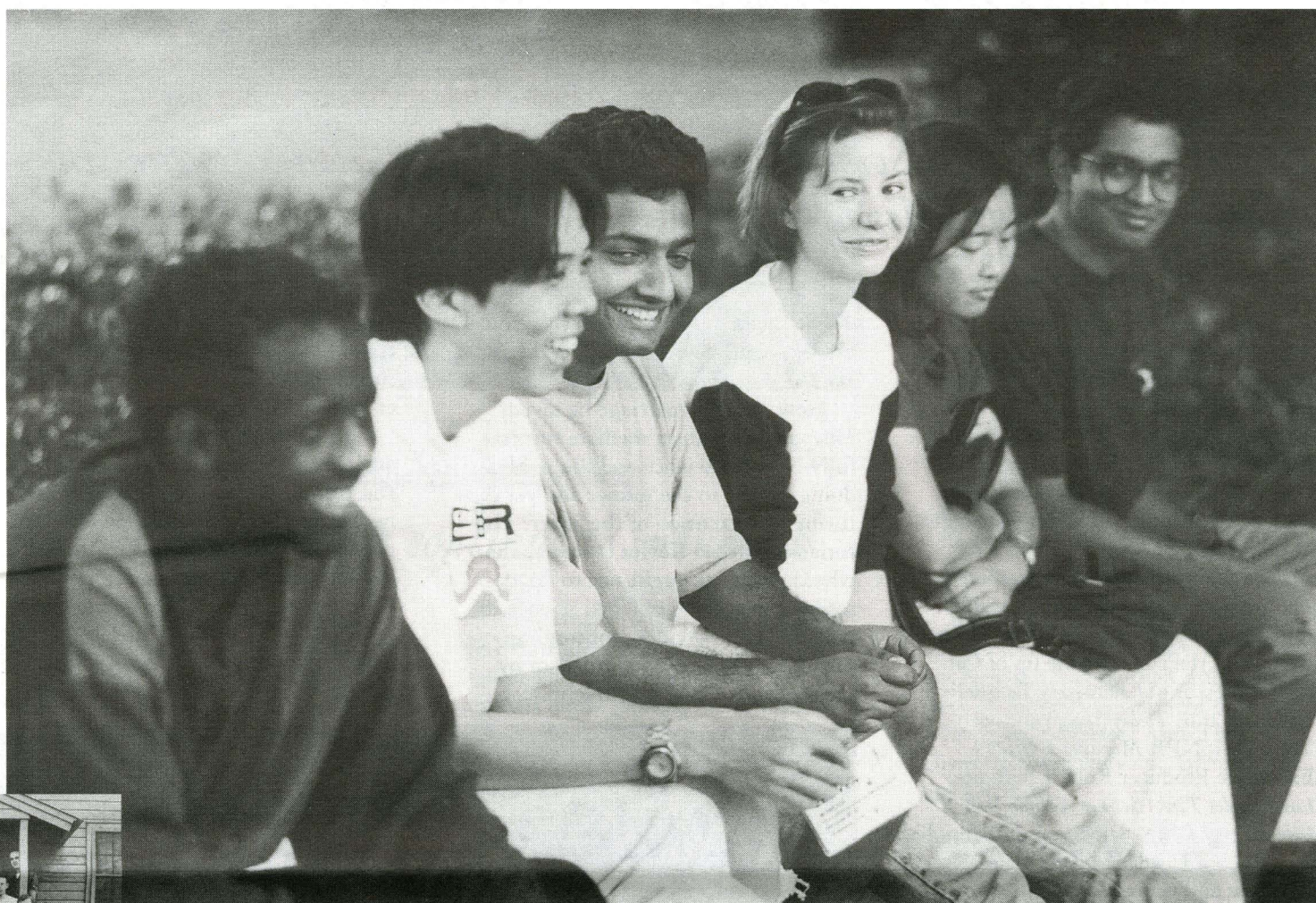
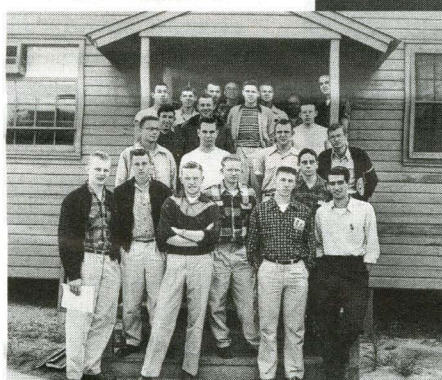


Caltech *News*

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A lot has changed since the 1950s, but as schools become more aggressive in recruiting top underrepresented minorities, Caltech considers ways to stay in the game.



Toward a more diverse campus

By Hillary Bhaskaran

In the fall of 1995, the number of underrepresented minorities entering Caltech as undergraduates reached a seven-year low, sounding warning bells in student and administrative circles.

Alerted to the problem the previous May (when high-school students accept or decline offers of admission), President Everhart responded in July of 1995 by appointing the Committee on Minority Admissions and Retention. Professor of Mechanical Engineering Christopher Brennen chaired what became known as the Brennen committee as the group sought to understand and offer suggestions regarding Caltech's current recruitment and retention problem.

One year later, the number of incoming underrepresented minorities nearly doubled, say Everhart and others, as the result of cooperative efforts among faculty, staff, and students. Caltech's Class of 2000 includes 10 Latinos, 4 Native Americans, and 2 African Americans, all of whom make up 7.4 percent of the class.

This comes after a high point in 1991, when 21 Latinos and 8 African Americans matriculated, and a subsequent dip, which bottomed out in 1995 when 9 Latinos (all male) and no

African Americans or Native Americans joined the incoming class.

Among the experimental efforts that took place in early 1996, faculty traveled to meet with a number of "admits," or high-school seniors who had been accepted for admission to Caltech. In addition, ten President's Scholars awards were offered—not exclusively to minorities—to admits whom the admissions committee thought would contribute to the "quality and breadth" of the campus community.

Also in 1996, candidates were sought and hired for the upgraded position of associate dean/director of Minority Student Affairs and the redefined position of assistant director of Admissions in charge of underrepresented-minority recruitment.

"We've taken a step in the right direction," says Everhart. "But we're dealing with an ongoing problem. Competition for excellent minority students, the sort we need to recruit, is very strong, and it will take a sustained effort to continue to recruit the numbers we need to improve the Caltech education for all students. We have to keep improving the admissions and recruitment process without losing our focus."

Caltech's focus, he emphasizes, is to admit the best students and give them the best scientific and engineering edu-

cation possible. Everyone is subject to the same high standards for admission. In contrast, some schools may vary their admissions policies for certain applicants, such as for people from disadvantaged backgrounds or for descendants of alumni. Everhart points to a recent court case regarding affirmative action at the University of Texas law school, saying "UT used different admissions criteria" for underrepresented minorities than for other applicants. "We don't believe in doing that, and I hope we never will," he adds.

"We're not talking about reducing standards," says Dan Kevles, Koepfli Professor of the Humanities, who currently chairs the Faculty Board, where many discussions on the topic have taken place. Instead, Caltech wants to increase the number of qualified underrepresented minorities who apply and enroll.

"We're reaching out to find more kids who would enhance the diversity and quality of the student body," says Kevles. "It's not about having black skin; it's about students' bringing different perspectives and different life experiences from their peers. Color can be a proxy, an indicator of this."

Recruiting these top minority students is not some form of affirmative action that primarily benefits *them*, adds Kevles. "They can go anywhere.

But if they come here, it benefits everyone by adding electricity to the intellectual life of the student body. But once you find kids with high merits, the problem is getting them to come." Why?

Last March, after presiding over the first faculty discussions of the Brennen study, Kevles summed up the pertinent reasons that underrepresented minorities had given for rejecting Caltech's offer of admission in 1995. "Some noted they didn't want to go to a campus with few underrepresented minorities; some didn't want to travel across the country to go to college; and a few received bigger financial-aid packages elsewhere.

"We think we can overcome the problems through several means: by sending faculty out; by establishing better support mechanisms here; and by using financial aid in a limited way to get the kids we want most."

Not everyone has agreed on the third approach, which is why the Brennen committee did not make a recommendation regarding special scholarships. Brennen himself regrets that attention to this topic "caused more

Continued on page 8

CAMPUS UPDATE

Caltech Media and Science Symposium explores altared states in "Science and Journalism—A Marriage of Opposites"

By Rebecca Rothenberg

"I didn't even know we were dating," cracked Glenda Chui, science reporter for the *San Jose Mercury News*, as each of the panelists took a turn at interpreting the metaphor that served as the theme of Caltech's third annual symposium on science and the media, "Science and Journalism—A Marriage of Opposites."

"As with any relationship, there are moments of bliss and times of strife," remarked Provost Steven Koonin as he welcomed the panel (made up of Caltech Professor of Chemistry Jacqueline Barton; Chui; *Today Show* producer Tony Dill; NPR *Morning Edition's* Executive Producer Robert Ferrante; *Los Angeles Times Science Editor* Joel Greenberg; CNN Science and Technology Anchor/Correspondent Miles O'Brien; and Caltech's Koepfli Professor of Humanities Daniel Kevles, who, as historian of science, contributor to the *New Yorker*, and author of an upcoming book on the David Baltimore case, could have sat on either side of the aisle. The panel was moderated by David Garcia, Emmy-winning science reporter for Fox News.)

The panelists were speaking to a wider audience than the several hundred people gathered in Ramo Auditorium on October 3. This year for the first time a satellite link, underwritten by Mullin Consulting, Inc., whose CEO, Peter Mullin, is a Caltech trustee, enabled many institutions across the nation to watch the symposium, and to participate in the question-and-answer session.

As the symposium got under way, the "bliss"-filled aspect of the science-media connection to which Koonin had alluded was summed up by the panelists in a few succinct sentences: from science, journalists get stories to fill the bottomless "news hole"; through journalism, scientists get an informed, and perhaps sympathetic, public, capable of making educated policy decisions. But the "strife" was lingered over. O'Brien pointed out that the gatekeepers of the popular media usually do not have scientific backgrounds (he, for example, was a history major) and may be ignorant of, or even phobic about, science.

And the suspicion is mutual: scientists fear the media will oversimplify their work—compress "a lifetime into 30 seconds," as O'Brien said—or sometimes even get it dead wrong. Barton, a chemist whose work involves tailoring molecules of metal to bind to specific sites on DNA, mentioned a notorious cover of *Time* that depicted the

double helix of DNA in glorious color, boldly spiralling in the wrong direction.

How can this marriage be saved? How can journalists mediate successfully between science and the public, doing justice to the former and yet capturing the attention of the latter? Historian of science Kevles talked about what journalists ought not to do, describing two types of failed science reporting. The "wonder-working" approach is, essentially, journalism by press release: uncritical, celebratory,

scientific process, would portray scientists as human beings with failures and successes, and avoid the two extremes of hero-worship and demonization.

The panel also suggested that, as in any relationship, better understanding and communication are crucial. This necessitates some preparation by both parties. Science reporters need to understand the field well enough to, as Chui recommended, "Go behind the press release. . . go into the lab, get the facts." Here the panel's print journalists clearly had the edge over the TV and

Whatever other marriages were shaky, the union of technology and journalism seemed firm. Almost 20 universities and other sites nationwide were in two-way satellite communication with the symposium—but was there intelligent life out there? Then the questions began to roll in, from Monterey Bay Aquarium Research Institute, from UC Davis, from Michigan, Cornell, and Clemson. What was the most-neglected science story of the last few years? ("Chemistry," said Barton, without missing a beat; "it's the central discipline of science.") How did the journalists introduce a "trend" story that didn't have a specific breaking event? (Chui talked about "saving string," accumulating details over years until she had a story; Greenberg said his paper's editorial board was unusually understanding about the value of long-term stories.) What level of expertise did the reporters assume on the part of their readers? (Many panelists, including Barton, said their imagined audience was "their mothers.") How did reporters know if they were doing a good job of serving the public? (Chui said that reporters don't receive direct feedback unless they get facts wrong, but all of the panel's journalists referred to another kind of feedback: the "peer review" of their fellow journalists. Each fervently hopes her or his story will be picked up by the others—tomorrow.)

Finally a questioner—who, if not a paid confederate of the symposium organizers, should have been—returned to the morning's central metaphor. "If science and journalism are to marry," he said, "what kind of prenuptial agreement should they draw up?" In the few moments remaining, the panelists put their thoughts in order. Ferrante, sounding like a veteran of the conjugal and journalistic trenches, said, "Both sides should expect disappointment." Greenberg proposed the following compromise: "You [the scientist] ask if you can see the story before it's printed; I say no." But Barton probably had the last word. "I'll try to speak English," she said, "and you try to get it right."

Portions of this article appeared in different form in the December 1996 issue of the Newsletter of the National Association of Science Writers.



From left, panelists Miles O'Brien, Jacqueline Barton, Robert Ferrante, Tony Dill, Daniel Kevles, and Glenda Chui listen as moderator David Garcia (whose image can be glimpsed on the monitor at right) fields a listener's question at the third Science and Media Symposium, held this past October on the Institute campus.

taking extravagant claims at face value. Its sensationalism serves the need of journalists who have to "grab the attention of the audience in the first six seconds," as Garcia put it, but ultimately it does a disservice both to the public and to science: it arouses unreasonable expectations and false hopes whose inevitable disappointment increases public cynicism—and creates a ready audience for the second journalistic distortion Kevles noted.

The "diabolical school" of reportage assumes that science and scientists are not to be trusted, and is less interested in the content of scientific discoveries than in their potential for further concentrating power in the hands of a scientific elite. Barton said she was dismayed by this trend, and baffled by the public's eagerness to accept anecdote over science, and to dismiss scientific studies on the basis of funding agency. Kevles pointed out that this wasn't altogether irrational, given recent revelations about tobacco companies' suppression of epidemiologic data. He suggested that a third approach to science reporting, one that chronicles the

radio reporters. Greenberg was an editor and writer for *Science News*; Chui has a degree in biology, trained at the UC Santa Cruz program for science writers, and now teaches there. She noted that while newspaper reporters usually bounce from beat to beat, science writers are an exception, staying in their field and becoming increasingly competent and savvy about their subject matter. A solid grounding in science also works to reporters' advantage in a competitive arena in which they must often make instant decisions about what is and isn't a reputable story. Greenberg recounted a cautionary example, recalling a headline from his days at *Science News*: "Lost City in Peru—Never Mind" (hours before press time a staffer had located the "newly discovered city"—on a roadmap).

But in terms of preparation, scientists must meet their "partners" halfway, by offering reporters information that is not only accurate but succinct and lively. O'Brien suggested that universities' public information officers might help their scientists practice presenting their work to a lay audience.

Caltech Board names new trustees

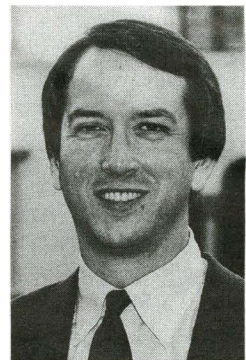
Caltech has elected two new members to its Board of Trustees; they are William Davidow and Edward Lambert '82.

Davidow is a high-tech industry executive and venture investor with Mohr, Davidow Ventures. Previously, he held a number of positions at Intel Corporation, including senior vice president of marketing and sales, vice president of the microcomputer division, and vice president of the microcomputer systems division.

Davidow is the author of three books: *Marketing High Technology* (1986), *Total Customer Service* (1989), and *The Virtual Corporation* (1992). He is chairman of the board of directors of Rambus, Inc., and FormFactor, Inc. He also serves as a director of Chromatic Research, Inc., and Vantive Corporation.



William Davidow



Edward Lambert

He earned a BA summa cum laude (1957) and an MS (1958), both in electrical engineering, from Dartmouth College, and a PhD in electrical engineering from Stanford University in 1961. He also took graduate courses at Caltech before earning his doctorate. He lives in Woodside, California, with his family.

Lambert, the current president of the Alumni Association, has been named a Caltech Young

Alumni Trustee, a distinction reserved for alumni under the age of 45. Lambert received his Caltech BS in chemical engineering in 1982.

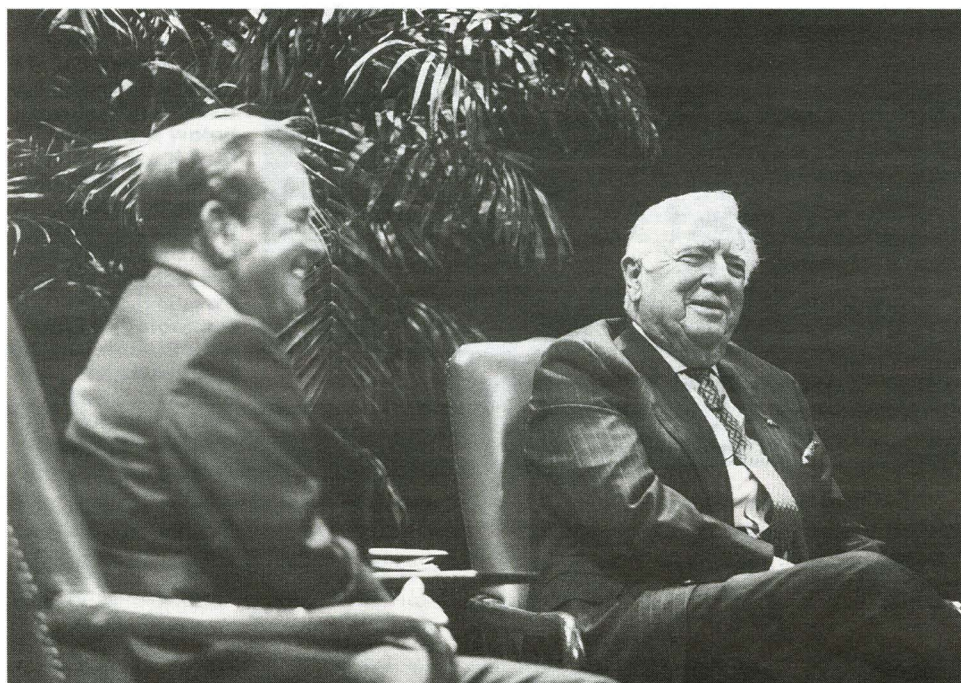
Lambert is managing director and cofounder of Meridian Ventures, Inc., a venture management and consulting firm that focuses on the aerospace, high-technology, and retail industries.

He is also director of Tecstar, Inc., a City of Industry-based manufacturer of space power systems.

Prior to creating Meridian Ventures, Inc., in 1991, he worked for four years as engagement manager at a leading international management consulting firm, McKinsey & Company, Inc., in Los Angeles. Before that, he spent three years in operations planning and facilities engineering for the Standard Oil Company in Alaska.

After graduating from Caltech, Lambert went on to earn an MBA from Harvard Business School in 1987. His community activities include working with agencies that serve the homeless in both Los Angeles and Seattle.

Lambert lives on Mercer Island, Washington, with his wife and three children.



He's been called the "most trusted man in America," but it was his reputation as an eloquent witness to history that made veteran news anchor Walter Cronkite the man to entrust with inaugurating Caltech's Lee DuBridge Distinguished Lecture Series this past November. Billed as "A Conversation with Walter Cronkite," Cronkite's lively and wide-ranging discussion with NBC4 news anchor Jess Marlow (left) of his life and times was met with great enthusiasm by the capacity crowd in Beckman Auditorium. Midway through the evening, Cronkite, who also took questions from the audience, was presented with a plaque commemorating the naming of a near-Earth asteroid in his honor. The possessor of a "high profile and slightly eccentric" orbit, the asteroid, like its namesake, has the potential to make a big impact on Earth—some 10 to 30 million years in the future.

A videotape of Caltech's first DuBridge Lecture, "A Conversation with Walter Cronkite," is available for \$19.95, and may be ordered by contacting the Institute's Office of Public Events at 818/395-4652 or via e-mail at tickets@caltech.edu

Honors and awards continue to snowball

David Anderson, professor of biology and associate investigator, Howard Hughes Medical Institute, has been selected by the Division of Biology to receive the Lawrence L. and Audrey W. Ferguson Award for Biology Education.

Professor of Chemistry Jacqueline Barton is the recipient of the 1997 William H. Nichols Medal by the Nichols Medal Jury and the New York Section of the American Chemical Society for her outstanding contributions in bioinorganic chemistry.

John Bercaw, Centennial Professor of Chemistry, has been awarded an American Chemical Society Award for Distinguished Service in the Advancement of Inorganic Chemistry. The award is sponsored by Mallinckrodt Baker, Inc.

Associate Professor of Chemistry Erick Carreira has received an American Chemical Society Award in Pure Chemistry from the Alpha Chi Sigma Fraternity. Carreira has also received an Arthur C. Cope Scholar Award from the American Chemical Society.

Donald Coles, PhD '53, Professor of Aeronautics, Emeritus, has been awarded the 1996 Otto Laporte Award by the American Physical Society.

Professor of Astronomy and Planetary Science Shrinivas Kulkarni has received the 1996 Indian Institute of Technology, Delhi, Distinguished Alumni Award for outstanding contributions as an astronomer.

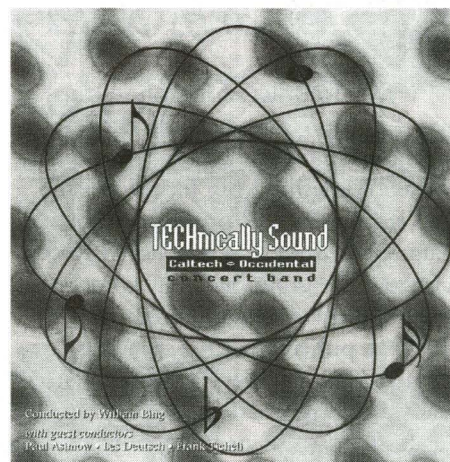
Nobel Laureate Rudy Marcus, the Arthur Amos Noyes Professor of Chemistry, has received an American Chemical Society Award in Theoretical Chemistry from the IBM Corporation.

Carver Mead '56, PhD '60, the Gordon and Betty Moore Professor of Engineering and Applied Science, has received the 1996 Phil Kaufman Award from the Electronic Design Automation Companies (EDAC), an association of companies engaged in the develop-

ment and manufacture of design tools for electronic engineering. Mead was honored for his "broad and distinguished career [which] has always found him at the very leading edge of a topic... many of the silicon-based industries of today can trace their origins to the influence of Carver Mead's insights and design approaches."

Edward S. Harkness Professor of Economics and Political Science Charles Plott has been awarded an honorary doctorate by the Université Pierre Mendès-France of Grenoble, France.

John Seinfeld, the Louis E. Nohl Professor and professor of chemical engineering and chair, Division of Engineering and Applied Science, has been selected to receive an Award for Postdoctoral Program in Environmental Science for 1996 from the Camille and Henry Dreyfus Foundation.



Talk about harmonic convergence! Just in time for the New Year, the Caltech-Occidental Concert Band, under the direction of Bill Bing, has recorded its first CD. Entitled *TECHnically Sound*, the new release includes such selections as "Centennial Suite," composed in 1991 for Caltech's hundredth birthday by JPL scientist Les Deutsch '76, PhD '80; "Throop March"; Mozart's Overture from the "Abduction from the Seraglio"; and a medley of Caltech favorites, including "Lead Us On, Our Fighting Beavers." The CD can be ordered from the Caltech Bookstore (818/395-6161) for \$12.95 plus shipping and handling.

Robert Sharp '34, MS '35, Robert P. Sharp Professor of Geology, Emeritus, has been selected by the Geological Society of America as recipient of the Distinguished Career Award of the Quaternary Geology and Geomorphology Division.

Edward Stolper, the William E. Leonhard Professor of Geology and chair, Division of Geological and Planetary Sciences, has been chosen by the European Union of Geosciences to receive the Arthur Holmes medal, jointly with Professor Bernie Wood of the University of Bristol. The Holmes Medal is awarded for scientific achievements in terrestrial or extraterrestrial materials science; in particular, for successful efforts in using physicochemical methods to establish relationships between the genesis of Earth's materials and terrestrial dynamics, and in understanding the historical evolution of the main geological cycles, in the spirit of A. Holmes.

Professor of Geology Peter Wyllie has been invited to become a Foreign Member of the Academia Europaea in the Earth & Cosmic Sciences Section. Academia Europaea is an organization of individual scholars from the whole of Europe and covers the full range of academic disciplines.

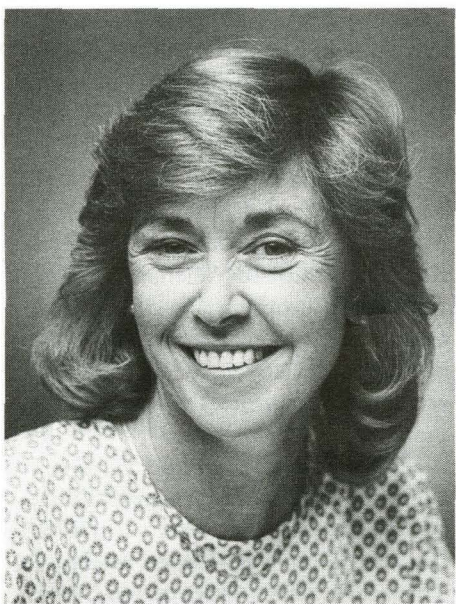
Ahmed Zewail, the Linus Pauling Professor of Chemical Physics and professor of physics, has been selected to receive the 1996 Kirkwood Medal. The award, which is presented biennially by the New Haven Section of the American Chemical Society and the Department of Chemistry of Yale University, recognizes "outstanding contributions to the field of chemistry." Zewail was cited for his "pioneering work in chemical dynamics," particularly in the developing field of femtochemistry, which allows the motions of atoms to be viewed in real time as chemical bonds are formed and broken.

Anneila Sargent to head Owens Valley

Anneila Sargent, PhD '77, has been named the executive director of Caltech's Owens Valley Radio Observatory (OVRO) in Big Pine, California. Sargent, a senior research associate in astronomy who is widely known for her research into the formation and evolution of stars and protoplanetary systems, has been serving as associate director for millimeter-wave operations at OVRO since 1992. She succeeds Nick Scoville, the Francis L. Moseley Professor of Astronomy, who has stepped down after 11 years as OVRO's director.

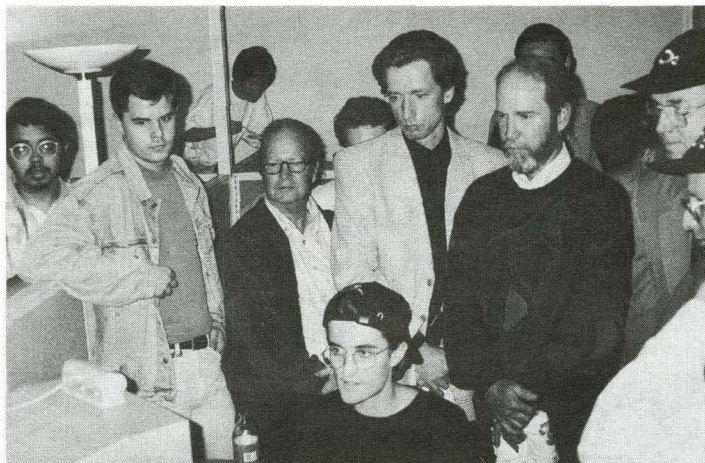
As head of OVRO, Sargent will oversee such major research projects as the Norris Planetary Origins Survey, a search for young planetary systems around nearby sunlike stars being carried out on OVRO's six-dish millimeter-wave array, which over the last decade has played a major role in studies of how stars and protoplanetary systems such as the solar system are formed. The Norris Foundation, which funds the study, recently made OVRO a grant to investigate a new observatory site at a higher, drier elevation, where atmospheric conditions are better for such research. According to Sargent, the OVRO dishes may be joined at the new site by the 9-dish BIMA array operated by the universities of California, Maryland, and Illinois at Hat Creek in northern California. The resulting 15-dish instrument would continue to train the astronomers of the future, carry out cutting-edge science, and could also be used to test new astronomical equipment for the proposed national millimeter-wave array.

A native of Scotland, Sargent re-



Anneila Sargent

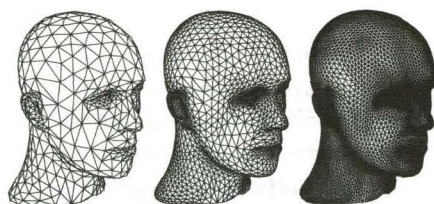
ceived her BSc in physics from the University of Edinburgh in 1963. She is a member of the Royal Astronomical Society, the American Astronomical Society, and the International Astronomical Union. Since 1994 she has served on the NASA Advisory Council and chaired the NASA Space Science Advisory Committee. In December, she co-chaired a National Research Council-NASA Workshop and subsequently presented its conclusions to Vice President Al Gore, in preparation for the President's 1997 Space Summit.



Among those looking on as student Lena Petrović (seated) creates the graphic shown below are Assistant Professor of Computer Science Peter Schröder (behind Petrović in sports jacket), Forest Baskett (in sweater), chief technology officer with Silicon Graphics, President Tom Everhart, and Provost Steve Koonin '72 (both in caps).

Anyone for head games?

Here's one that the students and faculty in Caltech's computer graphics group like to play—developing new ways to create images that convincingly mimic real life, not only in terms of fidelity to detail but also with regard to fluidity of line and contour and fluency of movement. Conventional modeling approaches have had some success meeting these challenges, notes Caltech Assistant Professor of



Computer Science Peter Schröder, but they have had difficulty scaling up to the levels of complexity that users increasingly expect. The trio of heads shown at left illustrates a powerful modeling technique that Schröder and his students are employing to address the problem. While classical methods of modeling rely on stitching together polynomials, this one is based exclusively on the successive

subdivision of precisely defined and positioned triangles—an approach that allows for far greater design flexibility and produces more realistically detailed geometric models. These heads were modeled by Lena Petrović, a senior majoring in computer science (see photo, top) and one of several students presenting demonstrations at the recent dedication of Caltech's new Undergraduate Computer Graphics Lab. Outfitted with state-of-the-art software and hardware donated by Silicon Graphics, Inc., a leading supplier of high-performance interactive computer systems, the new facility will provide Caltech students with a variety of hands-on opportunities to learn and apply such innovative modeling methods as triangular subdivision. Developing ways to make these powerful and mathematically sophisticated techniques more user-friendly for practical design purposes is one of many research areas being explored by Schröder and his colleagues Jim Arvo and Alan Barr and their students. For more information, check out the Caltech computer graphics research web site at <http://www.gg.caltech.edu/>

Seismo marks data-processing milestone

When 53 miles of fault lines ruptured in the 7.3-magnitude Landers earthquake in June 1992, it was the start of something big for the Seismo Lab employees who process earthquake data. According to seismologist Kate Hutton, her group worked on more than 63,000 aftershocks from the quake, a project they finished last month. "We are now caught up with the Landers processing," says Hutton, "at least until the next aftershock."

"Normally we process about 10,000 earthquakes per year," she continues. "So completing the Landers data on top of our usual workload was a big job." The "usual" workload included 13,000 aftershocks from the January '94 Northridge temblor, and 11,000 from the 1995/96 Ridgecrest sequence.

Although a computer automatically assigns a location and magnitude for each earthquake, sometimes Mother Nature gets too complicated for the computer. "There were so many aftershocks from Landers," says Hutton, "that one quake would start before the

last one had stopped." Because the records overlapped, the timers had to examine each data record themselves to check for errors and perform careful quality control steps.

Hutton notes that the Landers earthquake data is significant because Landers is the largest earthquake to occur in California since the 1952 7.5-magnitude Kern County earthquake. "Back then," she says, "the seismograph array and the computing capabilities were nowhere near as sophisticated as those we have today. By processing Landers aftershocks down to the magnitude 1.5 level, as we have done, we have what is probably the best set of data that exists anywhere of the aftershock sequence of a magnitude 7 temblor."

This database, which took four years to bring up to date, takes up 100 gigabytes of computer space—an amount equal to 37.5 sets of the *Encyclopedia Britannica*. Each of the 63,000 records is now available—through the WWW pages of the Southern California Earthquake Center—to researchers worldwide.

FRIENDS

Gifts by Will

Trusts and bequests provide welcome support to Caltech's operating and endowed funds. The following are recent gifts received by the Institute.

Elizabeth "Lilly" Zechmeister, widow of Laszlo Zechmeister, professor emeritus of organic chemistry, has made Caltech a bequest of \$546,210. The funds will be added to the Elizabeth and Laszlo Zechmeister Memorial Fund "to be used by the Divisions of Biology and Chemistry for graduate student aid." Dr. Zechmeister served on the Caltech faculty from 1939 to 1959.

Beatrice Wulf has made a \$300,000 bequest to the Institute. She was married to Oliver Wulf, PhD '26, who retired as senior research associate in physical chemistry emeritus in 1974. The gift was made as an expression of the gratitude the Wulfs felt to the Institute, especially to Arthur A. Noyes and Richard C. Tolman, for the enrichment of their lives. The funds will be "used for pure research."

Irma Gregg McCollum, widow of longtime Caltech benefactor Ross McCollum, has made a \$607,905 bequest to the Institute. The funds will be added to the Ross McCollum and William H. Corcoran Professorship in Chemical Engineering.

Caltech has received a \$622,500 bequest from Richard L. Hayman. The funds will be added to the Richard L. and Dorothy M. Hayman Scholarship, which was established by the Haymans, longtime members of the Caltech Associates, to benefit undergraduate students.

Lawrence Ferguson, who received his BS in mechanical engineering from the Institute in 1931, has left Caltech the majority of his estate in the amount of \$2,800,000. The funds will be added to the Lawrence L. and Audrey W. Ferguson Fellowship and Prize Fund in the Division of Biology.

For information about the wording for bequests to the Institute, call the Office of Gift and Estate Planning at 818/395-2927.

Burroughs Wellcome makes major grant for interdisciplinary research

Caltech has received a \$2.5 million grant from the Burroughs Wellcome Fund. The grant will be used to support young scientists doing interdisciplinary research in the emerging field of computational molecular biology.

According to Caltech's Anna L. Rosen Professor of Biology Scott Fraser and Professor of Physics Michael Roukes, co-directors of the new program, the funding will support both graduate and postdoctoral research.

"The program's central theme is the integration of experimental and theoretical methods, approaches more typically used in the physical sciences, to complex problems in molecular biology," says Roukes.

During each of the five years of the grant, participating Caltech researchers will receive intensive cross-disciplinary training by concurrently working in

the laboratories of professors from different academic disciplines.

"The idea is not to increase the total number of scientists trained, but to make it easier for talented physical scientists to develop and pursue interests in the biological sciences," says Fraser. "Many of the most exciting recent advances in biology have happened at the boundaries of disciplines. The grant will foster innovative cross-disciplinary research and the development of specialists who might otherwise be constrained by these traditional boundaries."

"Caltech has a strong research tradition that transcends disciplinary bounds," Fraser adds. "This program provides a new way in which the Institute will be able to help square pegs

and round holes go together."

"This kind of collaborative research in molecular biology has already begun, quietly and spontaneously, between laboratories in different divisions at Caltech," Roukes says. "The melding of research approaches is powerful, and we expect explosive growth and exciting advances in this area over the next decade."

One new avenue of inquiry that Fraser thinks the Burroughs Wellcome Fund grant will foster is the application of new computational techniques in biology. Already, researchers at Caltech and other institutions are making progress in applying the power of the computer to the dynamical systems and complexity of the nervous systems of living organisms, Fraser says. This

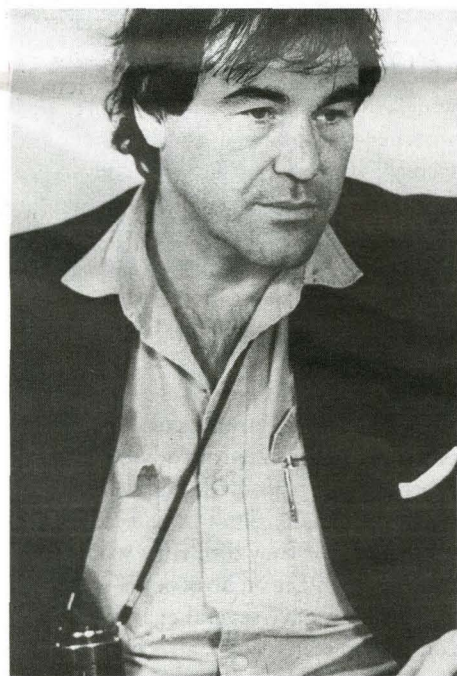
requires researchers with backgrounds in both physical and biological sciences.

"Physicists, for example, are trained to create simple problems out of complex ones, while biologists have been trained to study the really daunting complexity of life and derive meaningful experiments out of it."

"So the end result should be that we'll have very good mathematical models of very good biological problems."

The Burroughs Wellcome Fund is a major philanthropic supporter of biomedical research. Founded in 1955, the foundation provides \$20 million annually in grants.

"Film, chaos, and mass delusion"



Noted screenwriter/director/producer Oliver Stone will bring his own inimitable brand of chaos theory to campus when he delivers the above-titled talk on January 28 at 8 p.m. in Beckman Auditorium, as the fifth speaker in Caltech's Michelin Distinguished Lecture Series. No tickets are required to attend this free public talk; seating is on a walk-in, first-come/first-served basis. The auditorium opens at 7:30 p.m.

Designed to promote creative interaction between the arts and science, the Michelin lectures were established at Caltech by New York designer Bonnie Cashin in memory of her uncle, James Michelin, a consulting engineer who had always hoped to attend the Institute. Past Michelin lecturers have been architectural historian Vincent Scully, artist David Hockney, playwright Tom Stoppard, and architect Frank Gehry.

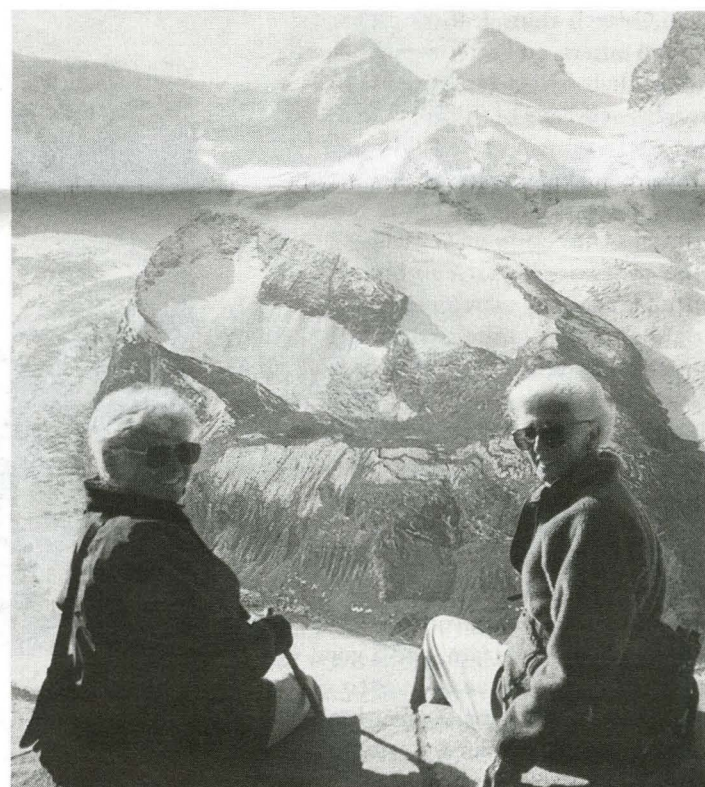
Stone is a three-time Oscar winner. His motion pictures include *Platoon*, *Born on the Fourth of July*, *Wall Street*, *JFK*, *The Doors*, and most recently, *Natural Born Killers* and *Nixon*.

President's Circle: from colliding continents to colliding particles

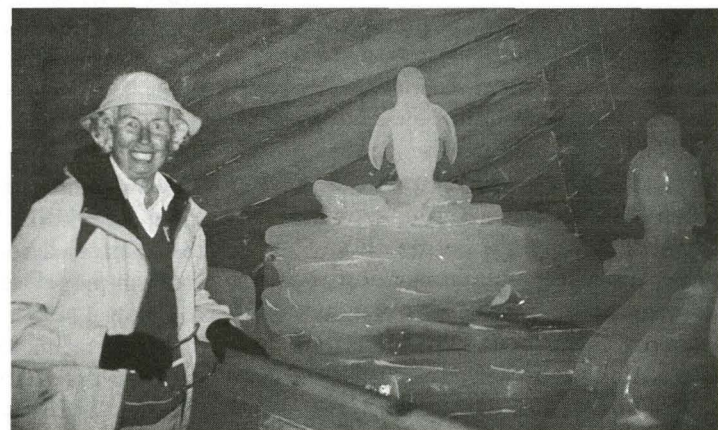
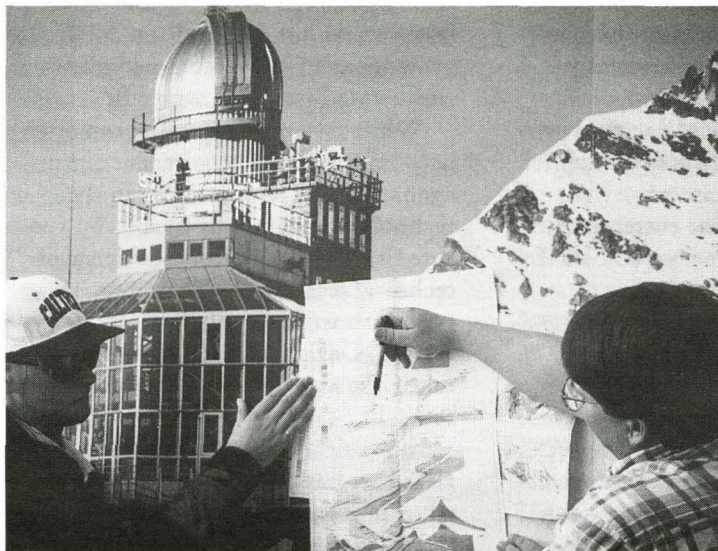
Most people visit Switzerland for the skiing and the cuckoo clocks, but the President's Circle of the Caltech Associates, being an unorthodox bunch, went for the tropical beaches and the state-of-the-art particle accelerators. The beaches disappeared hundreds of millions of years ago, but they left traces in the towering Alps for those who can read rocks like books—Professor of Geology Brian Wernicke, for example. Wernicke, who has made extensive studies of the dramatic mountains of Switzerland, the birthplace of the science of tectonic geology, led the group on a nine-day high-altitude trip in September, beginning with the Jura Mountains, who lend their name to the Era (Jurassic, that is), continuing through the Alps, and concluding in Geneva with a tour of the famed CERN nuclear research facility.

The group spent a night in the glacier village of Grindelwald, surrounded by the towering peaks of the Eiger, the Mettenberg, and the Wetterhorn, then rode the Jungfrau mountain railway through mountain meadows to Europe's highest railway station (11,333 feet), and ascended by elevator to the research station at the summit, which

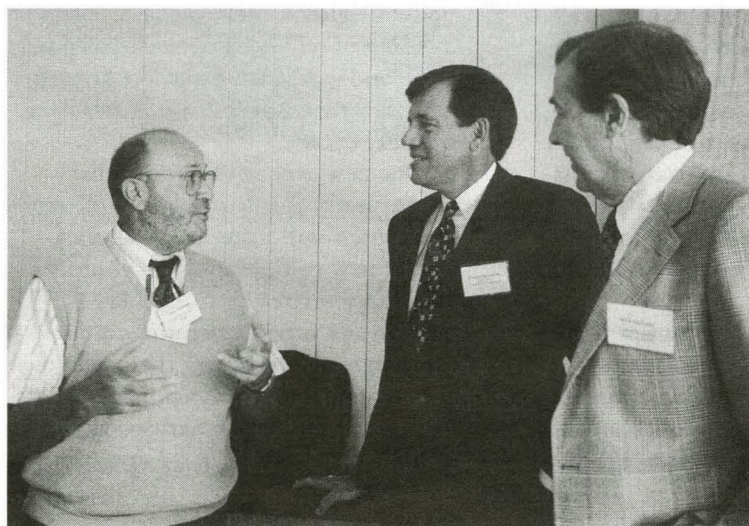
affords a view of the Black Forest in the distance, and, in the foreground, the geology of a mountain turned upside down (layers of sediment have been gradually pushed to the summit). Their Alpine tour included a good mix of spectacular views (pristine lakes, sheer 13,000-foot cliffs, the Matterhorn), geology (the collision of ancient continents written on the landscape), elegant meals, Romanesque churches, and more sightseeing. Finally, the group made its way to Geneva, where it was guided through CERN by Caltech Professor of Physics Harvey Newman, who spends half of each year working with the Large Electron Positron Collider.



Above: Zermatt offers spectacular views to Lorna Bagley (left) and Nancy Glanville. Below, intricate ice sculptures greet Mary Johnson in the Jungfrau Ice Palace, while Jungfrau Observatory provides an ideal backdrop for a geologic consultation between graduate student Rob Brady (left) and Professor of Geology Brian Wernicke.



So, you want to be an entrepreneur?



From left, Larry Gilbert, director of Caltech's Office of Technology Transfer talks shop with Roger Davisson '65, MS '66, and Gaylord "Nick" Nichols, director of Caltech's Industrial Relations Center. Below, from left, are Michael Krieger '63, Ghufuran Ahmed '89, Richard Hsu '89, and William Mitchell '89.

By Michael Rogers

Caltech venture capitalists offer insider information



It was billed as a "Technology Transfer Roundtable," but a recent panel discussion in Los Angeles hosted by a Caltech alum, featuring the advice of two others, and attended by a number of their fellow Institute graduates, might well have been called "How to Succeed in Business by Really Really Trying." The discussion, which highlighted the perspective of the venture capital community on starting a business, was a crash course in practical advice for aspiring entrepreneurs.

The venture capitalists offering their opinions agreed that in launching a venture, the best policy is to do your homework, from making sure that the technology behind a product works, to determining whether anyone will buy it. As David Morse, the founder of Amiga Computer Inc., told the group, "Raising money for good ideas is not difficult. The trick is coming up with a good idea, a good team, and a good way to execute." Unfortunately, even good ideas don't always make great businesses, and the conference attempted to reveal how to lay the groundwork for a successful start-up company.

Organized and hosted by Richard Hsu '89, a patent attorney at Lyon & Lyon, the panel discussion was held at the firm's Los Angeles office at the First Interstate World Center. This is the second such workshop Hsu has held on technology transfer, which he defines as the "meeting of the minds between the providers of business development capital and the providers of business development technology." Hsu, a graduate of Columbia Law School, said that he got the idea when he "realized the tremendous—even if unrealized—potential for high-technology companies in the Los Angeles region of Southern California." The first roundtable, held earlier this year, offered the perspectives of universities and research institutions, including Caltech, JPL, USC, and UCLA. "For this one, we wanted to get a view of technology as seen through the lens of business development capital."

The October event was attended by approximately 100 entrepreneurs, small-business consultants, lawyers,

technology transfer administrators, and venture capitalists, among others. Attendees included about 20 Caltech alumni and staff, including Larry Gilbert, the director of Caltech's Office of Technology Transfer, and Nick Nichols, the director of Caltech's Industrial Relations Center.

Two of the four panelists, Roger Davisson '65, MS '66, and Christopher Chu '89, were from venture capital firms. They offered strategic advice to budding entrepreneurs, particularly those in the technology and medical fields. Davisson, a general partner with Brentwood Associates, a venture capital firm that has helped start more than 225 companies, said that entrepreneurs should think like venture capitalists if they want to determine whether their idea can propel a successful start-up company.

While technology is often the most important concern of the entrepreneur, it's usually the least important aspect for a venture capitalist when evaluating a deal, said Davisson, who worked for Hughes Aircraft Company, United States Filter Corporation, and Bristol Corporation, before joining Brentwood in 1973. "I once overheard someone say

that venture capitalists invest when their greed overcomes their fear," Davisson said.

To make a venture capitalist sufficiently greedy to make an investment, Davisson said that a new venture should have five characteristics: the nucleus of a solid management team, a proprietary product or service, clear evidence of technical feasibility, a strong potential market—usually at least several hundred million dollars growing at 15-20 percent per year—and a sound product/market fit.

While a venture capitalist can often help improve the entrepreneur's management team, serious flaws in the technology may not be fixable. So venture firms look for strong evidence of technical feasibility, through prototypes, lab work, or other preliminary testing, Davisson said. "Although we take risks as a way of life, we don't really like taking them. We like to wring out the risks. And one of the risks that has to be wrung out before a business gets out of the starting blocks is the technology. We need to make sure that the technology will not only work, but will work at a price that

can be made commercial."

Regarding the requirement for a proprietary product or service, Davisson said that his firm likes entrepreneurs to have patents or evidence that the products are demonstrably superior to anything on the market and protectable by trade secret. Toward this end, Hsu said that entrepreneurs should consult a patent attorney before approaching venture capitalists.

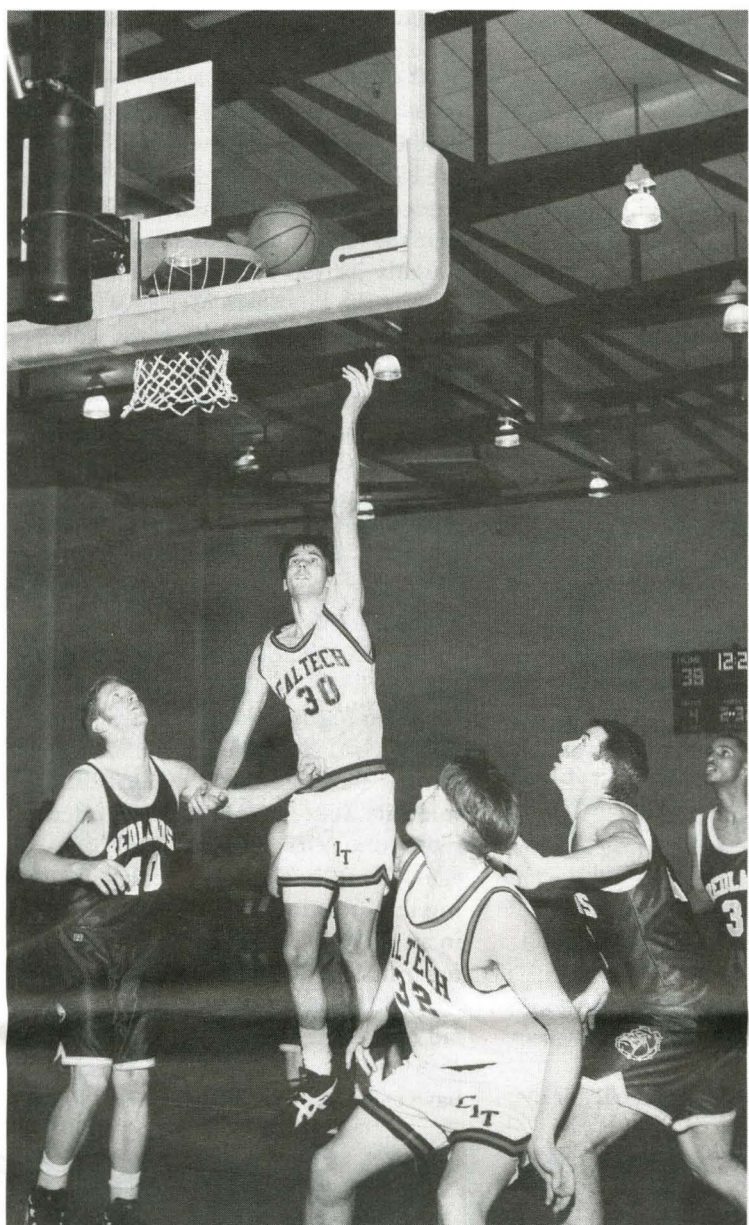
"There are important patent strategies that an entrepreneur should take when starting a technology company," said Hsu, who recently wrote an op-ed piece for *The New York Times* on how universities can commercialize faculty inventions by taking equity positions in companies. "Intellectual property can be an expensive proposition, but it is often the only valuable asset a start-up technology company may have," said Hsu, who spends a lot of time working with start-up companies. Since U.S. patents typically cost between \$5,000 and \$10,000, and as much as \$50,000 in foreign countries, a patent attorney "can advise you on which technologies to protect and which form of intellectual property—whether patents, copyrights, or trade secrets—would be most cost effective."

Patent attorneys can also draft non-disclosure agreements, so that entrepreneurs can be assured that venture capitalists or potential joint-venture companies whom they approach won't steal their ideas. Hsu, who also serves on the Executive Committee of the Caltech-MIT Enterprise Forum, said, "A good patent attorney provides advice and protection at reasonable costs, because start-ups usually don't have a lot of money and, if they did, they wouldn't want to spend it on attorneys."

Davisson gave several examples of companies started by Caltech alumni, generally based on innovative technology. Many have successfully raised venture capital and achieved commercial success. Some, however, have targeted markets too small to entice venture capitalists, or have failed to design a product that fits the specific customers' needs, which change with time. "We've made a lot of mistakes where a product really looks great, but it doesn't fit the way the customer works. Wayne Gretzky used to say that he was a great hockey player not because he could skate to the puck, but because he could skate to where the puck was going to be," Davisson said. "That's what a new company has to do. It has to anticipate where the market is going to be when it gets there, and the longer the lead time, the tougher the job."

Christopher Chu, an associate with a venture capital affiliate of New Enterprise Associates, presented a step-by-step program for preparing the launch of a new venture. Once the entrepreneur is convinced that the technology is

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Whether they're making a basket (left), or taking a time-out for a volleyball team pose (right), Caltech's sportsmen and women give it their best shot.

Caltech's scholar athletes— making the grade

By Betsy Woodford

Each year when it holds its sports banquet, Caltech gives the expected awards, presenting letters to members of Caltech's 17 intercollegiate athletic teams—men's and women's basketball, swimming, fencing, cross-country, tennis, golf, and track and field; men's water polo, soccer, baseball, and golf; and women's volleyball. Awards also go to the best male athlete, best female athlete, and the most improved. However, for the last two years the sports award banquet has included a unique prize—the Super Genius Team Award. That's sports awards, Caltech style.

"I don't know of any other university in the country that gives an athletic award for the highest team GPA," says Dan Bridges, Caltech's director of athletics. "The students came up with the award when they planned the banquet. Last year we had a tie between the men's tennis team and the men's golf team, whose members earned GPAs of 3.68 during the competitive season."

Golfer Clay Kishiyama, a senior, was thrilled to be recognized. "Receiving the highest team GPA award was a great honor," he says. "I was extremely surprised that we won. When I hang out with my teammates, I don't think about what kind of grades they get—I may play with the school's smartest physicist and I'd never know it."

How do student athletes manage to be so successful scholastically while spending an average of 15 hours a week on sports rather than study? Bridges thinks it's because "students who play on a team are very goal-oriented and plan their time well." Bridges is right on target, according to Kishiyama. He says, "I do better academically while I'm playing sports. With a busier schedule, I plan my time more efficiently to get all my work done, go to practice, and play in away games."

But scholastic achievement goes beyond time management, and the competitiveness of sports also helps the students academically. "Athletics keeps me competitive, which I can apply in the classroom," says junior Grace Yang, who competed on the women's volleyball and tennis teams last year. Bridges,

too, acknowledges the connection between sports competition and academia. "Students who play on a team are very competitive, which can apply to the classroom as well as to sports."

That competitive spirit was crucial last year to the women's tennis team. Coach Karen Nelson says, "There were only six members on the team—the minimum required by league rules." Nevertheless, the team completed their schedule without forfeiting a match due to a player's absence. "To make it through the season with only six players shows the depth of commitment of team members," says Nelson.

The reasons for participating on an athletic team go beyond the black and white of a box score. It is clear from the remarks of both students and coaches that what each student gets out of competing on an athletic team is as different as each individual. Friendships with

students, one attraction of sports may be that winning on the green flexes their intellectual muscles as much as investigating a gene. Nelson sums up this side of sports, saying, "By competing in sports you can learn what it means to be mentally tough, and the added strength that comes from a strong mental game."

Athletics at Caltech is not like playing at many other universities in one area—the win/loss column. Because of Caltech's small size, the lack of recruitment of athletes, and sometimes inexperienced players, Institute teams often lose. "The men's basketball team plays in a tough conference," says Bridges. "They haven't won a conference game in five years, although they've come really close a few times during the past two seasons."

Indeed, Caltech athletes face an extra challenge that is hidden to many sports fans—that of working just as hard as any athlete, but coming away with a losing season. Says Bridges, "It's harder to do all the things that coaches expect—the daily practices, exercises, and sacrificing of personal time—when you're not winning."

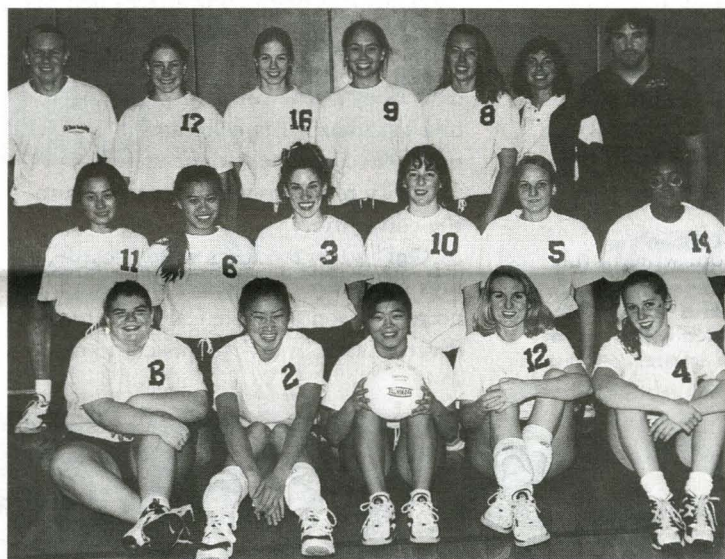
Kishiyama has experienced the agony of defeat personally. In the four years he's been on

the men's soccer team, they have never won a conference game. "Sometimes I wonder what keeps me coming back," he says. "Perhaps just the possibility of that one victory, which would be so sweet amid the tremendous number of losses. Well, my dream has already passed me by, since my final soccer season just ended without a conference win. I guess it just wasn't meant to be."

But Kishiyama has gained something from his participation that goes beyond the thrill of victory. "I admire my teammates for their dedication and pride. It takes a tremendous amount of pride to lose so badly in so many games," he says. That pride comes in part from the coaching staff, according to Bridges. "We have exceptional coaches here," he says. "They try to make each student feel like a winner by valuing effort and commitment above all else."

Feeling like winners also extends to how teammates treat each other, says Bridges. Recalling his days in the dug-out managing Caltech's baseball team, he says, "It's not uncommon for the best player on the baseball team to spend extra time before or after practice helping the weakest player because there's a strong sense among the athletes that they're all in this together."

He adds that this social aspect is an important one to students. "Student



teammates are important to Keri Ryan, a junior who is a member of the swimming and diving team. "I enjoy the meets," she says, "but competing is not the most important part to me. I like participating because it is a chance to take a break from academics and it relieves stress. I enjoy the camaraderie of my teammates."

For Grace Yang, relieving the pressure of student life is a big part of the reason she participates in intercollegiate athletics. "Sports is an excellent outlet for stress," she says, "and is an important part of an individual's social life and mental stability." Kishiyama goes even further, saying, "Without sports, I think I'd be a nervous wreck. It keeps my mind off school for a couple of hours a day and keeps me active. I can release some of the pent-up frustration that undoubtedly goes along with Caltech academics."

The mental toughness gained from athletic competition is another attraction, say the coaches. Baseball coach John D'Auria says, "Players have to be tough mentally when they're at the plate. They have to say, 'This pitcher is not going to strike me out.'"

In golf, the mental aspect shows itself in the practice routine. Coach Mike Jackson describes the practice routines of some members of the golf team as being so systematic and repetitive that they are equivalent to practice routines of professional golfers. So, for Caltech

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Diversity

Continued from page 1

important, less controversial recommendations to be overlooked.

"What we need is a broad-brush approach in order to improve recruitment and retention," he says. For example, "in the area of outreach, we need to do more to target the highly talented young people who happen to be minorities and are potential applicants to Caltech."

On campus, Brennen wants to see the administration do a better job of providing role models. "It will be a while before we have many underrepresented minorities on the faculty, so the committee strongly recommended a program to bring to the campus visiting scholars from ethnically diverse backgrounds."

Students speak

Not only the method, but also the goal of improving recruitment and retention has been a topic of discussion. In order to hear a diverse range of viewpoints, the Brennen committee members included students from the minority and majority communities, in

The changing face of Caltech's student body is seen throughout the decades (from left) at orientations in the 1960s, '70s, '80s, and '90s. (The photo from 1996 includes a professor in the bottom lefthand corner.)

in point from a lecture presented in May of 1995 during Caltech's *Semana Latina*, a week-long event highlighting Latino culture.

Vargas recounts that Carlos Chavez, the keynote speaker from Cornell, told how mathematical models predicting the spread of AIDS and tuberculosis through populations were proving to be inaccurate and fairly worthless. When he looked at the models, he realized, "one of the big problems was that the mainstream scientists—there were no minorities—had listed Latinos and Blacks as homogeneous societies that also had little interaction with other groups." In contrast, whites had been subdivided as gay, heterosexual, etc. She says, "It was not very realistic, so Chavez teamed up with an anthropologist to build a better model and got funding."

Fellow Brennen-committee-member Jonathan McDunn, who was a senior and president of the undergraduate student body at the time, interviewed 30 to 40 students (majority and minority) in order to represent their views on minority recruitment and retention to the committee.

Only a few students were "hostile," says McDunn. "They felt there was no real reason to make Caltech a more diverse place, and that this could un-

McDunn and Mike Herrera, a fellow undergraduate on the Brennen committee, point out the strain that organizing such events puts on the few students who do it. These students, including Herrera, are often heavily involved in outreach and mentoring efforts as well. Herrera says that, while he and others feel burdened doing this in addition to course work, they feel compelled to help their peers on an academic and personal level.

"It's such a small community; to lose one person is a big loss. It's like having your brother kicked out of school." On the other hand, gaining another person increases the opportunity for underrepresented minorities to share the load, as well as to add to the cultural and educational aspects of campus life, say Herrera and McDunn.

"I'm glad to see that the administration and faculty are becoming more aware of students' feelings in terms of recruitment," says Herrera. "They paid attention to the low matriculation and took it seriously."

Scholarships discussed

Last winter and spring, the question of whether to respond to the low minority enrollment with scholarships spurred much discussion in faculty meetings. Faculty members wondered what message these non-need-based scholarships would send, especially at a

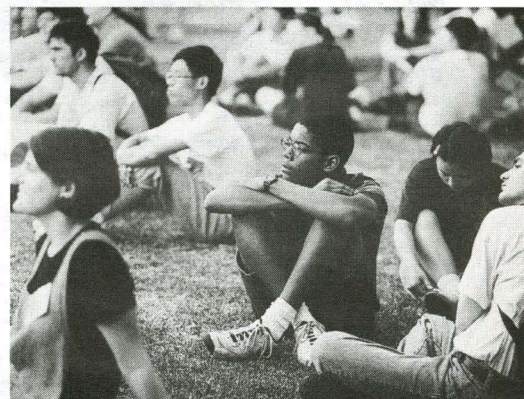
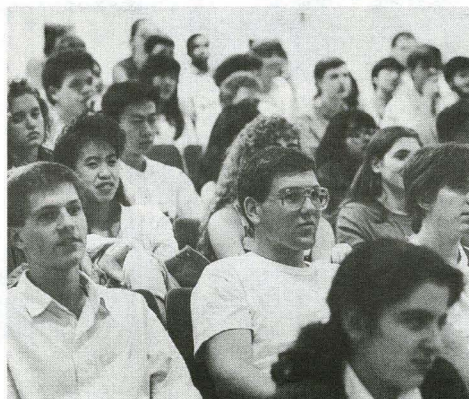
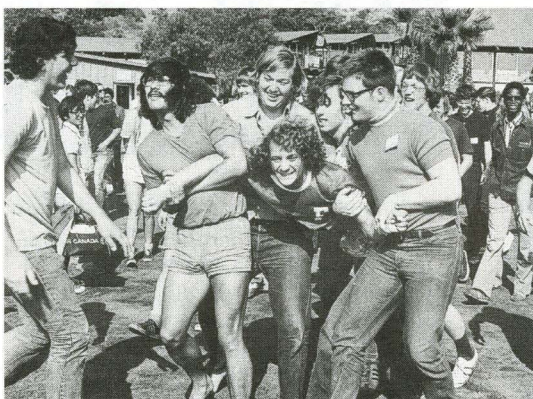
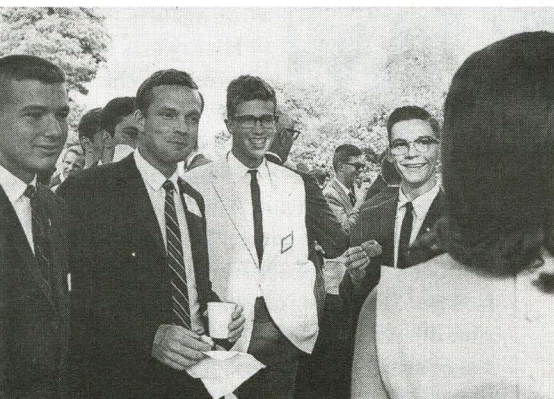
January's Faculty Board meeting to propose an experimental scholarship program, later named the "President's Scholars" program.

"I suggested that if we are going to offer 41 Merit Awards, why not also have up to 10 scholars who will contribute to the quality and diversity of the student body." By "quality," he meant that the recipients would come from roughly the top 50 percent of admits.

Like the Freshman Merit Awards, the President's Scholars awards would cover \$10,000 of a student's first-year tuition, and they would be renewable for a second year, pending good performance at Caltech. Then students could apply with their peers for the upper-class awards. Admits would be offered scholarships along with their admission notices in April before having to choose a school in May.

The President's Scholars program and Merit Awards stem from the same trends in higher education. By 1995, Caltech had concluded it was losing some of its best admits, majority and minority alike, to other schools offering more competitive financial-aid packages. The schools were putting increasing resources into non-need-based aid in an effort to attract the top students, regardless of financial circumstances.

"This move away from need-based aid is a recent phenomenon," says Everhart, who worries that Caltech may have to head more in that direction to



addition to faculty and staff.

Cathy Vargas, who served on the committee as a junior, believes that underrepresented minorities are essential to the Caltech community. The Institute's mission statement calls for Caltech to seek the best and brightest people to be scientists and engineers, she says. "At that level, you want to nurture people's creativity by exposing them to different international and socioeconomic backgrounds, humanities, athletics. . . . You want them to see that there's more than one way of life and more than one way of looking at things. You don't know where the next inspiration is going to come from."

According to Vargas, who comes from a Latino background, "underrepresented minority students represent a part of the world that the more mainstream and elite don't have much exposure to." She warns that being a scientist and not knowing about a part of even one's own society can have negative consequences; and she offers a case

fairly divert resources away from them. Personally, I think Caltech provides tremendous resources to everyone, and I don't see any way that would be diminished."

When choosing a college, "diversity" was not an issue for many students, says McDunn. They came to Caltech primarily for science and considered "social atmosphere" to be secondary at most.

For McDunn, diversity became more of an issue when he heard from his friends about the cultural life at other schools. And when Caltech's minority community hosted *Semana Latina* after he'd been here two years, he says "it was a real eye opener." Now he believes he would consider cultural diversity as a factor if choosing a school.

Exposure to people from different backgrounds "brings more of a sense of what the world is like. I never really got a good sense for how the real world interacts and gets along," he says. But programs like *Semana Latina* and International Day, and events during Black History Month "at least raised awareness where there was very little."

school that has long prided itself on providing support to those who need it.

According to Paul Dimotakis, 97 to 98 cents of every financial-aid dollar for undergraduates is awarded on the basis of need alone. The Northrop Professor of Aeronautics, professor of applied physics, and chair of the Institute's Scholarships and Financial Aid Committee, Dimotakis adds that a small percentage of Institute financial support is strictly merit-based, traditionally for returning students in the form of Upper Class Merit Awards.

This academic year, Caltech has expanded Institute support to its entering students by offering 41 Freshman Merit Awards, at least one of which went to an underrepresented minority student in 1996.

Douglas Flammig, Brennen committee member and associate professor of history, says that to reach out to more underrepresented minorities, Caltech has to do more.

Everhart, who says his goal of bringing the best students for the best education "includes having a reasonable mix of people," used the occasion of last

meet the competition. "If other colleges are getting the best students, Caltech has to respond."

To have an effect on the Fall 1996 entering class, it had to move quickly following the presentation of the Brennen report and various proposals, including Everhart's, at the January Faculty Board meeting. Two months remained for the faculty to debate the principles and legality of the President's Scholars program, for two Institute committees to define the program to the satisfaction of the Faculty Board, and for an Admissions subcommittee to carefully choose the President's Scholars from all 500 admits.

"The faculty became more involved in the subject than they might otherwise have," suggests Everhart, "because of external events that were related." Most notably, the University of California regents had voted to put an end to affirmative-action programs that take race into account when making admissions and employment decisions at UC schools.

Also, the UT case mentioned earlier was being tried in the Fifth Circuit,

which covers Texas, Louisiana, and Mississippi, and it had the potential of being retried at the national level. As it turns out, the Circuit Court did not support the Texas law school, finding its use of race-based admissions to achieve diversity contrary to the 14th Amendment. Since the U.S. Supreme Court subsequently refused to hear an appeal of the Circuit Court case, the law stands for the region only, but may be invoked as a precedent in trials outside the region where race affects admissions decisions.

Since Caltech was not planning to alter its admissions standards, neither the University of California nor Texas experiences were directly comparable. "But people read about the Texas case, talked about it, and wondered if it applied," says Paul Bellan, professor of applied physics and chair of the Freshman Admissions Committee. It was his committee and Dimotakis's Scholarships and Financial Aid Committee that fine-tuned the President's Scholars program wording for approval by the Faculty Board.

Kevles says he and a number of other faculty members wanted to focus on bringing people with diverse cultural backgrounds to campus. "We want to provide the overall undergraduate community with an environment not unlike the world they're going to live in as adults."

However, says Bellan, "there was considerable resistance to having a minority scholarship." When the committees met, the first word on the chopping block was "diversity." "Breadth" was chosen instead, some say, to be inclusive of diversity but not exclusive.

Says Bellan, "the compromise that we reached was to have a scholarship that is not restricted to minorities, but where being a minority may be helpful because of that person's contribution to campus—to making Caltech a more interesting, enriching place."

Ultimately, President's Scholars awards for the 1996-97 school year were offered to three Latinos (two of whom enrolled), two African Americans (one enrolled), one Native American (not enrolled), two Asian Americans (one enrolled but then canceled) and two Caucasian Americans (one enrolled). The awards come from a special fund set up by the president, rather than the general financial-aid pool.

As the students began their studies in October, the Faculty Board approved the final wording for the purpose of the scholarships: "to provide additional discretionary means in making offers to freshman applicants, with the aim of enhancing the quality and breadth of the undergraduate student body at Caltech." Kevles adds that he and others will be watching to see if the four-year experimental program works.

"The scholarships make a statement," says Gary Lorden, vice president for Student Affairs. "They make it clear we want to attract underrepresented minorities." Lorden is satisfied

with the fact that the program includes others as well, but he stresses the urgency in seeking African Americans, Latinos, and Native Americans.

"Their numbers are small, reflecting how few specialize in science and how intense the competition is to attract those who do. If we don't do a good job recruiting them, we risk losing more people." Lorden points out that, in 1995, a minority high-school student who was interested in attending

Cheryll Hawthorne, the new associate dean, is launching a Saturday academy in which Caltech students and postdocs will develop and teach innovative classes to high school students to expose them to science and math. "We hope to interest more underrepresented students in coming to the Institute," says Hawthorne, seen here talking to postdoc Tracy Johnson (right) about the research-oriented biology curriculum that Johnson is preparing.



Caltech later declined, saying she didn't want to be the only African American in the class.

Faculty members hit the road

Another major component of the recruitment plan, which met with unconditional support, involved sending faculty to meet with underrepresented minority admits as well as Merit Award recipients across the country. "The Brennen report emphasized that personal contact is especially important for recruiting minority students," says Bellan.

Vargas says that such contact is positive in general, and may be more so for minorities because many are the first generation in their families to go to college or to live in the U.S. "Someone who is poor, or who doesn't know the difference between Caltech and Cal Poly, or who sees more value in a job, will be harder to convince to invest energy to look into financial aid and not be scared away" by Caltech's \$18,000-per-year tuition. And people from across the country may wonder "if it's worth the emotional separation of being 3,000 miles away."

Speaking from her experience as a Latina, Vargas adds that choosing a college is usually a family decision. "It's not just what's best for the student; the uncles and aunts have to be convinced." The personal contact lets family members know that someone at the university cares about their teenager, she says.

With the importance of personal contact in mind, Bob Grubbs, Atkins Professor of Chemistry, suggested a modest faculty recruitment program, and "the Grubbs Initiative" was born. Bellan helped Grubbs boost the number of recruiters to 22, and staff members from Admissions, Development, and individual professors' offices handled the arrangements.

Many of the faculty members were able to incorporate their visits into research-related trips, keeping extra costs to a minimum. Others traveled just to recruit students, while still others met with local admits.

Even the president got into the act. When Everhart called admits and their parents, he says, "I think I surprised a few of them. But other university presidents are also doing this."

Faculty recruiters managed to meet

with 17 of the 35 underrepresented minority admits and 27 of the 41 admits offered Merit Awards. When Bellan and Director of Admissions Charlene Liebau looked at matriculation figures for the minorities, they found that 11 of the 17 admitted minority students who were personally recruited decided to come, whereas only 6 of the 18 who were not visited decided to come.

"Although very encouraging," says Bellan, "these statistics demonstrating the effectiveness of faculty visits must be treated with some caution, because students who had opted to go elsewhere would often decline to meet with a Caltech faculty member." He adds that these minority recruitment results contrasted strongly with those for the Merit Awardees, where personal visits by faculty did not make a significant difference in the acceptance rate.

"We want to let minorities know that they are welcome, that they can succeed, and that they have something to offer Caltech," says Everhart. "We thought if we took a more personal approach we'd be more successful. That seems to have happened."

However one interprets the results, Grubbs has seen the benefits of personal contacts for everyone. "Having three kids in college and having gone through the process, I know how good it feels to see faces connected with a school." Grubbs became the Caltech connection for an African American student, now a freshman, whom he visited in the Southeast.

Faculty recruiters including Grubbs want to continue meeting with the students they helped recruit. According to Lorden, what may become informal mentoring relationships would "complement rather than replace formal advisory roles, which are designated according to the student's field in the sophomore year."

As for future recruiting, Grubbs is enthusiastic that, with more planning, "we can do even better." He'd like to see individual faculty members get involved for a few years, returning to the same area again and again, in order to keep in touch with advisors and advanced-placement science teachers. This might work well for people who consult with a company in the area, he suggests. Then new faculty members could take over.

Faculty recruiters are not exactly new, says Grubbs. "One of the unique features of Caltech recruiting until about a decade ago was the faculty visit. People took two-week tours to cover numerous high schools, meeting with as many Institute applicants as possible, as well as with their advisors and teachers at each school. But it took phenomenal resources and was losing its effectiveness." The new program is more selective, he says.

Herrera recalls how surprised he was to hear that faculty members went out pounding the pavement. "Wow, get out of town," he says, "that takes a lot of effort." He should know, as one of Caltech's minority students who has worked with the Admissions and Minority Student Affairs offices to educate high-school students about Caltech. "I've done enough recruiting for a lifetime," he adds.

Changes affect offices

The President's Scholars program and faculty visits may represent the latest, biggest push to turn the tide on underrepresented minority enrollment. Certainly they required the most cooperation campuswide to be created and implemented in such a short period of time.

But they are part of a much larger picture. In recent months Lorden, as vice president for Student Affairs, has overseen changes in both the Minority Student Affairs and Undergraduate Admissions offices.

In the former, the vacant position of assistant dean was upgraded to associate dean/director of Minority Student Affairs. "This resulted in a national search for more senior, experienced candidates," says Lorden, and changed the reporting structure so that the person would report directly to him rather than via his assistant vice president. Cheryll Hawthorne was chosen for the post and joined Caltech in July.

Stanford's former assistant dean for Engineering and precollege director, Hawthorne will focus on Caltech's underrepresented minority undergraduates, especially providing academic advising. Some of her time will go toward working with Admissions and other offices on outreach programs for high-school and middle-school students, and raising funds for such programs.

Zaragoza Guerra was hired in September as an assistant director of

Continued on page 13

Entrepreneur

Continued from page 6

solid and that the resulting products have genuine commercial potential, Chu said that the next step is securing venture capital. It makes the most sense to approach a venture capital firm that has experience in the area of concern and is willing to help in times of crisis.

"Most important is the chemistry," Chu said. "It's like a marriage between the venture capital firm and the entrepreneurial entity. You're going to be in it together for at least five years until liquidity, so you have to make sure that you're able to work with the partners and that they understand what you're doing."

The next step is obtaining the funding. Typically, the entrepreneur has to present a business plan to the partners of the venture capital firm. "You must be able to convey your concept in layman's terms," said Chu, who was an applications and design engineer with VLSI Technology, and held positions at NSC Fairchild Research Center, the Jet Propulsion Laboratory, and the IBM Thomas J. Watson Research Center, before joining New Enterprise Associates. "Many general partners at the firm will not know your industry, so they have to understand your vision and mission. If you can convince the partners in layman's terms, they'll be persuaded that you can convince the public."

Every great product has a story behind it, so "Sell the vision," said Chu. "Know the market, know the competition, know the regulations, and raise the money before you are desperate, because if you're going to come to a venture capital firm with nothing in your pocket, they'll want to know how you landed in that situation."

The third step is negotiating the deal. "You need to know what you want out of this deal and what the venture capitalists want," Chu said. He suggests consulting other entrepreneurs or investment bankers to assist in determining the financial parameters of the deal.

Along with the negotiations comes the due diligence process, in which the entrepreneurs provide the venture capital firm with market data, information on the people involved in the venture, and financial statements. The venture capital firm then attempts to verify the information. "Be honest," Chu warned. "If you're optimistic on the market and, later on, we find out it's not that rosy," it will kill the deal.

Other tips for getting funding, Chu said, include having a strong and open-minded management team. "We want to know whether management will listen to suggestions. It's also important to know where you're going to be

in the next one, three, five, and 10 years—milestones that will help you gauge your progress. And when you're selling the vision, make sure you're committed to the vision and that you have a strategy in place. We're looking for people who are focused." Chu said it also helps if entrepreneurs have forged alliances with larger companies, since that adds credibility.

Because of their track record in starting new companies and creating innovative technologies, Caltech alumni might even have a slight advantage when approaching venture capital firms. Asked whether he would give special attention to Caltech alumni with ideas for starting a new business, Davisson hesitated before answering, as if anticipating phone calls from anyone who had ever set foot on the Caltech campus. Then he said, as a Caltech alumnus himself, "I obviously have a bias, so alumni would get my attention."

Athletes

Continued from page 7

athletes spend a lot of time in social interaction within the context of practices and games, which forms a solid basis for friendships." Bridges remembers a baseball player who "had a hard time staying focused on his studies because of many emotional distractions. It took him six years to graduate. I know that the help and encouragement he received from his baseball teammates was a big factor in his eventual success."

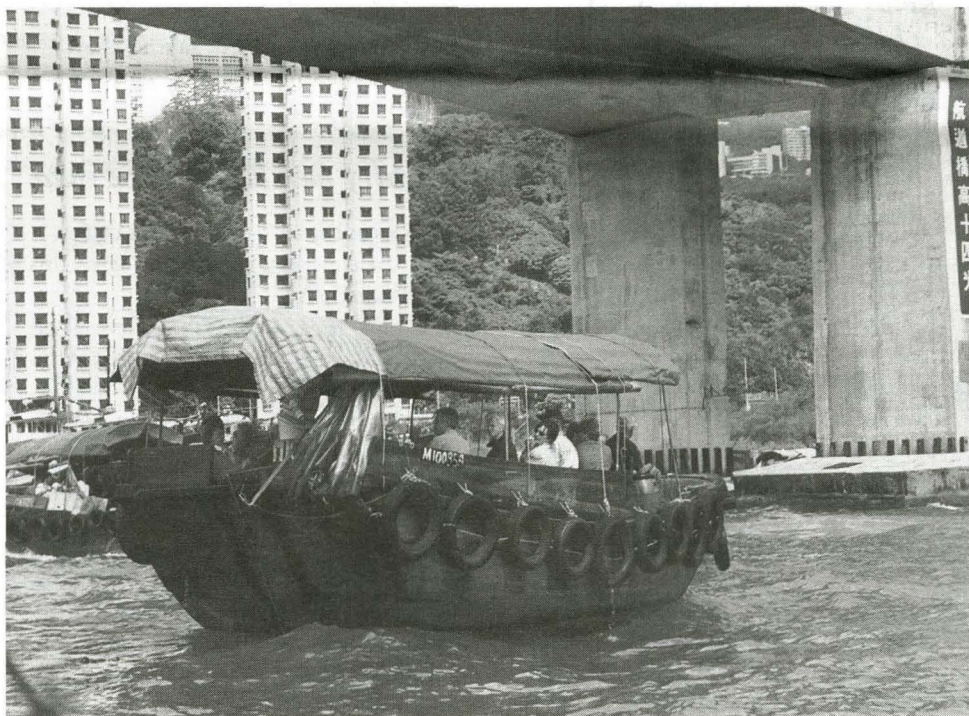
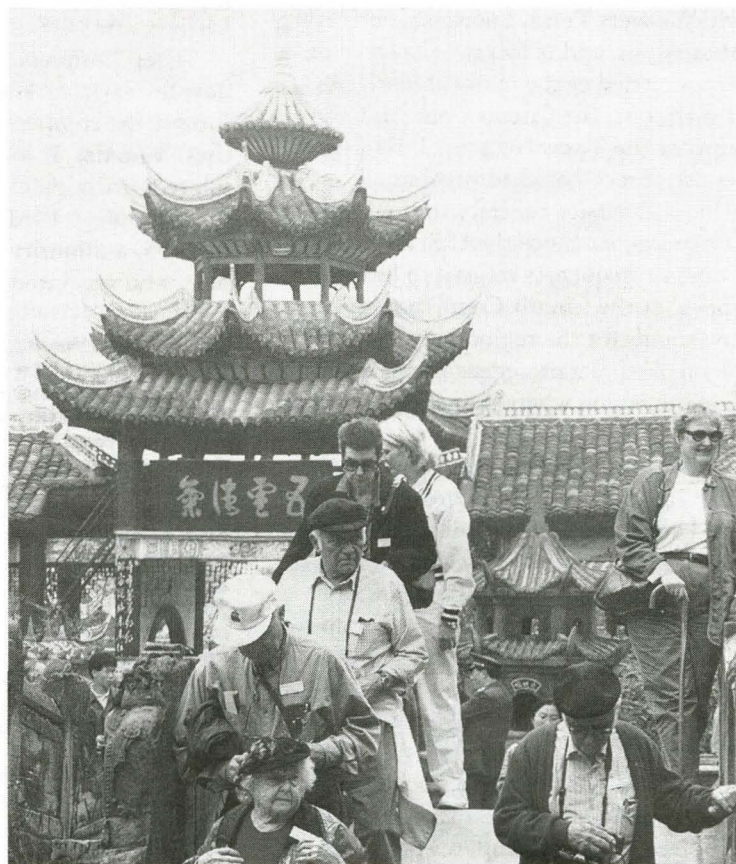
Students involved in athletics can also reach out to one another on a more formal basis through the three-year-old Athletic Council for Mentoring and Education (ACME) program, run by Caltech students for other students. Two or three students on each team are selected by their teammates to serve as mentors. The mentors attend an annual retreat and various other training sessions through the year in order to help teammates deal with problems and make responsible choices in a wide range of areas such as drug and alcohol use, academic concerns, time management, personal health, and conflict resolution.

"The student mentors do a wonderful job," says Bridges, "by serving as a positive role model for younger players and acting as a resource—letting students know where they can find help on campus for specific problems."

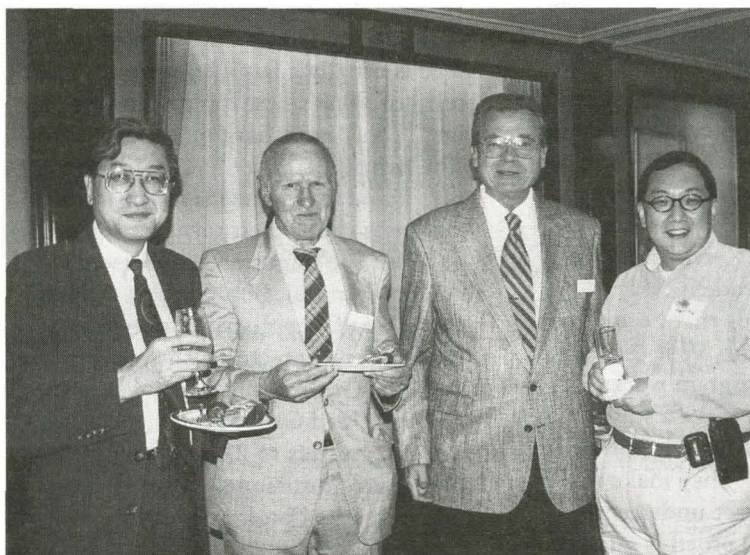
With the fall sports of volleyball, water polo, and cross-country winding down and the winter sports of fencing, basketball, and swimming starting their seasons, Caltech's 275 athletes will be hitting the gym, court, and water. Winning isn't everything or the only thing at Caltech. In fact it isn't even high on the list, according to Bridges. "If the coaches can make students feel better about themselves and instill in them positive values, then we've done a good job. The coaches are educators, whose lessons go far beyond winning and losing."

ALUMNI

Caltech alumni cross the "Bridge to Heaven" in the ancient city of Fengdu on the banks of the Yangtze River in central China. Clockwise from front, left, are Dori Milan, Don Pinkerton '57, Reuben Snodgrass 41, MS '42, Virginia Snodgrass, Sara Costigan, Jane Pinkerton, and Leo Milan '36. They were among the nearly 60 participants in the Association's recent travel/study program exploring China and the Yangtze River, led by Caltech Associate Professor of History James Lee.



Caltech alumni enjoy an outing aboard a sampan (above) in the Aberdeen harbor on Hong Kong Island during the extension of the Association's travel/study program in China. A highlight of the Hong Kong visit was the opportunity to meet with local alumni and participate in the inauguration of Roger Ng '85 (far right) as the first president of the Hong Kong alumni chapter, which has been serving roughly 60 Caltech graduates and postdocs unofficially for several years. Among those attending the event were (below, left to right) Poon Chung-kwong, a former postdoc at Caltech and currently the president of the Hong Kong Polytechnic University, where Ng is a lecturer; Ken Nicholson '53, MS '54, Eng 58; and Gerry Hooper '55.



Letter from the Association president: Celebrating our centennial

By Edward Lambert '82

In the last edition of *Caltech News*, I mentioned that the Alumni Association will be marking the centennial of the Caltech alumni organization in 1997. Several events are planned this spring to celebrate the centennial and promote the unique and substantial contributions that Caltech alumni have made to our society and throughout the world. These events offer an outstanding opportunity for alumni to return to campus, participate in special events, and get together with their friends from years past. Furthermore, this celebration provides us with the chance to recognize the exceptional achievements of Caltech alumni. I would like particularly to call your attention to these three events.

Centennial Celebration Dinner

On May 17, 1997, the Association will be sponsoring the 60th Annual Alumni Seminar Day. This has traditionally been one of the most well-received and well-attended events held by the Association. If you haven't participated before, 1997 will be a great time to start. The day's series of seminars, presented by campus and JPL researchers, will be capped that evening by a gala Centennial Celebration Dinner at the Ritz-Carlton Huntington Hotel in Pasadena. To make the event more affordable in such an attractive venue, ticket prices will be subsidized by the Alumni Association and by Caltech Institute Relations.

The evening's program will be one that all Caltech alumni can enjoy as we salute the greatest pranks or "Legends" in Caltech history. Five Legends have been selected as finalists:

- A Model T is rebuilt in a Ricketts House room
- The great Rose Bowl card caper
- A McDonald's contest goes strangely awry
- Caltech and MIT find their way onto the Rose Bowl scoreboard
- The Hollywood sign undergoes alterations

Key participants from these pranks have been invited to the dinner and will be sharing their stories. In addition, the Association will be making an award to the team responsible for the greatest prank of the first hundred years, based on alumni voting this spring. (See related story this page.)

We will also be saluting President Tom Everhart for his contributions to the Institute and its alumni. As you know, President Everhart will be retir-

ing in 1997, and the Centennial Celebration dinner offers a perfect opportunity for alumni to thank him for his ten years of leadership. In all, this promises to be an enjoyable day and a very special evening. For further information on the dinner, please contact Patsy Gougeon at 818/395-8366.

Alumni march at commencement

Caltech's commencement exercises on June 13 will include a new role for alumni. The faculty committee that plans commencement has graciously agreed to let alumni celebrate the centennial by participating in the graduation ceremony. For the first time in memory, alumni will join Caltech students, faculty, and trustees for the march in the opening procession. No special robes are required, although many alumni have already expressed their intent to wear theirs. In addition, we will be inviting several of the oldest "pioneer" alumni to be recognized during the commencement exercises.

Centennial issue of Caltech News

This spring, Caltech's Office of Public Relations will be publishing a centennial issue of *Caltech News*. As a special insert to this centennial issue, we will be including an alumni "pride piece" that highlights the remarkable careers, roles, and achievements of Caltech alumni. We will accomplish this by profiling two alumni from each of the last ten decades. By telling the stories of these alumni, we hope to celebrate the remarkable story of all Caltech alumni. Keep in mind that we are not attempting to select the greatest alumni of the last hundred years—that would be an impossible task given the scope and variety of Caltech alumni achievements. Rather, we want to illustrate the range of extraordinary alumni contributions over the last century. Who will be among these 20 alumni? Stay tuned and make your travel plans now for May 17 and June 13.

I look forward to seeing you there.

Association President Ed Lambert was recently elected a Caltech Young Alumni Trustee. The story—and picture—appear on page 3.

Alumni asked to vote for best prank

What's the greatest prank in Caltech's history? As Ed Lambert's article (See "Letter from the Association President," this page) notes, five finalists have been put forward for consideration by all Caltech alums. The winner will be announced at the May 17 dinner.

Alumni are asked to send their votes for the best prank to Alumni Association Assistant Director for Seminar Day/Reunions Patsy Gougeon, via e-mail to patsy@alumni.caltech.edu, or via regular mail to the Caltech Alumni Association, 1-97, Pasadena, CA 91125, Attn: Patsy Gougeon. **Please submit your votes by no later than March 31.**

More information on the dinner itself and other Seminar Day/Reunion Weekend events will be forthcoming in future issues of *Caltech News* and in the Preliminary Seminar Day Packet that will be mailed to all alumni in early March.

As for those alumni who are not familiar with this aspect of Caltech's illustrious history or who would like to refresh their memories about the Institute's prankish past, now is an excellent opportunity to order the 2-volume *Legends of Caltech*. Copies are available through the Alumni Association at 818/395-6592.

Black Family Reunion Weekend planned for alums

As part of the Institute's celebration of Black History Month, the Caltech Minority Student Affairs Office will hold a Black Family Reunion Weekend, February 22–23; please put this date on your calendar. Planned events include a picnic, play, technical talks, round-table discussions, and church service, as well as other activities. For further details, contact Cheryll Hawthorne, associate dean for minority student affairs, at 818/395-6207, or send e-mail to chawthorne@starbase1.caltech.edu. The Minority Student Affairs Office will be mailing out additional information in the near future. If you've recently moved, please let the office know your new address via phone or e-mail.

ALUMNI ACTIVITIES

January 31, San Francisco Chapter Reception, with guest speaker Tom Everhart.

February 8–18, Wings Over the Nile River Travel/Study Program, led by Francis Clauser, Clark Blanchard Millikan Professor of Engineering, Emeritus.

February 13, San Diego Chapter Reception, with guest speaker Tom Everhart.

February 19, Orange County Chapter Dinner/Meeting, with guest speaker, Nobel Laureate Edward Lewis, the Thomas Hunt Morgan Professor of Biology, Emeritus.

March 20, East Bay/Marin County Chapter Reception, with guest speaker Tom Everhart.

March 21, Seattle Chapter Reception, with guest speaker Tom Everhart.

April 2, Tri-State Chapter Reception, with guest speaker Tom Everhart.

April 3, Boston Chapter Reception, with guest speaker Tom Everhart.

April 19–26, The Last Frontier of Texas: Big Bend National Park Travel/Study Program, led by William Muehlberger '49, professor of geological sciences, University of Texas at Austin.

April 28, Houston Chapter Reception, with guest speaker Tom Everhart.

April 29, New Mexico Chapter Reception, with guest speaker Tom Everhart.

May 15–17, 60th Annual Seminar Day and Alumni Reunion Weekend. Classes of '27, '32, '37, '42, and '47 on the 15th; classes of '52, '57, '62, '67, '72, '77, '82, '87, and '92, and Biology Division Reunion on the 16th; Seminar Day on the 17th.

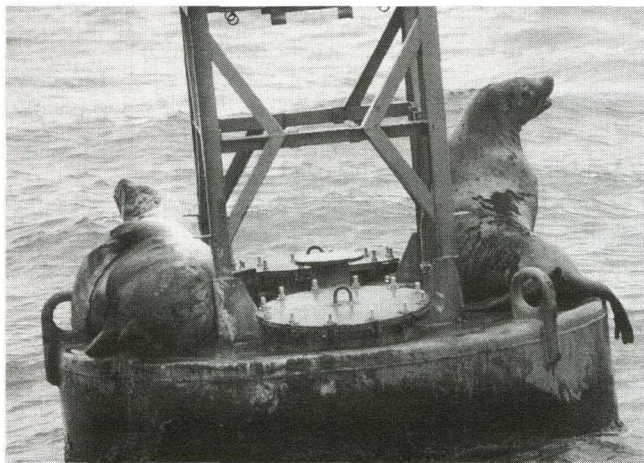
May 17, Alumni Association Centennial Celebration Dinner, Ritz-Carlton Huntington Hotel.

June 21–July 1, Alaska Travel/Study Program, led by Bob Sharp '34, MS '35, the Robert P. Sharp Professor of Geology, Emeritus, and Leon T. Silver, PhD '55, the W. M. Keck Foundation Professor for Resource Geology, Emeritus. See story, next page.

September 26–October 5, Rio Grande del Norte—Geology and Culture of the Rio Grande Travel/Study Program, led by Leon Silver.

Join Association on Alaska adventure

The Alumni Association's Alaska '97 Travel/Study program with Robert Sharp, the Robert P. Sharp Professor of Geology, Emeritus, and Leon Silver, the W. M. Keck Foundation Professor for Resource Geology, Emeritus, will begin with a sampling of coastal fjords and glaciers—including the magnificent Columbia Glacier—in the Turnagain Arm and Prince William Sound areas. Traveling from Whittier to Valdez, we are sure to see many species of wildlife on land and sea.



The natives await their fellow sea voyagers.

From Valdez, we will travel northeast via the historic Richardson Highway, paralleled by the Alaskan oil pipeline. This route crosses the rugged, heavily glaciated Chugach Range. Here, we will explore the Worthington Glacier and inspect elevated sections of the oil pipeline that were specially designed to avoid problems with frost heaving, perennially frozen ground, and ground ice.

Crossing the Copper River Basin, we will view the 16,000-foot peaks and active volcanoes of the Wrangell Range and the foothills of the Alaska Range. We will take a short diversion along the Denali Highway into tundra country, with its views of the snow-clad Alaska Range peaks. We will cross this range through the ice-scoured Delta River gap to the Tanana Lowland, which leads us northwest to Fairbanks.

At Fairbanks, a voyage by paddle-wheel steamer on the Chena and Tanana Rivers will be followed by an exploration of the geological hazards and history of the Fairbanks area. Moving into the Alaska Range, we will spend a day touring Denali National Park and, weather permitting, view Mount McKinley. Along the way, our chances of seeing caribou, moose, and grizzly bear—and even a bald eagle—are good.

From Denali Park, we will travel south through glacier-widened and lowered Broad Pass to the open spaces of the Susitna and Matanuska valleys. There, we will have an opportunity to view the volcanic peaks of the Aleutian Range.

Traveling south, we will explore the scenic, ice-scoured terrain of the Kenai Peninsula, finishing with the rail terminus and port city of Seward, now completely rebuilt after being devastated in 1964 by tsunami waves generated by the Good Friday Earthquake, magnitude 8.4. In Seward, we will take a day-long cruise of the Kenai Fjords that will bring us closeup views of glaciers and wildlife. Working our way back to Anchorage, we will make one of our most impressive stops—Portage Glacier, with its iceberg-filled lake.

Trip participants will assemble in Anchorage on Saturday, June 21, and disperse on Tuesday, July 1, 1997. The per-person cost of the trip is \$2,600 double occupancy and \$3,400 single occupancy—a price that includes all meals, lodging, and transportation while on the trip. Transportation to and from Anchorage is the responsibility of the participant.

To sign up for Alaska '97 please send a deposit of \$100 per person along with the completed coupon below. Deposits may be made by credit card; however, all final payments must be made by cash or check. Priority will be given to Alumni Association members, and space is limited.

If you have questions about the program, call Arlana Bostrom at 818/395-8363.

Caltech Alumni Association Alaska '97 Travel/Study Program
June 21–July 1, 1997

Here is my deposit for _____ spaces @ \$100 per person for the Alaska '97 Travel/Study Program.

Name(s) _____ Class Year _____

Address _____

____ Please charge my _____ VISA _____ MC _____ Check enclosed

Card # _____

Exp. Date _____ Signature _____ Total _____

Mail to: Alaska '97, Caltech Alumni Association,
Mail Code 1-97, Pasadena, CA 91125
For Credit Card Phone Reservations, call Kerry Etheridge, 818/395-6852
Credit Card Fax Reservations: 818/795-8736

Biology Division to hold first reunion

The evolution of biology in the new millennium, and the growth of new fields at Caltech, will be among the themes of the first Division of Biology reunion, which will be held Friday, May 16, in conjunction with the Alumni Association's 60th annual Seminar Day.

Designed primarily for students who received graduate degrees in biology from the Institute, the reunion program will include open houses in the biology laboratories and poster sessions, followed by a series of afternoon talks, a social hour, and dinner.

Among the day's talks, Nobel laureate Phillip Sharp will speak on the future of biology. Currently professor of biology and head of the Department of Biology at MIT, Sharp shared the Nobel Prize in physiology or medicine

in 1993 for his research into the basic structure and function of genes. His research advanced the biotechnology revolution by shedding light on the arrangement and reproduction of DNA.

Melvin Simon, Caltech's Biaggini Professor of Biological Sciences and chair of the Division of Biology, will speak on the future of biology at Caltech; and Gilles Laurent, associate professor of biology and computational and neural systems, will speak on future trends in neurobiology.

As part of the reunion year, Caltech graduate degree holders in biology will have the option to designate their giving to the division.

For more information on the reunion and reunion activities, please contact Mary King at (818) 395-2037 or via e-mail at kingm@starbase1.caltech.edu.

ALUMNI ASSOCIATION FINANCIAL STATEMENT

ALUMNI ASSOCIATION
CALIFORNIA INSTITUTE OF TECHNOLOGY
Pasadena, California

BALANCE SHEET
September 30, 1996

ASSETS	
Cash on Hand and in Bank	\$ 20,459
Investments: C.I.T. Consolidated Portfolio	2,039,512
Charles Schwab	135,500
T. Rowe Price	39,654
Caltech Employees Federal Credit Union	45,222
University ProNet	5,000
Accounts Receivable	2,098
Investment Income Receivable	47,897
Inventories and Postage Deposit	17,053
Deferred Program Expense	16,712
Computer and Other Equipment	30,609
Accumulated Depreciation	(12,240)
TOTAL ASSETS	\$ 2,387,476

LIABILITIES, RESERVES, and SURPLUS	
Accounts Payable	\$ 19,190
Deferred Income:	
Investment Income from	
C.I.T. Consolidated Portfolio	94,897
Life Membership Reserve	2,039,512
Operating Reserves:	
Directory	79,997
Publications	7,811
Computer Equipment	19,908
Investment in Equipment	18,369
Surplus	107,792
TOTAL LIABILITIES, RESERVES, AND SURPLUS	\$ 2,387,476

STATEMENT OF INCOME, EXPENSES, AND SURPLUS
For the Year Ended September 30, 1996

INCOME	
Dues of Annual Members	\$ 80,432
Investment Income:	
C.I.T. Consolidated Portfolio	90,121
Other Investments and Checking Account	23,718
Net Income of Alumni Programs	4,550
Sale of Legends and Other	3,952
TOTAL INCOME	\$ 202,773

EXPENSES	
Publications	\$ 20,976
Net Expenses of Seminar Day	13,587
Net Expenses of Class Reunions	21,404
Net Expenses of Chapter Programs	5,713
Student/Faculty/Alumni Relations	19,416
Undergraduate Admissions Support	14,631
Administration	54,767
Membership	7,258
Directory	20,000
Electronic Communication	9,041
TOTAL EXPENSES	\$ 186,793

INCOME OVER (UNDER) EXPENSES	\$ 15,980
Surplus, September 30, 1995	91,812
Surplus, September 30, 1996	\$ 107,792

INDEPENDENT AUDITOR'S REPORT

Board of Directors
Alumni Association
California Institute of Technology

I have audited the accompanying balance sheet of the Alumni Association, California Institute of Technology as of September 30, 1996 and the related statement of income, expenses, and surplus for the year then ended. These financial statements are the responsibility of the Association's Board of Directors. My responsibility is to express an opinion on these statements based on my audit.

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

In my opinion, the financial statements referred to above present fairly in all material respects, the financial position of the Alumni Association as of September 30, 1996 and the results of its operations for the year then ended in conformity with generally accepted accounting principles.

Calvin A. Ames
Certified Public Accountant

December 7, 1996

Diversity

Continued from page 9

Admissions and charged with leading the concerted on- and off-campus efforts to recruit underrepresented minorities. Says Director Liebau, this is his primary responsibility as assistant director, in addition to participating in the full range of admissions activities. And Lorden adds that everyone will continue to make a special effort to recruit minorities and women.

One of the projects that Guerra oversees is the Partnership Program that Admissions launched in the fall of 1995. Initiated by Assistant Director of Admissions Dina Figueroa, the program brings students and educators from 19 area high schools to Caltech, and Caltech representatives to high-school classes, for a series of activities.

"The purpose is to build bridges to surrounding area high schools," says Liebau. "Partnership schools are public schools that not only have high minority populations but also offer rigorous courses in math and science, which help prepare students for Caltech."

Partnership-school activities include trips by Admissions staff members to speak to entire classes about college planning and admissions; lectures by Caltech professors or alumni; a winter meeting between math and science high-school teachers and Caltech faculty on campus; and, tentatively, a spring science competition led by Caltech students.

Time will tell

Lorden is optimistic about how recent changes will affect minority recruitment and retention. "The fact that we did so much better this year—before Cheryll, before Zaragoza, and as the Partnership Program progressed—shows we should do much better next year. We have the right collaborative spirit among students, professors, and staff—we're especially fortunate that the students are helping us overcome our problems."

Neither Lorden nor Vargas had such high hopes a year and a half ago. "I was hopeful but not necessarily optimistic," says Vargas. From her undergraduate years of involvement with minority affairs, she has learned that changes can come slowly. "But I've been impressed with everyone's determination to make things happen"—and the administration's willingness to "put their money where their mouth is. I've seen a fair amount of follow-up from the Brennen committee's report."

Vargas is hoping to see other committee recommendations pursued as well, such as expanding Caltech's long-established 3/2 program to include partnerships with historically Black and Hispanic-serving colleges. Students in the 3/2 program typically come to Caltech after completing three years at one of several liberal arts colleges. They graduate two years later with a Bachelor of Science degree from the Institute, as well as a degree from their original institution.

In addition to building the Insti-

tute's minority community, says Vargas, such an expansion "would get the Caltech name out there more." In their predictions for the future, Vargas joins Herrera in expecting a slow rise in minority enrollment rates as a result of recent changes.

Says Everhart, "I had the sense when I came to the Institute that if we could make important incremental changes, that would be better than making revolutionary changes that had the potential to backfire, and consequently set us back. Incremental changes that are institutionalized become part of the culture."

By way of example, he notes that the enrollment of women at Caltech during his tenure has risen from 15 percent to about 25 percent annually. "We're not pushing for the ratio to be exactly 50-50," says Everhart, but at the same time "it won't go back to 15 percent. With a few more underrepresented minorities, the same thing might happen."

However, Brennen predicts that "we'd have to get up to some number that is substantially larger than the current number, perhaps 10 percent—approaching the percentage in the public at large"—in hopes of reaching a self-sustaining level that people refer to as a "critical mass." Caltech's 50 underrepresented minority undergraduates now total about five percent of the undergraduate student body.

The importance of the numbers lies in the students' perceptions of their community, says Brennen. Referring to entering students, he pointed out that if there are 14 underrepresented minorities, only two might end up in each house, and if these students see those numbers declining, they feel desperate.

"One of the primary purposes of the report was to address the concerns of the current underrepresented students and to help improve their morale. I was certainly satisfied with the report, but it remains to be seen if I'll be satisfied with the response of the administration and faculty to the recommendations we made." Brennen adds that he would like to see a continuing, proactive approach to the follow-up.

Everhart is open to further discussion of the issues. He says he will leave the execution of new policies in the hands of the appropriate offices and faculty committees. Grubbs adds that, with the success of last year's faculty visits to students, processes are being developed to maintain and expand this effort at the faculty level.

Says Everhart, "I'm proud of the way the Institute, with very strong participation by the faculty and students on the respective boards and committees, has approached the problem with regard for all persons concerned."

When he leaves campus this year, Everhart says he'll look back on the recruitment activity as a Caltech success, right down to the debates. "Sometimes intense discussion does a lot of good. Opinions get modified as a result. That's an important part of what universities are about."

PERSONALS

1946

JOHN S. SHOWELL, MS '49, retired from his position as program director for synthetic organic chemistry at the National Science Foundation in 1994. While at NSF he was very concerned with encouraging young women to enter the fields of science and technology. He has continued this concern as science consultant to his wife, children's book writer Ellen H. Showell, who has coauthored *From Indian Corn to Outer Space, Women Invent in America*, with Fred M. B. Amram. Intended to be of special interest to those of ages 12 and up looking for female role models in science and engineering, the book gives American social history from the perspective of women as inventors. With many drawings and photographs as well as study aids and creativity-challenging activities, it tells the stories of women responsible for innovations in computer science, textiles, agriculture, space research, and other fields. Included are first-person accounts by Nobel Prize-winner Gertrude Elion and other notable inventors, including women from NASA. The Showells live in Arlington, Virginia.

SHERMAN STEIN retired in 1993 after serving for 40 years as professor of mathematics at the University of California, Davis. Since then he has written *Strength in Numbers*, which was published by John Wiley and Sons in the fall of 1996. "The immodest goal of the book is to persuade everyone to appreciate mathematics for its utility and its beauty. From debunking myths to exposing psychics, from mathematics in the workplace to mathematics education reform, from three ways to sum a geometric series to a prelude to calculus, the 32 chapters use anecdote and a leisurely pace to make the case."

1962

JEAN-CLAUDE RIVET, MS, writes that he has retired and that, in June 1995, he was elected mayor of Pont-Aven, France, "a city famous for its butter cookies and for Paul Gauguin, who stayed there in the 1890s and painted some of his best masterpieces. Alumni of Caltech will be welcome!"

As *Caltech News* went to press, David Ho '74 was named "Man of the Year" by *Time* magazine. A native of Taiwan, Ho, who earned an MD from Harvard Medical School and now directs the Aaron Diamond AIDS Research Center in New York City, played a key role in the development of the protease inhibitors that—in combination with standard antiviral drugs—are proving to be a powerful weapon in the treatment of AIDS. While not a cure, when used in the early stages of infection—an approach pioneered by Ho—these "antiviral cocktails" have eliminated all signs of the HIV virus in the blood of many AIDS patients and have provided, in *Time's* words, "the first concrete evidence that HIV is not insurmountable." Calling Ho "an emblem of a key moment, picked to represent the best work of all the AIDS scientists," the magazine's editors sum up, "Dr. Ho did not make headlines but he helped make history."

1968

ERNO S. DANIEL, who went on from Caltech to receive both his MD and his PhD, has been honored by his inclusion in the 1996 edition of *The Best Doctors in America, Pacific Region*. He practices internal medicine and geriatrics at the Santa Barbara Medical Foundation Clinic in California, where he is chairman of the department of geriatrics and codirector of the vascular ultrasound diagnostic laboratory. He also holds an appointment as clinical assistant professor of medicine at the USC School of Medicine and serves as medical director of the transitional care unit of Santa Barbara Cottage Hospital. He is currently principal investigator of the study of the investigational drug milamilene in the treatment of Alzheimer's disease. In addition, he serves as question writer and reviewer for the geriatric-medicine examinations of the American Board of Internal Medicine. During a sabbatical in 1996 he served as internal-medicine consultant to the Saudi ARAMCO Medical Center, in Saudi Arabia.

KEEP US INFORMED!

Keep us informed so we can keep your fellow alums informed. 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_____

Is this a new address? _____ Day phone _____

Occupation_____

NEWS_____

1969
CHARLES ELACHI, MS, PhD '71, JPL's director of space and earth science programs, has been awarded the 1996 Nordberg Medal by the Committee on Space Research (COSPAR), for his contributions to space science, and was particularly cited for his contributions in active radar remote sensing, especially for the Magellan and Cassini missions. He received the award July 15 in Birmingham, England, during COSPAR's biennial meeting. Among his many other awards are the NASA Exceptional Scientific Achievement Medal (1982), the IEEE Medal for Engineering Excellence (1992), the NASA Outstanding Leadership Medal (1994), and the Nevada Medal (1995). An IEEE Fellow, he is the author of 200 publications, including reports and conferences, and is the holder of four patents. He is also the author-editor of the chapter "Microwave and Infrared Satellite Remote Sensors" in the new edition of the *Manual of Remote Sensing* (1983) and is the author of two textbooks, *Physics and Techniques of Remote Sensing* and *Spaceborne Radar Sensors*. He has been principal investigator on a number of NASA research and mission-development studies, as well as on the Shuttle Imaging Radar Experiments SIR-A (1981) and SIR-B (1984). Elachi lives in Altadena, California.

1970
RAHUL BASU, of Bangalore, India, writes that he is doing further research on alloy deformation after his earlier NSF work at Caltech under THAD VREELAND, JR., '49, MS '50, PhD '52. Basu is also restoring antique radio sets and doing some real-estate development. "I shall be happy to discuss prospects with a few alumni who may wish to purchase some apartments here."

1971
FRANÇOIS WILDENBERG, MS, of Contrexéville, France, has received the medal of Chevalier de l'Ordre National du Mérite from the president of the French Assembly. Receiving the medal of Commandeur de l'Ordre des Arts et Lettres at the same time was the sculptor Bernar Venet, who, although a resident of New York, made his sculpture at Wildenberg's company, Constructions Mecaniques des Vosges.

1975
DAVID B. ATKINSON, of St. Louis, Missouri, writes, "Brooke and I will celebrate our 45th anniversary this month (two per year)! Our son, Blaine, is now 18, and our daughter, Julie, is 14. Brooke is working on her PhD in history. I recently completed an enlightening MBA program at Washington University here in St. Louis, where we've lived now for almost 10 years. I continue to enjoy the world of 'high finance,' while envying the great majority of my classmates still involved in science and technology. I'm looking forward to our 25-year reunion in 2000!"

1977
RICHARD CAMPBELL, MS, is president of CE Holt Company, a Pasadena-based engineering company that is a subsidiary of CalEnergy Company of Omaha, Nebraska. CE Holt Company (formerly the Ben Holt Co.) has designed seven U.S. geothermal power plants, and two international geothermal power plants currently under construction (165 MW on Leyte, in the Philippines; and 55 MW on Java, in Indonesia). He is also president of the Geothermal Resources Council, and is a former chairman of the Southern California Section of the American Institute of Chemical Engineers.

1983
CAMILLA A. VAN VOORHEES '84, who received her two BS degrees in literature and biology, respectively, married LES NILES '81 on June 30. "I have changed my name to 'Camilla [first] Voorhees [middle] Niles [last], MD,'" she writes. "Les changed his name to 'Les [first] Voorhees [middle] Niles [last], PhD.' I am doing a fellowship in women's psychiatry at UCSF, and Les continues to work for Xerox PARC." The couple live in Palo Alto, California.

1985
MARGARET OLICH BAILEY, of Coeur d'Alene, Idaho, writes: "We've had two new additions to our family this year. Kerry joined sister Lauren on September 25, 1995. And in January we acquired a second MailBoxesEtc franchise. Life is wonderful in Northern Idaho!" BRIAN DAVISON, PhD, of Farragut, Tennessee, has been named group leader of the biochemical engineering group in the energy research section of the Chemical Technology Division of the Department of Energy's Oak Ridge National Laboratory; he had been serving as acting group leader since November 1995. Since joining Oak Ridge, he has been involved in a number of projects related to biochemical engineering, and he earned a Martin Marietta Energy Systems Technical Achievement Award in 1992 and a Significant Event Award in 1987.

1986
DANIEL E. LOEB, of Bala Cynwyd, Pennsylvania, writes that, after six years in Bordeaux, France, he has moved to the Philadelphia area with his wife, Helen, and his children, Gabrielle (five) and Jonathan (two). There, he will be doing industrial mathematical consulting for Wagner Associates.

1991
MARK LYTTLE as well as several alums and friends were houseguests of his mother during the Atlanta Olympics. She was "thrilled," she writes. Guests included SCOTT KISTER '91, Stella, ANDRE OHANISSIAN '90, Paul Socolow, John Raguin, Janis, and DELWYN GILMORE '92. CHRIS CAMPO '91 and Cathy were missed. "Thanks to all the guys," Mark's mother adds, "for their tasteful parting gift of classical CDs and a stuffed Izzy!"

OBITUARIES

1929
WILLIAM H. MOHR, MS '30, of Santa Monica, California, on March 24; he was 89. He worked for the State Highway Department and was one of the original engineers involved in designing the Oakland Bay Bridge in San Francisco. During World War II he commanded a Corps of Engineers camouflage battalion in Germany. He returned to active duty during the Korean War and later retired as a full colonel. He belonged to the Santa Monica chapters of the Shriners and BPOE. He is survived by a son, William; a daughter, Joan Johnston; three grandchildren; and a sister, Darlyne Holliday.

1930
WENDELL L. HUMPHREYS, Ex, of Scotts Valley, California, on April 23. A registered civil and structural engineer, he was employed by the state of California and the Western Precipitation Company. For the latter, Humphreys designed and managed the installation of pollution-control equipment in various states and foreign countries. An early interest in computers led him to perform pioneering work in the computer design of large equipment. After retiring, he continued to pursue his interest in mathematics and computer programming. He is survived by two sons, James and Donald, and by three grandchildren; Dorothy, his wife of 57 years, died in 1995.

O. FRANKLIN ZAHN, of Los Angeles, on June 3. A pacifist and activist who was jailed for his beliefs, Zahn was a conscientious objector during World War II who rejected civilian public service and joined a noncooperative group that protested their unpaid labor. He was arrested for desertion while working in a hospital and was jailed. He served a second jail term in the early 1960s after joining the crew of *Everyman II* in protesting nuclear tests in the South Pacific. Early in his life, Zahn had

adopted disciplines of religious asceticism such as meditation, vegetarianism, celibacy, and voluntary poverty, and in 1956 he joined the then-new Wider Quaker Fellowship in Claremont. In recent years he was a resident of the Los Angeles Friends Meeting in South Central Los Angeles, assisting minority groups. Zahn had published his autobiography, *Deserter From Violence*, and completed a second book, *Alternative to the Pentagon*.

1932
BRYANT FITCH, of Napa, California, on May 4; he was 86. A retired chemical engineer, he earned a master's degree from the University of Connecticut and was employed by the American Potash Company, in Trona, California, in the 1930s and early '40s, and then by the Dorr Oliver Company, in Westport, Connecticut, where he worked for 32 years, performing research on flocculant suspensions and on sedimentation and supervising installation of Dorr Oliver equipment in chemical-processing plants worldwide. He later taught at Carnegie Mellon University and Auburn University. A holder of 27 patents, he was published extensively in engineering journals. He retired to Napa in 1981. An enthusiastic gardener particularly knowledgeable in the breeding of rhododendrons, he was also a fencer and jewelry maker. His first wife, Mary Elizabeth, died in 1979. He is survived by his widow, Nan Stormont Vaaler; a daughter, Mary Jill; a son, James; two stepsons, Erik Vaaler and Iver Vaaler; two brothers, James and Robert; a sister, Jean Ariss; and numerous nieces and nephews.

1933
IRVING P. KRICK, MS, PhD '34, of Pasadena, California, on June 20; he was 89. A pioneer in the fields of long-range forecasting and weather modification, or cloud seeding, he had also been a principal participant in the preparation of the D-Day forecast for the Normandy invasion, on June 6, 1944. After receiving his PhD, he was encouraged by Robert Millikan and Krick's mentor, Theodore von Kármán, to establish meteorology at Caltech as a branch of aeronautics. One of its first professors, he remained head of meteorology until leaving Caltech in 1948. Also at the suggestion of Millikan and von Kármán, he traveled to Europe and studied the air-mass theories of Scandinavian and German meteorologists. In 1936, Krick founded one of the first private meteorological consulting firms, with the Motion Picture Producers Association as one of his first clients. With the outbreak of World War II, Krick was asked by General H. H. "Hap" Arnold, chief of the U.S. Army Air Forces, to establish a training program at Caltech for USAAF meteorologists. Krick also began work on a "weather-typing system," which became the basis for his future long-range weather-forecasting system. Arnold also asked Krick to assist in establishing a weather directorate in England, to prepare forecasts for bombing missions and, eventually, the invasion. Krick became chief of the weather information section at Eisenhower's headquarters, and for these efforts he received numerous medals from both the U.S. and French governments. After leaving Caltech in 1948, Krick expanded his private firm and moved it to Denver. He was among the first to use computers in long-range forecasting, and after much research he began commercial cloud-seeding operations. In 1966 he relocated Irving P. Krick Associates to Palm Springs, and in 1990 he sold it to Strategic Weather Services, becoming chairman emeritus of that company. He is survived by his wife, Marie; a daughter, Marilyn Lunde; and a son, Irving P. Krick II.

1935
GORDON EWING, of Chicago, on July 13; he was 83. A retired R. R. Donnelley & Sons Company vice president, he was an expert on jazz great Duke Ellington and on wines. After graduating from Caltech, he received his MBA from the Harvard School of Business in 1937. He then worked for the Army Ordnance in Chicago, procuring materials for the war effort. After the war he served on a congressional committee, looking into the costs of moth-

balling ships. Returning to Chicago in 1949, he went to work for Donnelley in its engineering department, then left in 1962 to head the printing division of Meredith Corporation, in Des Moines, Iowa. He rose to its presidency, then rejoined Donnelley in 1967. He retired in 1977 as head of Donnelley's catalog and directory division. A member of the Duke Ellington Society, he was instrumental in encouraging Chicago's Pegasus Players to produce the acclaimed revival of the musical *Jump for Joy*. He also donated books and other materials to the jazz archives at the University of Chicago and gathered a computerized itinerary of Ellington's every public performance. An avid wine collector, he headed the Chicago chapter of an international association for promoting Burgundy wines. He is survived by his wife, Miriam; a daughter, Ellen; a son, Gordon Jr.; a foster son, Fernando Suarez; and two grandsons.

1936
BERNARD M. OLIVER, MS, PhD '40, of Los Altos Hills, California, on November 11, 1995; he was 79. He worked for 12 years at Bell Labs, and then in 1952 joined his Stanford classmates William Hewlett and David Packard at their Hewlett-Packard Company, where he was director of research for four decades and founded Hewlett-Packard Laboratories. In 1957, he was named a vice president and joined the board of directors. The holder of more than 60 U.S. patents and the author of numerous papers, he received the National Medal of Science in 1986 and NASA's Medal for Exceptional Engineering Achievement in 1990; he was perhaps best known for the design of the first programmable desktop calculator and the handheld calculators that followed it, as well as Hewlett-Packard's first computer. He was also the founder of Biosys, a company specializing in biological controls for agriculture. With a background in radio physics, he became interested in radio astronomy as a practical means to attempt the detection of intelligent extraterrestrial life, and his concept of a phased array of 10,000 steerable dish antennas was a catalyst for a major feasibility study, Project Cyclops, which he codirected in 1971, and which became the basis for much of the Search for Extraterrestrial Intelligence (SETI) project, including a NASA program of which Oliver was a senior manager. In 1993, when Congress mandated an end to NASA's involvement in SETI, he was instrumental in finding philanthropic funding to continue part of the experiment under the auspices of the nonprofit SETI Institute, for which he served as a board member and with which he remained involved until his death. Priscilla, his wife of nearly 50 years, died in 1994, and he is survived by two daughters, Karen and Gretchen, and by a son, William.

RALPH H. OSTERGREN, MS, of Anaheim, California, on June 13. After a period with the L.A. Bureau of Power and Light, he worked for a number of Southern California companies, including Bell Telephone, Douglas Aircraft, Northrop Aircraft, North American Aircraft, Beckman Instruments, and the Nano Laboratory. He did consulting work for a variety of other companies as well. He is survived by his wife, Evelyn.

1938
KENNETH J. PALMER, PhD, of Medford, Oregon, on April 25. After a three-year post at Washington University in St. Louis, he accepted a position as head of the physics investigation unit at the U.S. Department of Agriculture's Western Regional Research Laboratory, in Albany, California. He conducted research in X-ray crystallography for the last 15 years of his career at the lab and, at the time of his retirement in 1975, was research leader of the instrumental analysis unit. He is survived by his wife, Helen; a son, Donald; a daughter, Virginia Horler; and three grandchildren. HAROLD L. SMITH, MS, of Seattle, Washington, on March 24. Prior to attending Caltech, he had graduated from West Point in 1930, joined the Army Air Corps, and become a pilot at Kelly Field, Texas. Much of his career was devoted to meteorology and communications,

and he helped develop the Air Weather Service. During World War II, he served in the Aleutians and the Pacific theater, and in 1947 he was a member of the first class of the National War College, in Washington, D.C. He commanded the U.S. base in the Azores during the 1950s. His decorations included the Legion of Merit, plus two medals from Portugal for meritorious service, and an honorary doctorate from American International College. He retired with the rank of brigadier general. He is survived by his wife, Karine, and two nieces, Dorothy Gibson and Mary Ann Magnone.

JOSEPH L. VELAZQUEZ, MS '39, of Burbank, California, on April 21; he was 80. An aeronautical engineer, he served on an aircraft carrier during World War II and, during his career, held positions at Douglas, North American, Piaseki, Weber, Hughes, and, finally, Lockheed, where he worked in that company's legendary, top-secret "Skunk Works." He was featured in *Aviation Weekly* for his work on vertical takeoff and landing craft. Holder of a private pilot's license, he enjoyed flying to points ranging from Catalina Island to Las Vegas to Mexico City. He also enjoyed yachting, roller coasters, horseback riding, musicals, and the "forest" that he planted around his home. After his reluctant retirement when he turned 75, he continued working in his home laboratory on his "project," a perpetual-motion apparatus. He is survived by his son, Lewis William Velazquez Stewart; his daughter, Anita Marlene Velazquez Tighe; two grandsons; and a brother, Hector Velazquez Moreno.

1940
SHERWIN P. AVANN, MS, PhD '42, of Redmond, Washington, on May 22; he was 83. A mathematics professor at Yale, Washington University in St. Louis, Caltech, and the University of Washington, he retired from the latter institution in 1975. A member of the Mountaineers, he both taught climbing and had climbed most of the major peaks in the western United States, and he enjoyed skiing as well. Kathleen, his wife of 39 years, died last year. He is survived by two nieces, Jamie Avery and Lauren Martin.

1943
ROBERT E. BEVIS, Ex, of Orinda, California, in October 1995. He is survived by his wife.

1944
EARLE K. FISHER, of La Habra Heights, California, on August 10, 1995. He is survived by his wife, Lois.

RICHARD H. GILMAN, MS '47, of Berkeley, California, on March 2; he was 75. After attending officer candidate school and receiving his commission as a lieutenant in the Marine Corps, he served on Okinawa and in Tientsin, China, 1944–46. After receiving his master's degree, he became controller of Leeds, Hill & Jewett Engineers. He was ordained a deacon in 1984 and a priest in 1985 in the Anglican Province of Christ the King and was controller of the Diocese of the Western States. Predeceased by his first wife, Elaine, and his second wife, Wynn, he is survived by a sister, Ann Butte, and by two nephews.

JOHN A. HIGHTOWER, CAVU, of Ancho, New Mexico, on January 5, 1996; he was 72. One of a group of students during World War II who received certification at Caltech after completing an accelerated training program in meteorology, and who referred to themselves as Ceiling and Visibility Unlimited, Hightower was commissioned as a second lieutenant and served in the Army Air Force as a weather forecaster. He married Vernelle Stoneman Brininstool on December 3, 1944, and after the war the couple moved to the homestead of Hightower's grandfather, where they became ranching partners with Hightower's parents. The ranch was expanded, and grew into the Hightower Land & Cattle Company, which his sons currently manage. A former Lincoln County Commissioner, he also served on the Soil and Water Conservation Board, the

Carrizozo School Board, the board of trustees of the Lincoln County Medical Center and Carrizozo Health Clinic, and the New Horizons Developmental Board of Directors. He was a member of the New Mexico Cattle Growers and Farm Bureau. He is survived by his wife, Vernelle; two sons, Gary and Bill; and seven grandchildren.

1946
WALTER D. BONNER, PhD, of Shanesville, Pennsylvania, on August 6; he was 75. Emeritus professor of biochemistry and biophysics at the University of Pennsylvania Medical Center, he spent his research career studying the respiratory systems of plants; a highlight was a series of papers identifying a unique electron transfer system (the "alternate oxidase") used to heal plants. After he received his doctorate from Caltech, Bonner completed a postdoctoral fellowship at Cambridge in 1951. He then achieved associate professor status with Cornell University's botany department. In 1959 he was appointed professor of physical biochemistry at Penn, later becoming professor of biochemistry and biophysics when that department merged with the biochemistry department in 1975. After retiring he became associated with Albright College as research mentor for undergraduate biology and biochemistry majors, and continued with his own research as well. He is survived by his wife, Josephine; two sons, Andrew and Brian; a sister, Priscilla Horton; three brothers, Lyman, Robert, and Francis; and three grandchildren. His brother James Bonner, a longtime Caltech faculty member, died on September 13.

1948
DAVID B. WILFORD, MS '51, of Encinitas, California, on April 2; he was 70. A computer designer and math teacher, he had worked at General Dynamics and taught at Grossmont High School, in San Diego County, until his retirement a decade ago. After graduating from Caltech, he worked as a chemist for Gulf Oil in the Los Angeles area and then as an engineer at North American Aviation in Pasadena, where he helped develop the Atlas and Saturn rockets. He entered the computer field while employed in Bethesda, Maryland, by General Electric, and was hired by General Dynamics in 1968. A diabetic, he was active in the American Diabetes Association and the Hemochromatosis Society, hemochromatosis being a rare disease in which iron deposits build up throughout the body, often resulting in diabetes and other ailments. He is survived by a daughter, Victoria Wilford-Beanan; a son, John; a sister, Mary Jane Clark; a brother, Ed; and seven grandchildren.

1953
WILLIAM DUESTERHOEFT, JR., PhD, of Austin, Texas, on June 14; he was 74. After receiving his doctorate, he worked at General Dynamics, developing digital processor applications to reconnaissance systems. In 1954 he returned as associate professor to the University of Texas (UT), where he had received his bachelor's degree in 1943. He was promoted to full professor in 1961 and was assistant chairman of the electrical and computer engineering department from 1969 to 1991. He served as a research associate at the Oak Ridge National Laboratory in 1957 and the General Atomics Lab in 1963, he initiated a UT research arrangement with the Texas Atomic Energy Research Foundation in 1963–64, and he helped obtain for UT the Department of Defense Joint Services Electronics Program in 1964. Active in student advising and in academic affairs, he received the General Dynamics Teaching Excellence Award in 1958, as well as four other teaching excellence awards from student organizations, and the Certificate of Merit from the National Academic Advisor Association in 1985. A life fellow of the IEEE, he was also a member of Sigma Xi, Tau Beta Pi, and Eta Kappa Nu, and a registered professional engineer in Texas. He is survived by his wife, Doris; a daughter, D'Ann; two granddaughters; a brother, Ernest; and two sisters, Martha Duesterhoeft and Bertha Zuch.

1955
JAMES N. MCCLOUD, MS '56, of Pasadena, California, on August 2; he was 71. While employed at Skil Corporation, he invented the Skil roto-hammer, which is now in use worldwide. Devoted to theoretical mathematics, he taught math for many years at Foothill High School in Pasadena, and he continued private tutoring until his death. An award-winning speaker and a member of Toastmaster's International, he was also a vocal soloist for many community activities, and he had recently published three volumes of short stories: *Growin' Up*, *Potpourri*, and *99 Short Tales*. He was, in addition, a registered professional engineer, a member of Sigma Xi, and a nominee to *Who's Who in America*. He is survived by his wife, Bertha; two sons, James and David; a daughter, Susan; three grandchildren; four brothers, David, Marshall, Bill, and Owen; and a sister, Mary.

1959
WILFRIED E. STOCKMAIR, ENG, of Gauting, Germany, on May 25; he was 59. A European patent attorney, he was one of the founders of the firm Grünecker, Kinkeldey, Stockmair & Schwanhäusser. He often traveled to Japan, both to visit his friend Akira Kobayashi, MS '59, and to research Japanese aircraft companies. He is survived by his wife, Judith; a son, Cornelius; a daughter, Verena; and his mother, Maria.

1963
WILLIAM L. BURKE, PhD '69, of Santa Cruz, California, on July 22, following an automobile accident while on vacation. He was professor of physics and of astronomy and astrophysics at UC Santa Cruz, with a close connection to Lick Observatory. An outdoor enthusiast, photographer, and wood craftsman, he had an eclectic intellect and was a voracious reader. He had a longtime interest in oriental culture, practicing Tai Chi, playing Go, and contemplating how ancient cultures as well as our own have attempted to understand and experience their connection to the universe. He had a deep interest in general relativity and cosmology and, following his important calculation of gravitational radiation by binary stars, he joined the faculty at UCSC in 1970. "He was renowned for his fundamental grasp of physics and geometry, often leading other people in productive directions; one result was his being known as the 'Godfather of the Santa Cruz Chaos Cabal.'" He published two books, *Spacetime, Geometry, Cosmology* and *Applied Differential Geometry*, and coauthored a widely used primer on special relativity. Another work, cast as an interactive computer text and graphics, was nearly completed. He had remarkable senses of balance: skeletal, metaphysical and psychological. He is survived by his father. His spirit continues in his homepage: <http://www.ucolick.org/~burke/home.html>.

1970
THOMAS H. MARKERT, of Brookline, Massachusetts, on June 19, of thyroid cancer; he was 48. After graduating with honor from Caltech, he received his PhD in physics at MIT. He became a member of the research staff at MIT's Center for Space Research in 1975, and had been a principal research scientist since 1990. His professional-society memberships included the American Astronomical Society, the American Physical Society, and the International Astronomical Union, plus he was an active volunteer and served on the boards of directors of several nonprofit organizations. He is survived by his wife, Angie; his parents; and a brother, a niece, and a nephew.

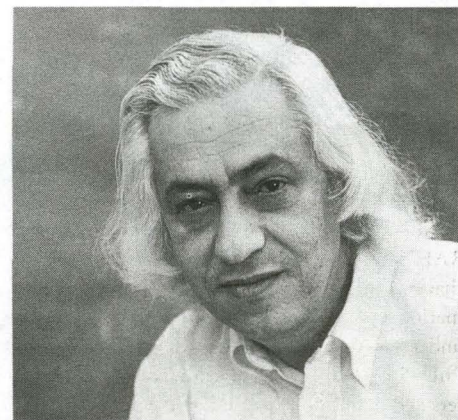
On December 14, the Caltech community was saddened to learn of the death of Howard Keck. A former Caltech trustee, Keck was for many years chair of the W. M. Keck Foundation, which among its many philanthropic pursuits provided the major funding for the W. M. Keck Observatory.

Ricardo Gomez 1929–1996

Professor of Physics, Emeritus, Ricardo Gomez died unexpectedly on October 14, in Pasadena. Gomez, 66, had been at Caltech for 40 years.

A native of Bogota, Colombia, Gomez came to Caltech in 1956 as a research fellow after earning his PhD from MIT. He was appointed senior research fellow in 1959, and served in that capacity until becoming an associate professor in 1971. He became a professor in 1977, and retired as emeritus professor in July 1996.

According to Charles Peck, chair of



Ricardo Gomez

Caltech's Division of Physics, Mathematics and Astronomy, Gomez in his early years at Caltech exploited the Caltech 1 GeV electron synchrotron for photoproduction studies at what was then the high-energy frontier of particle physics. He later helped establish the new style of doing particle physics experiments at remote accelerators, contributing to Caltech-led experiments at Lawrence Berkeley Laboratory, SLAC, the Brookhaven National Laboratory, and Fermilab. His research included studies of the photodisintegration of the deuteron, the photoproduction of various mesons from nucleons, and the interactions of high-energy mesons with nucleons. He also searched for fractionally charged particles, made experimental tests of quantum chromodynamics, and investigated certain meson decay modes of special interest.

Throughout his career, Gomez was also known for his commitment to undergraduate teaching, and he took particular interest in the introductory undergraduate lecture courses and laboratories. In recent years, he played an active role in upgrading the freshman and sophomore physics labs and in creating new ones.

Said Peck, "It was not uncommon to find him absorbed in how to present some concept or other to his classes and he spent a great deal of time with both graduate and undergraduate students. With his legendary exuberance, he always took a strong interest in the welfare of students."

Gomez also conducted training programs for high school teachers in his native country, Colombia, translated important high school physics texts into Spanish, and participated actively in various programs for minority students in Pasadena.

He is survived by his wife, Clara; and two daughters, Marta Inez Gomez of Boston, and Adriana Gomez of Santa Monica, California.

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