago I came across a quotation which reflects this sentiment: "Concern for man himself and his fate must always form the chief interest of all technical endeavors. . . in order that the creations of our mind shall be a blessing and not a curse to mankind. Never forget this in the midst of your diagrams and equations." The speaker was Albert Einstein. The occasion was an address in 1931 at the California Institute of Technology.

Concern for man and his fate is of course the agenda of the Earth Summit currently underway in Rio de Janeiro. Of all the technical issues that will face you and challenge you in the future, none are more important than those complex environmental issues currently being discussed in Rio. For the first time, one can sense that there may exist some possibility for the kind of concerted effort that will be necessary if we are to have any hope of achieving a sustainable world. The problems seem almost overwhelming. And, even though much is lacking in our scientific understanding of these problems, most of us would probably agree that the science is the easy part. The difficult part is visualizing how this world could possibly summon the collaborative political effort necessary to find solutions, particularly when there will inevitably be social, economic and political prices to be paid. It is my hope that in some small way we have prepared you for those challenges as well as for the technical ones.

As you all know, I subscribe to the idea that education must be more than a series of classes, more than the accumulation of credits. After eight years of working with our students, I am more firmly convinced than ever that the Caltech undergraduate experience has some very special attributes that are particularly valuable in tackling these complex issues. Among these attributes I would include the discouragement of individual competition and the encouragement of collaboration, because almost all modern technical and scientific endeavors require such teamwork. I would also include the freedom that we give our students in their own self-government. When asked, most Caltech alumni remember the experience of living under the honor system as providing lessons more important than any other single class they took. One of my fears for the future is that the increase in externally imposed regulation and legislation, albeit well-meaningly imposed, and the increase in court-adjudicated liability will cause us to impose sets of rules which will overwhelm the honor system and devalue it.

One of our founding fathers, the acting president in 1907, and the very first Dean of Students, was Arthur



Chris Brennen

Henry Chamberlain, a man who has not received the recognition he deserves. It was during his tenure as Dean that the honor system began to evolve. In a 1907 address to the National Education Association, Chamberlain said, "a well trained engineer must be a man broad in his sympathies and possessing a knowledge of people and of things that shall give him place anywhere and always." Chamberlain's words are as apt today as they were in 1907, although today he would undoubtedly have said man or woman.

My point is that those of you who are graduating with special technical expertise have it within your power to influence not only the material well-being of the people of the world but also their much larger future, indeed the very survival of our species. It seems to me that the confidence that we are all acting in the common interest is an essential prerequisite for a sustainable world. Perhaps—just perhaps—there is now a chance that nations throughout the world will be capable of the kind of collaboration that is necessary. That is the greatest challenge for you, the Class of 1992, and for all the classes which will follow you.

So in closing, let me say that it is my hope for each and every one of you that you will find a career in which it is possible for you to look beyond the known and in doing so to contribute to the welfare of all mankind. Know that when you leave us tomorrow you carry with you our affection and our sincerest wishes for success in whatever you choose to do. We hope you will remember us with affection.

I finish with my traditional blessing to all the classes whom I have been privileged to address on the eve of graduation. The words are from Ireland, the land of my birth:

*May the road rise up to meet you  
May the wind be always at your back  
May the sun shine warm upon your face  
And the rains fall soft upon your fields  
And until we meet again  
May God hold you in the palm of his hand.*



# ALUMNI

## CHAPTER ACTIVITIES

**San Francisco chapter gets its Licks, and then some**

There was supposed to be just one private tour of Lick Observatory for Bay Area alumni, on May 30, but interest in seeing the University of California optical astronomy facility near San Jose proved to be so high that the San Francisco Chapter sponsored a second visit on June 6. Each evening tour attracted about 60 alumni and their guests, and included a viewing of the observatory's main research instrument, the 120-inch reflector telescope, as well as an opportunity to see the skies through a 36-inch refractor telescope. A talk by Lick astronomer Rem Stone highlighted observatory research.

On June 18, chapter members heard Stephen Colley BS '75 speak on "Small High-Tech Firm Flourishing in Global Market." Colley, the founder and chairman of nCUBE, a leading supplier of the world's fastest supercomputer, discussed the importance of small high-tech firms' having a global strategy, and outlined possible avenues that such companies might follow to succeed in the international market.

## Peisner new head of Tri-State chapter

David Peisner BS '74, newly elected president of the Tri-State Chapter, says he's one of only a handful of people in his medical specialty with an engineering background. Peisner majored in electrical engineering at the Institute, and went on to medical school at Wayne State University. Today, he's assistant professor of obstetrics and gynecology at Columbia University.

"Medicine is becoming more and more technical," he says. "For example, ultrasound is used extensively in my field. I've found my Caltech background increasingly useful."

As an undergraduate, Peisner found plenty of ways to get involved on campus. He was manager of the *Big T*, *little t*, and *California Tech*—all at once—and treasurer of ASCIT. He also joined the Israeli folk-dancing group, thus sparking an interest that continues. He has helped to run several Israeli folk-dancing camps, and for three years was technical director of the Israeli Folk Dance Festival in New York City. Of course, he finds ample opportunity to join in the dancing himself.

Peisner, single, likes to camp, and jogs regularly. Last year, he ran for the first time in the New York Marathon.

The Tri-State chapter encompasses the New York metropolitan area, Con-

necticut, and New Jersey, where about 650 alumni live. The group has been actively involved with Undergraduate Admissions Support, a program of the Alumni Association and the Admissions Office in which alumni meet with potential Caltech students at the high-school level. It has also hosted programs for students admitted to Caltech, and their parents, including one recent event when two undergraduates showed a video on campus life and shared their experiences. Peisner credits his predecessor, Andrew Weigel BS '73, for his role in reactivating the chapter and initiating program directions that are being followed today.

Keeping alumni in touch with the Institute and with one another, and helping them become involved in support for Caltech's programs, is a key focus of an alumni chapter, Peisner believes. His own involvement took on a new dimension a few months ago, when he joined The Caltech Associates and returned to the campus for the new-member dinner.

"Caltech was an incredible part of my life. I received a superb education there, and now I want to contribute," he says. "Finding ways to help up to 650 alumni make a stronger connection to the Institute and its programs is certainly a significant way to do that."

## ALUMNI ACTIVITIES

**August 8, Mt. Wilson Observatory Tour**, Robert Jastrow, Director, Mt. Wilson Institute.

**August 15-23, Ashland/Crater Lake Travel/Study Program**, with Jenijoy La Belle, professor of literature, and Dr. Charles Bacon, U. S. Geological Survey (USGS).

**August 29, Merle Norman "San Sylmar" Classic Beauty Collection Tour**. Two-hour tour of fine functional art owned by J. B. Nethercutt Ex '35.

**October 17, Orange County Chapter Geology Field Trip**, with Robert P. Sharp '34, Robert P. Sharp Professor of Geology, Emeritus. This is a repeat, by popular demand, of a trip originally given in May. Contact Arlana Bostrom, at 818/356-8363.

**October 24-31, Hawaii Travel/Study Program**, with Robert Sharp, Sharp Professor of Geology, Emeritus, and Dan Dzuris PhD '77, USGS Cascades Volcano Observatory.

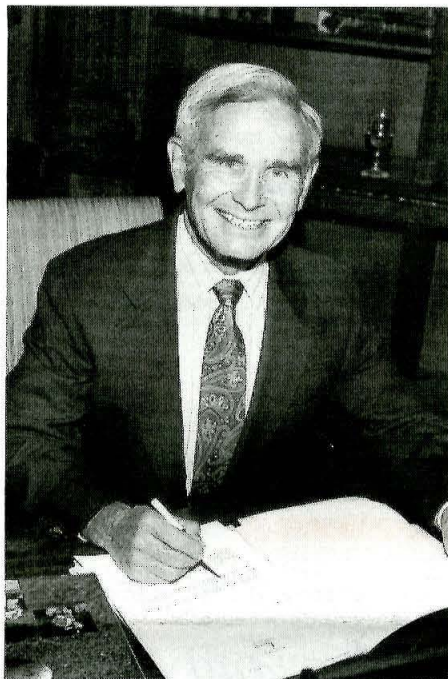
**November 7, San Gabriel Mountains Geology Trip**, with Bruce Carter BS '68, PhD '80, Associate Professor of Geology, Pasadena City College.

For information on the above, unless otherwise indicated, contact Helen Shafran at 818/356-8364.

## From the alumni president

by Le Val Lund '47

As the new President of the Caltech Alumni Association, I should first like to thank my predecessor, Gary Stupian '61, for his leadership over the past year. Gary was instrumental in initiating the alumni computer network now available to Association members, which currently handles over 800 accounts, and in creating a Committee on Long-range Planning, headed by Ted Combs '27 and John Fee '51, to assess current Association



Le Val Lund

programs and make recommendations for the future. Each of these developments has the potential to change the scope of the Association over the years. Congratulations, Gary, for your superb direction in 1991-92.

I will from time to time comment on the activities of the various committees of the Association. While policy decisions for the Association are decided by the Board of Directors, and the daily activities are carried out by the small and efficient staff at the Alumni House under the direction of Judy Amis, Executive Director, most of the activities are organized by these

committees, made up of both board and non-board members. I urge any Association member interested in becoming more involved to read the article on committees that appears on page 9 of this issue and to contact the Alumni Office for more information.

Many of you may not realize that an Office of Governmental Relations and Community Affairs has been formed by the Institute in response to Caltech's increasing interaction with elected and administrative government officials at the federal, state, and local levels. Recently, alumni in the San Diego area cooperated with this office in supporting the retention of the existing San Diego street-lighting system, which mitigates the effects of light pollution on astronomical observations at Caltech's Palomar Observatory. The fact that a month's-long effort by several San Diego city councilmen to change the lighting policy proved unsuccessful was in no small part a result of alumni efforts in the city, according to Government Relations and Community Affairs Director Hall Daily. A Caltech legislative communications network is currently being established. Hall encourages all alumni who are interested in finding out more about the network's activities and objectives to contact him directly at (818) 356-6256 or by Email, where he can be reached at hall@pcmail.caltech.edu.

Finally, I wish to remind all alumni that the Caltech Alumni Association exists for their benefit, whether their Institute degree is undergraduate or graduate. We also encourage all former students who left the Institute in good standing prior to graduation to consider membership. Our programs are many and varied, and participation in the committees and on the board affords an opportunity to shape the direction of the Association.

Your comments about the Association and its activities are welcome and can be sent to me, Le Val Lund, at mail Code 1-97, Pasadena, CA 91125, (818) 356-6592. Or, you can reach me via E-mail at: judyamis@pcmail.caltech.edu.

**From left, Dave Arnold '43, Vic Veysey '36, and Chuck Davis '45 listen attentively as Big Bear Solar Observatory staff member John Varsik, explains the workings of the facility's telescope during a June 10 day-trip that brought about 25 alumni together under the white dome overlooking Big Bear Lake.**







Participation in one of the Alumni Association's eight committees offers tangible as well as intangible benefits. From left, Membership Committee members Bill Whitney, Ed Lambert, Frank Dryden, and Mike Boughton enjoy appetizers at the Athenaeum prior to a committee meeting.

## Alumni committees outline goals

The Caltech Alumni Association utilizes various committees throughout the year to research and organize projects and programs for alumni, faculty, and students. The Association encourages members who are not on the Board of Directors to serve on these committees. The committee chairs and statements of goals for 1992-1993 are listed below. If you are interested in serving, please call the Alumni Office, 818/356-6592, for more information.

Chapter Affairs, Trudy Bergen, chair:

- Extend chapter organizations to further interested centers of alumni across the country.
- Extend and strengthen cooperative programs with MIT Alumni Association.
- Explore and support opportunities for interested chapters to become involved with educational outreach programs.
- Provide chapters with assistance in leadership training, program planning, and arranging speakers.
- Strengthen ties between chapters and Undergraduate Admissions Support activities.

Electronic Communications, Gary Stupian, chair:

- Insure that the alumni computer server is used to best advantage to serve the interests and needs of alumni and the Alumni Association.
- Determine hardware/software needs and additional services to be provided.
- Explore more economical user access.
- Monitor the improvement and maintenance of user help files and other system functions.

Membership, Frank Dryden, chair:

- Increase alumni membership.
- Analyze membership data when new data base and programs are available.
- Develop strategy for reaching those segments of alumni who are not currently represented in the Association.

Programs, Warren Goda, chair:

- Continue to provide alumni with educational and enjoyable events.
- Increase young alumni participation with short and inexpensive events.
- Develop ideas for programs with broader emphasis beyond geology.

- Continue development of contacts within the Caltech community for event ideas and/or participation as program leaders.

Publications, Don Wilkinson, chair:

- Maintain oversight of the publication of *Caltech News* and *Engineering & Science* as the publisher of record.
- Provide volunteer help to the editor and staff of these publications in obtaining material suitable for publication and in identifying possible avenues of financial support through advertising.
- Plan and implement publication projects that are consistent with the purpose, objectives, and non-profit status of the Association.
- Monitor and support publication and distribution of the 1992 Alumni Directory; recording such information as is useful for publishing future directories.

Student/Faculty/Alumni Relations, David Ritchie, chair:

- Provide support and activities for both undergraduate and graduate students.
- Enhance the alumni, student, and faculty relationships so that students and faculty become more aware of the alumni and the Alumni Association.
- Expand alumni/student house programs.
- Expand alumni/graduate student activities.

Undergraduate Admissions Support, Ed Lambert, chair:

- Build and maintain an organization of qualified alumni volunteers to help the Admissions Office meet its recruiting objectives.
- Maintain and strengthen ties with the Director of Admissions.

**Gary Stupian, outgoing Alumni Association president, presents the Association's Donald S. Clark Memorial Awards for 1992 to Juniors Amitabh Mehra (left) and Edward Etzkorn (right) in recognition of service to the campus community and good academic performance. The \$1,000 awards commemorate the late Caltech professor of engineering, who served for many years as Association secretary.**

## DuBridge, Noda named honorary alumni

Arrola DuBridge, wife of Caltech president Emeritus Lee DuBridge, and Jeanne Noda, Caltech's assistant vice president for student affairs, were named honorary alumni by the Caltech Alumni Association at a dinner following the association's annual meeting on June 18. The award is given annually to individuals who have made significant contributions to the Alumni Association itself or to its broader purposes.

Arrola DuBridge has been active in the Caltech Associates and in the Caltech Women's Club. Recently the Price Charities in La Jolla presented a gift of \$250,000 to Caltech to endow the Arrola DuBridge Scholarship Fund, which will provide Caltech undergraduate women with financial support. A talented violinist, DuBridge is a graduate of Iowa's Cornell College, where she and Lee DuBridge became friends as students. The DuBridges were married in 1974.

Jeanne Noda joined Caltech in 1985 as associate dean of students, becoming assistant vice president for student affairs in 1989. In this role, she has been responsible for restructuring the student counseling services, interna-

tional student services, undergraduate admissions, and secondary-school outreach programs to provide more effective services for the students, and for leading a \$2 million rehabilitation of undergraduate dormitories.

Noda holds an MBA from Washington University, an MSW from the University of Illinois at Urbana-Champaign, and a BS from St. Louis University.



**Undeterred by a summer downpour, Nancy Stuart (wife of Jay Stuart '46), and Alma and Heinz Pfeiffer '49, completed Yellowstone's "Fossil Tree Climb," after an hour-long hike punctuated by thunder, lightning, and rain squalls last June. The visit to the Fossil Tree summit, and numerous other treks, trail hikes, jaunts, and excursions, were all part of the Association's seven-day travel/study trip to the national park, led by geologists Bob Sharp and Lee Silver, and attended by a standing-room-only crowd of 41 alumni, guests, and friends.**





## Seminar Day

Continued from page 3

mercially significant amounts of helium 3 on Earth," he said, "a team of physicists at the University of Wisconsin pointed out in 1985 that helium 3 can be extracted from the soils of the moon, [which contain] enough helium 3 to satisfy terrestrial requirements well beyond the foreseeable future."

Nor would applications be limited to Earth. "Fusion power plants on Earth, fueled by helium 3, have the potential to produce essentially unlimited, environmentally acceptable electrical power," Schmitt explained. "By-products from the production of helium 3 on the moon would provide the hydrogen, oxygen, water, and other consumable materials critical to sustaining the early settlers of Mars."

"This Millennium Project, referred to here as the Chronicles Plan after Ray Bradbury's classic tales, combines space ventures to the earth, moon, and Mars into a single great human mission—a mission to protect the atmosphere, waters, and rain forests of Earth, a mission to settle the moon and utilize lunar resources for the benefit of all, and a mission to establish human civilization and freedom permanently on Mars."

"With the combination of vision and lunar resources," Schmitt said, "humanity stands on the threshold of the next great adventure, the settlement of Mars. Along with the purely human desire to 'be there' when great events unfold, education, technology, science, civilization, and evolution all will participate in this adventure."

"It seems likely," Schmitt said, "that the establishment of commercial and profitable mining operations on the moon could be completed by 2015. This time frame matches the Wisconsin team's estimates of the time required to develop and build the first commercial deuterium/helium 3 reactor on Earth."

To oversee and implement such a mission, he called for the establishment of two international organizations, INTERLUNE and INTERMARS.

Where would the highly trained and skilled population needed to bring such a scenario to pass come from? It would emerge, Schmitt asserted, as the excitement and appeal of the Chronicles Plan took hold in the imaginations and minds of young people the world over.

"Potentially, the most important benefit resulting from commitment to the Chronicles Plan would be the stimulation and motivation provided to young people and their education," he said. "Space is exciting to the young. This has been proved in school after school, country after country. . . . With improved education, all the challenges of empowerment, stewardship, and settlement can be successfully addressed by future generations."

## PERSONALS

1946

JULIAN D. COLE, MS, ENG '46, PhD '49, the Margaret A. Darrin Distinguished Professor of Applied Mathematics at Rensselaer Polytechnic Institute (RPI) in Troy, New York, has been elected to the Board of Trustees of the Society for Industrial and Applied Mathematics (SIAM). In 1984 he received SIAM's Theodore von Kármán Prize for a notable application of mathematics to mechanics or the engineering sciences. In 1993 he will receive the American Institute of Aerospace and Aerospace Fluid Dynamics Award. Other honors include a Guggenheim Fellowship in 1963, and membership in both the National Academy of Sciences and the National Academy of Engineering. Cole joined Caltech's faculty in 1949, becoming professor of aeronautics in 1959, and professor of applied mathematics in 1967. From 1968 to 1982 he held a joint appointment at UCLA as professor of mathematics and professor of engineering. He undertook his current position at RPI in 1982. He is a member of the American Academy of Arts and Sciences, the American Institute of Aeronautics and Astronautics, and the American Physical Society.

1961

JOHN E. HEARST, PhD, professor of chemistry at the University of California, Berkeley, has been awarded an honorary doctoral degree by Lehigh University. He is an internationally recognized molecular bioscientist noted for his important discoveries about the biochemistry of genetics. His discoveries include a new and potent drug for treating refractory psoriasis, which Hoffman-LaRoche Pharmaceuticals is developing. In addition, he formed his own company, HRI Research, Inc., to make that drug and similar analogs available to the scientific community for research purposes. Besides serving as director of HRI Research, Inc., and Steritech, Inc., Hearst is also a senior staff scientist at the Lawrence Berkeley Laboratory.

1968

ERIC WICKSTROM writes, "Lois and I have moved to Philadelphia, where I am now a professor of pharmacology at Thomas Jefferson University. My group has moved with me, and we are continuing our work on DNA drugs. We bought a lovely old row house near the art museum."

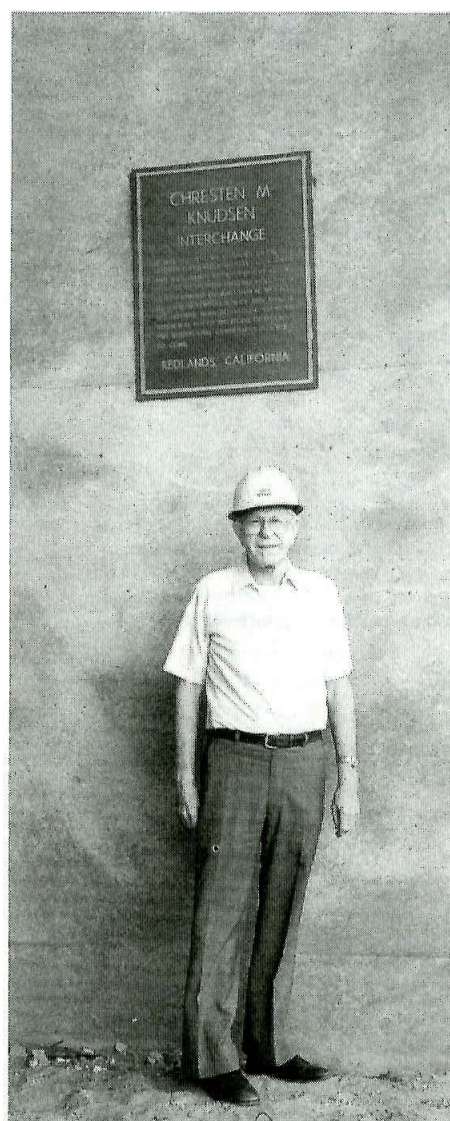
1969

JAMES P. KEENER, MS, PhD '72, professor of mathematics at the University of Utah, has been reappointed editor-in-chief of the *SIAM Journal on Applied Mathematics* by its publisher, the Society for Industrial and Applied Mathematics. Keener has received several grants from the National Science Foundation to study erratic patterns in cardiac arrhythmia, in an attempt to determine what causes heart attacks to be fatal. He is also author of *Principles of Applied Mathematics* (Addison-Wesley 1988). He is a member of the Society for Mathematical Biology.

1973

TONY CHAN, MS '73, professor of mathematics at the University of California, Los Angeles, has been elected to a three-year term as a member-at-large of the Council of the Society for Industrial and Applied Mathematics (SIAM). He is also an editor of two SIAM journals, the *SIAM Review* and the *SIAM Journal on Scientific and Statistical Computing*. After graduating from Caltech, he received a PhD in computer science from Stanford University, and served as a member of Yale University's Department of Computer Science and as a research fellow at Caltech. He joined the UCLA faculty in 1986. He is a member of the American Mathematical Society.

SHARON LONG, professor of biological sciences at Stanford and a member of the first class



**Dedicated in January, the Chresten M. Knudsen I-10/30 Interchange shown, above, under construction in Redlands, California, bears the name of Caltech alumnus and civil engineer Chresten M. Knudsen, BS '47, who as a Redlands city councilman, vice mayor (1968-1980), and president of the San Bernardino Association of Governments was instrumental in getting the interchange built. A recent policy change by the state's Department of Transportation makes it likely that Knudsen (shown here at the structure's base beneath a plaque that commemorates his role) will be the last living person to have part of California's freeway system named in his honor. Current plans call for the Knudsen Interchange to serve as the eastern end of an eventual hookup between the state's Highway 30 and the 210 Freeway from Pasadena—an appropriate link, given Knudsen's Caltech connection.**

of (four) undergraduate women to graduate from Caltech, received a \$260,000 MacArthur Foundation "genius" Award in June. Long was cited by the foundation for her pioneering research into the "relationship between bacteria and legumes [which] has implications for new agricultural genetic technologies." Long's work focuses on using genetic engineering techniques to create highly specialized microbes that may one day have the ability to increase agricultural crop yields by enhancing both the crops' nutritional intake and their resistance to disease.

1974

JESSICA TUCHMAN MATHEWS, PhD, vice president of the World Resources Institute, in Washington, D.C., has been elected an honorary member of the Iota chapter of Phi Beta Kappa at Radcliffe College. She is a columnist for *The Washington Post*, a Distinguished Fellow at the Aspen Institute, and a member of the Advisory Committee of the Institute of International Economics, and of the Environmental Protection Agency's Trade and Environment Committee of the National Advisory Council for Environmental Policy and Technology. She served from 1977 to 1979 as director of the Office of Global Issues for the National Security Council in the White House, and from 1982 to 1988 as research director of the World Resources Institute.

1983

BJÖRN MATTHIAS, currently a postdoc at the physics institute of the University of Heidelberg, received his doctorate from Yale in May 1991. He and his wife, Susanne, had a son, Philip, on October 20 of last year, and their daughter, Jessica, was three years old in May. His research involves studying the muonium atom, using microwave and laser spectroscopy. "We are also looking for physics beyond the standard model by searching for spontaneous muonium to antimuonium conversion in an experiment at the Paul-Scherrer-Institut (PSI) in Switzerland," he writes. "The previous experiment searching for this 'forbidden' process was also the topic of my dissertation at Yale. The experiment was carried out at the Los Alamos Meson Physics Facility (LAMPF) and my thesis managed to earn the Louis Rosen Prize, 1991, for the year's outstanding PhD dissertation on research carried out at LAMPF."

1922

BEN BENIOFF, of Laguna Hills, California, on June 21; he was 91. After graduating from Caltech, he joined a truss manufacturing firm in Los Angeles as a research engineer. He became a recognized authority in the structural properties of wood, specializing in the design of large, earthquake-resistant buildings, and over the years he was involved in the engineering design of many film and television sound stages in southern California. During World War II, Benioff served in the U.S. Army Corps of Engineers, in the China-Burma-India Theater. He retired with the rank of colonel. At the end of the war he was the first American to fly into Beijing, China, where he spent several months working as a consultant on highway construction and maintenance for the Chinese government. In 1956, he and the late Harold P. King formed King, Benioff and Associates, a structural-engineering firm headquartered in Sherman Oaks, California. With the addition of Hans G. Steinmann and King's son, Jack, as partners, the firm in 1966 became King, Benioff, Steinmann and King, and relocated to Van Nuys, California. Benioff retired in 1972, and Steinmann has continued to run the firm. For years, Benioff was involved in a variety of professional engineering organizations, including the American Consulting Engineering Council, the Consulting Engineers Association of California, the Construction Specifications Institute, the Society of American Military Engineers, and the American Society of Testing and Materials. He was a long-time member of the Structural Engineers Association of California and was a past president of the Structural Engineers Association of Southern California. He is survived by sons Neal and Donald; a daughter, Barbara Jones; and four grandchildren.

## OBITUARIES



1926

GEORGE R. JAFFRAY, of Los Angeles, California, on April 29, of a stroke. After graduating from Caltech, Jaffray earned an MS in mathematics from the University of Southern California. He taught chemistry in the Los Angeles city schools and was a professor of mathematics at Los Angeles Valley College, where he was later involved in computer-assisted instruction. He did computer work for the Los Angeles County Community College Overseas Program for the armed forces. His most recent project was the development of vocational testing and counseling for college students. He is survived by his wife of 60 years, Karine; his sons, George Robert, Jr., and John; and a grandson, Alan.

1933

ALEXANDER F. LIBBY, MS '34, on April 7, 1991. He is survived by his wife.

1935

JAMES N. SMITH, of Mariposa, California, on April 11, of a stroke. He was very active in his later years, playing tennis until he was 75 and hiking until he was 76. He is survived by his wife, Cornelia, and two sons.

1936

DAVID M. WHIPP, of Claremont, California, on May 10, of a heart attack. He had spent 29 years of commissioned service in the U.S. Environmental Science Services Administration, Coast and Geodetic Survey, retiring with the rank of captain. He entered service in the Survey as a deck officer in 1939 and was commissioned in 1940. He served on Survey ships for 11 years, five of them as ship electronics officer. He was assigned to duty with the U.S. Army for four years during World War II, in the European and Mediterranean Theater. He was the highest decorated officer of the Coast and Geodetic Survey, receiving the Silver Star, the Croix de Guerre, and the Legion of Merit. From 1955 through 1956, he was the assistant chief of the Coast and Geodetic Survey's division of geophysics and administered the Survey's participation in the International Geophysical Year. After serving for several years as executive officer on several ships working the U.S. continental shelves in various oceanographic research projects, he was in 1963 assigned to the commanding general, Fort Sill, Oklahoma, as the Survey's liaison officer; there he acted as advisor to the Artillery School, the Artillery Board, and the Combat Development Command in the fields of geodesy and geophysics. In 1965, he was appointed Pacific Field Director, Coast and Geodetic Survey, and Director of the International Tsunami Information Center, Honolulu, Hawaii, where he served as tsunami advisor to the governor of Hawaii and was responsible for the Survey's field activities in the southwest Pacific Ocean and Hawaii, and for the operation of the Tsunami Warning System in the Pacific. He is survived by his wife, Thelma; two daughters; four grandchildren; four step-grandchildren; and a sister, Neal Hoit.

1937

EUGENE H. QUINN, MS, of Tiburon, California, on June 29, 1989, of cancer. He is survived by his daughter, Sheila Quinn McGrath.

1938

GEORGE B. HOLMES, JR., of Pasadena, California, on April 15. He is survived by his wife, Jane. A memorial fund has been established at Caltech. Those wishing to contribute should write to: The George B. Holmes Memorial Fund, Caltech, 1201 East California Boulevard, 105-40, Pasadena CA 91125.

1939

MARCUS A. HALL, of Newport Beach, California, on August 11, 1991. He is survived by his wife.

CHAO-WANG HSUEH, MS, PhD '44, of Reading, Ohio, on January 28, 1990; he was 80. He attended Caltech with U.S. government help, but was unable to return to China because of the war. He had retired in 1977. He is survived by his wife, Li, and two sons and one daughter. Mrs. Hsueh writes, "Dr. Hsueh is remembered as a loving husband and father, honest and humble."

CHARLES MACKINTOSH, MS, on May 8, of cancer; he was 80. He was a civil and structural engineer and a humanitarian. For a time a teaching fellow and lecturer at Caltech, he also worked for 20th Century Fox, the U.S. Army Corps of Engineers, and the Arch-Rib Engineering Company, before starting Mackintosh & Mackintosh, Inc., with his brother in 1941. He was well known for his expert testimony in land-subsidence cases, as well as for thousands of home inspections in the Los Angeles and Beverly Hills area. He also held over 50 patents for his inventions, which included the first stacking chair, "hinged" pool, and foldable grandstand, and he originated a bridge design that was used in constructing over 100 bridges along the Pan American Highway. His office designed most of the grandstands in southern California, including those for 90 percent of the specialty events, such as the Rose Parade, the Long Beach Grand Prix, and other sporting events. In addition, he engineered the foldable grandstands for many stadiums around the country, including Anaheim Stadium, Candlestick Park, the Metrodome, the Kingdome, the Los Angeles Coliseum, the Inglewood Forum, and many others. He was president of Mackintosh & Mackintosh and of Rollway Grandstand Corporation, which is presently converting the Miami Dolphin's stadium for baseball. He was also a member of a number of organizations, including the Structural Engineers Association of California, the American Society of Civil Engineers, and the Earthquake Engineering Research Institute, among many others. He is survived by his wife, Marjorie; three daughters; nine grandchildren; and one great-grandchild, with another on the way.

1940

SHIH C. TAO, MS, of Hayward, California, on April 18, of colon cancer; he was 86. He was the father of eight children, the grandfather of fourteen, and the great-grandfather of two.

1942

ADRIAN MAYER, of Rancho Palos Verdes, California, on April 17. He had been a practicing physician for 42 years. He is survived by his wife, Betty; his son, Steven; and his daughters, Judith and Jo.

1943

CHARLES P. STRICKLAND, JR., of South Pasadena, California, on May 9, of cancer. After graduating from Caltech he received officer training at the U.S. Naval Academy, then served on the aircraft carrier USS *Cabot* for fourteen months in the Pacific Theater. After the war, he again attended the Naval Academy. His civilian career was in sales and marketing for industrial refrigeration companies, and he was responsible for the design and implementation of many of the refrigeration systems in packing houses in Ventura County. He was vice president for sales when he retired from Commercial Refrigeration, a West Coast industrial refrigeration firm, in 1987. After his retirement, Strickland managed the family citrus and avocado ranch in Santa Paula, California. He was a life member of the southern California chapter of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), was chairman of the ASHRAE national convention and exhibitor's show in Los Angeles in 1973, and served as the chapter's president in 1974. He was also a member of the Refrigerating Engi-

neers and Technicians Association. He is survived by his companion of 24 years, Gayle Striffler; his son, Fredrick; his daughters, Anita S. Nelson and Charlene S. Bailey; and his sister, Mary Fuller.

1944

J. DOYLE GRAY, of Stanford, California, on February 6, 1991. He is survived by his wife and his son, J. Doyle Gray, Jr.

1946

THOMAS L. FULLER, of Austin, Texas, on February 8, of a heart attack. After graduating from Caltech, he served briefly in the U.S. Navy. He spent most of his professional career in San Francisco. He was Engineer of Bridges for the Southern Pacific Railroad when he retired after 33 years with the company. He was a past president of the American Railway Bridge and Building Association and was a former director of the American Railway Engineering Association. He is survived by his wife, Nan; a son; two daughters; and four grandchildren.

FERN W. MITCHELL, MS, PhD '48, on April 21, 1991. He is survived by his wife, Esther.

1950

JAMES L. CASS, MS '53, of Northridge, California, on October 17, 1991. He is survived by his wife.

1953

THOMAS F. EMERY, of Logan, Utah, on April 15, of a heart attack while playing tennis; he was 60. He earned a PhD in biochemistry in 1960 from the University of California, Berkeley, following which he did laboratory research in Marseilles, France. He held a faculty position at Yale from 1961 to 1970, then accepted a position at Utah State University. He was internationally known for his work in the biochemistry of iron, and was the author of *Iron and Your Health: Facts and Fallacies*, which was published in 1991. He was famous for his innovative classroom techniques and was the recipient of many awards, including the Gibbs Award for Outstanding Teaching at Yale in 1969; the Robbins Award for Outstanding Teacher in the USU College of Science, 1978; Faculty Honor Lecturer in Science in 1981; and, in 1986, the Wynne Thorne Research Award, the highest research award at Utah State University. Emery was a passionate tennis player—winning Logan City singles and doubles championships a number of times—and mountain climber, and an accomplished amateur astronomer. Other interests included chess, flying, computer programming, photography, collecting fine wines, and gardening. He is survived by his wife, Liliane; their daughter, Danielle; and his brother, Ralph.

1955

WILLARD VAN TUYL RUSCH, MS, PhD '59, of Irvine, California, on May 27, in a drowning accident. He had been a professor in electromagnetism at the University of Southern California since 1960, and he was an expert in the field of reflector antennas, which are used for satellite communications. He was the recipient of several awards for teaching excellence; was the coauthor of the classic 1970 textbook *Analysis of Reflector Antennas*, which is still in use; and had several patents. He was also director of USC's Engineering Honors Program for the past 15 years. In addition, he participated actively in the Hospice of Pasadena Program, where he had been a volunteer since 1983, spending 10 to 15 hours a week giving emotional support and practical assistance to terminally ill patients and their families. He is survived by his wife, Joann; four children, Lenny, Marcy, Tuyl, and Garrett; two grandchildren, Katie and Casey; his brother, Ronald; his sister, Cynthia Lathrop; and his parents, Hugo and Cynthia.

1956

DONALD C. BROOKS, of Los Osos, California, on July 9. He had retired seven years ago from his position as director of planning for the Los Angeles Metropolitan Water District, where he had worked for 33 years, and he was the owner of one of the largest science-fiction collections in the world. He is survived by three daughters, Anthea, Laurie, and Leigh, and by a brother, Robert.

1964

HERBERT H. CHEN, of Irvine, California, on November 7, 1987. He is survived by his wife and his daughter, Christine.

1966

WILLIAM G. BOUNDS, MS, of Morgan Hill, California, on March 31, after a long illness. He received an MBA from Santa Clara University in 1974, and for the past ten years he had been in charge of program managers at Landis and Gyr, in San Jose, California. He is survived by his wife, Camille; his parents, Dr. and Mrs. George Ewart; and his brother, J. Robert Bounds.

1975

JOHN A. DENTINGER, JR., MS, of Los Angeles, on March 19, of complications from AIDS; he was 39. He taught physics at the University of Southern California from 1976 to 1980 and was a scientific consultant for the Rocketdyne Division of Rockwell International Corporation from 1981 to 1986. In 1982, he began a new career as a writer, concentrating on political opinion articles. His articles appeared regularly in *Playboy*, *The Wall Street Journal*, the *Chicago Tribune*, the *Los Angeles Times*, and other major publications. He was awarded the Mencken Award, sponsored by the Free Press Association, for the best editorial/opinion piece in 1987. At the time of his death, he was writing a book for publication by a major national publisher. He is survived by his companion of eight years, Gary S. Meade; his parents, John A., Sr., and Mildred; a brother, David; and a sister, Andrea Wagner.

## John G Braun

Trustee John G Braun died on June 22, 1992, after a lengthy illness. He had served as vice chairman of Caltech's Board of Trustees, and over the years was chairman or a member of a number of Board committees. A Caltech trustee since 1959, and a Life Trustee since 1985, Braun was part of a family tradition of service to Caltech. His father, Carl F Braun, became a trustee in 1954, and his daughter, Pamela Braun Pesenti, has been a trustee since 1985.

Braun family gifts to Caltech—through the Braun Foundation and the Carl F Braun Trust—include the Braun Laboratories for cell biology and chemistry, the Carl F Braun Professorship of Engineering, the Marvin L. Goldberger Professorship, Braun House, the soon-to-be-completed Braun Athletic Center, and the current athletic center, plus the swimming pool, women's locker room, and weight room.

Braun is survived by his wife, Ruth; brothers C Allen and Henry A Braun; daughters Beverly Braun Marsh and Pamela Braun Pesenti; and four grandchildren.



# Caltech*News*

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Pasadena, California 91125

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PERMIT NO. 583

California  
Institute of  
Technology

# Caltech*News*

Volume 26, No. 4  
August 1992



Issued six times a year (Feb., April, June, Aug., Oct., and Dec.) and published by the California Institute of Technology and the Alumni Association, 1201 East California Blvd., Pasadena, California 91125. Third class postage paid at Pasadena, California. Postmaster: Send address changes to: *Caltech News* Caltech 1-71 Pasadena, CA 91125.

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