Caltech News

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1996

The campus gets an Avery label

It's a Caltech house that would have welcomed Richard Feynman and his bongo drums as residents. And Thomas Edison might have been a sponsored guest for coffee and ideas on how to market inventions.

It's a residence for undergraduate and graduate students—and faculty. It's a residence for visiting lecturers. It's a campus community center. Its focus is entrepreneurship. Its focus is science and the arts. It's a library. Cozy coffeehouse. Elegant dining hall. Intimate. Airy and expansive. Brand-new. Feels like it's always been here.

It's Avery House, Caltech's innovative and ambitious new student-faculty residence hall, and further proof—if any is needed—that when R. Stanton Avery, creator of the ubiquitous and indispensable Avery label, gets an idea, it tends to stick.

Established with funds donated by Avery, who headed the Institute's board of trustees from 1974 to 1985, the $16.1-million, rambling Spanish Colonial structure was dedicated on September 10, just two weeks before it was due to welcome the 100 undergraduates, 35 graduate students, and three faculty members who will live together there. In addition to housing this diverse range of residents, Avery House will offer all Caltech students unprecedented and varied opportunities to explore the world of entrepreneurship and serve as a campus community center for a wide range of social, cultural, and intellectual activities.

"What goes on in Avery House will be pace-setting for all of American higher education," declared President Tom Everhart, as he welcomed about 300 guests to the dedication, held on the Avery House grounds at the northeast side of campus.

Joining Everhart as speakers at the ceremony were Board of Trustees Chair Gordon Moore (whose own eponymous facility, the Gordon and Betty Moore Laboratory of Engineering, was dedicated just last winter); Vice President for Student Affairs Gary Lorden '62, who headed the building committee that oversaw the planning, design, and construction of Avery House; representatives of the building's architectural and construction firms; and Stan Avery, who has maintained a close and active relationship with the Institute as board chair emeritus and a Life Trustee.

Lorden spoke for many of those present when he hailed Avery House as "a dream come true for a group of faculty and students who seven years ago expanded upon a recurring idea in the history of Caltech, the idea that there is a special kinship between our students and faculty, and that there should be a community-within-the-Caltech-community—at least one place—where professors and graduate students and undergraduates could live together, eat the same food, and join in the same conversations—talking as friends and Techers."

Adding that "boy, that food had better be good!" Lorden went on to speak with pride of at least one Specialty of the House—the array of visitors who will live for short periods in a guest apartment in Avery House and spend time with the residents. Many of these will be entrepreneurs who have distinguished themselves in a variety of ventures and whom a young engineer or scientist-to-be would view as inspirations. Others will be noted figures in the arts, sciences, or public life. Many will be Caltech alumni. The special events and programs built around these guests will, said Lorden, "not only enrich the life of this house, but all of campus life."

It was Avery himself, Lorden told the gathering, who suggested folding entrepreneurial ideas and encouragement into the building's concept, through seminars, a unique library exhibit, and entrepreneurs-in-residence, so that Avery House will, in Lorden's words, "inspire the Gordon Moores, Arnold Beckmans, and R. Stanton Averys of the next century."

Such aspiring entrepreneurs might well take Avery as a role model. When Avery, who worked his way through Pomona College, graduated in the midst of the Depression, he found it, he says, "easier to start a business with no capital at all than to get a job with no training at all." Luckily, he had no shortage of creative business ideas. The smoked-banana import business didn't pan out, and the adhesive company that hired him folded, but Avery borrowed $100 from his bride-to-be (she "married him for her money," he once said), cobbled together a prototype label-maker from a washing-machine motor, parts of a sewing machine, and a saber saw, and started the successful Kum-Kleen label business. And when it burned to the ground, an undaunted Avery took the $3000 insurance money, built new, modern machinery, and was back in business in a month—using a process that today is basic to the entire self-adhesive label industry, and which ultimately led to the advent of the Avery Dennison Corporation.

Today, Avery Dennison is a multi-billion-dollar international concern that dominates its market. As befits a minister's son, Avery has contributed his time and energy to a wide range of philanthropic concerns. His gifts to Caltech include the R. Stanton Avery Distinguished Service Professorship, currently held by Professor of Physics Rochus (Robbie) Vogt. In 1960 the Avery family established the Durfee Foundation, which since 1985 has offered members of the Caltech community the opportunity to undertake a "life-changing adventure" in China, where Avery spent a year in 1929 working on famine relief. A recent Durfee Foundation

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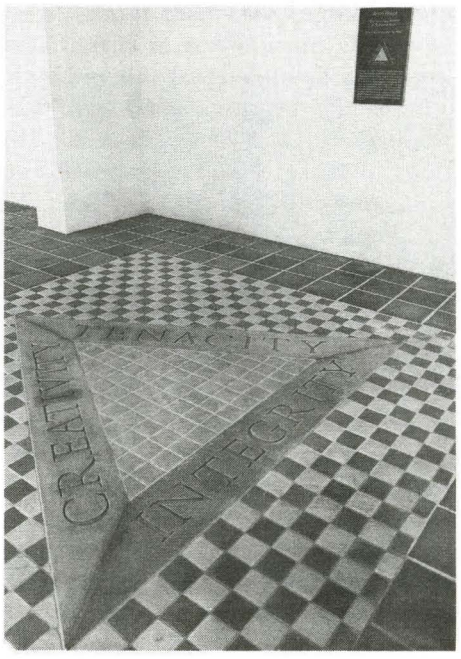
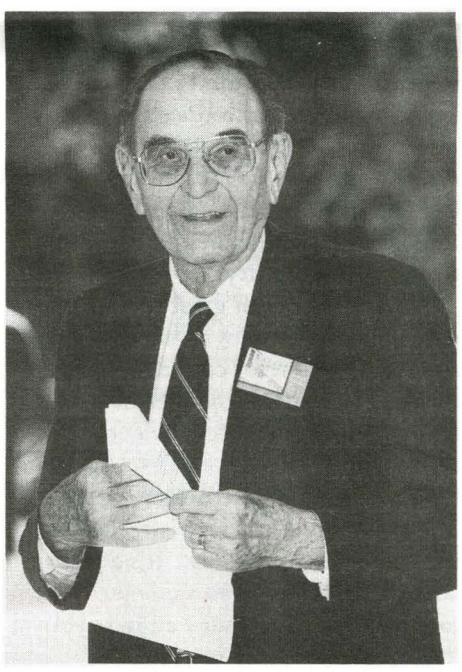
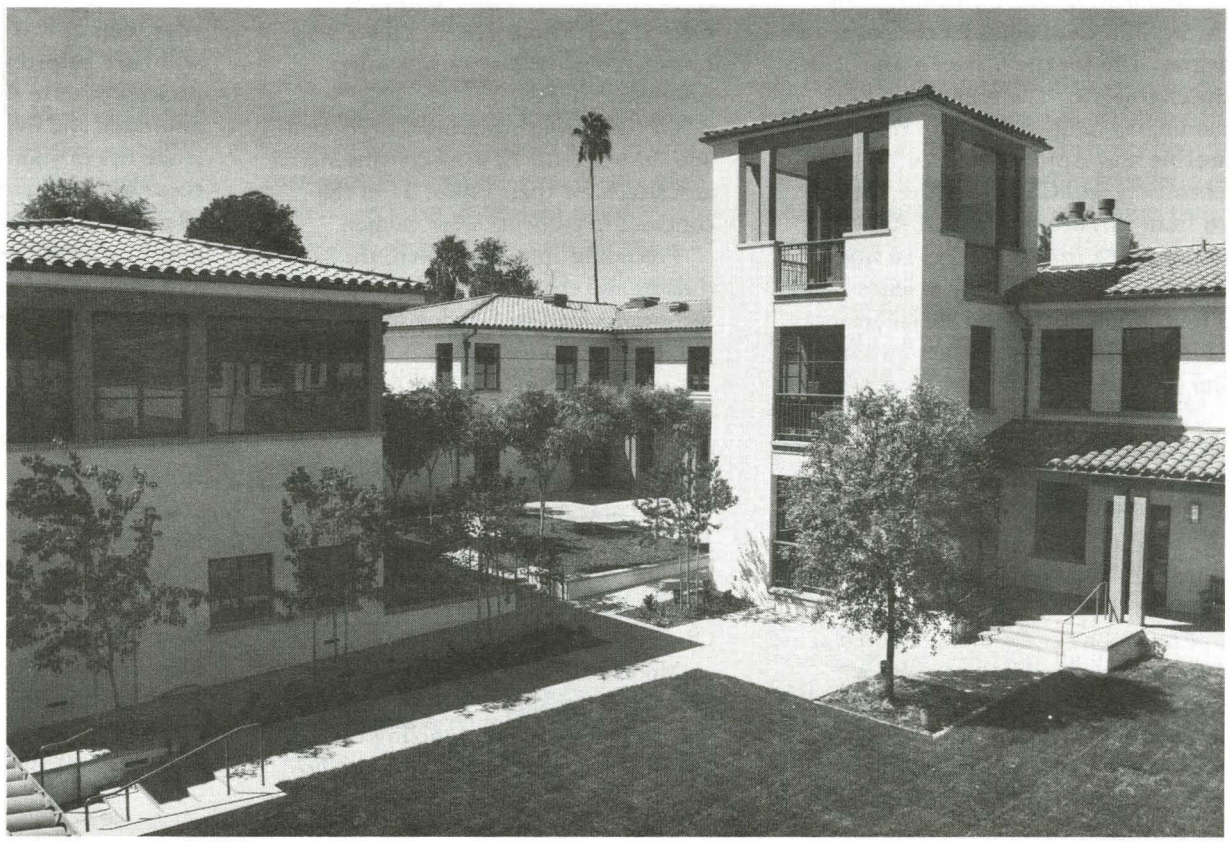


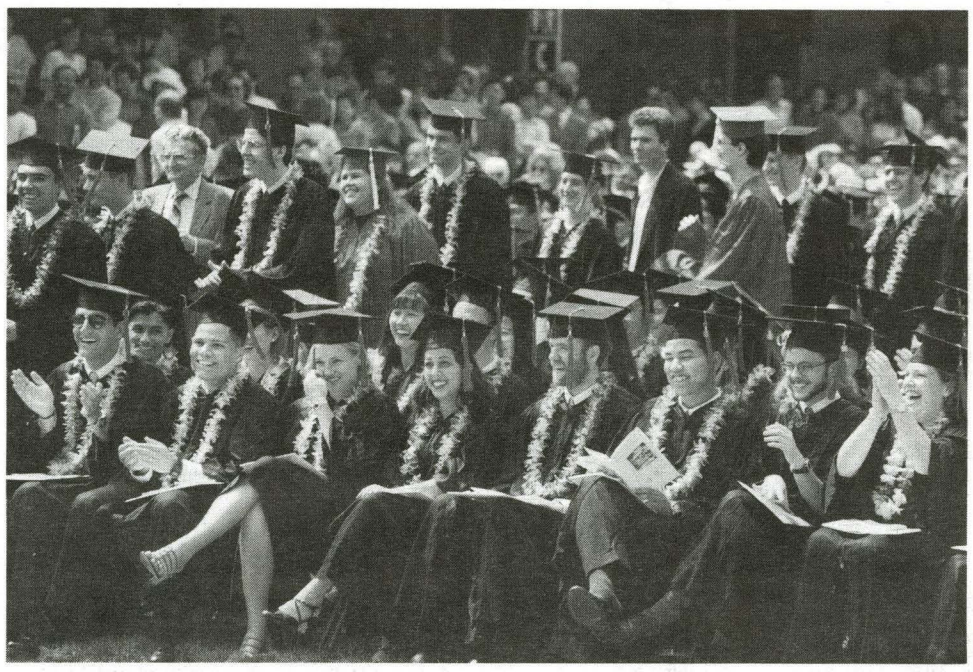


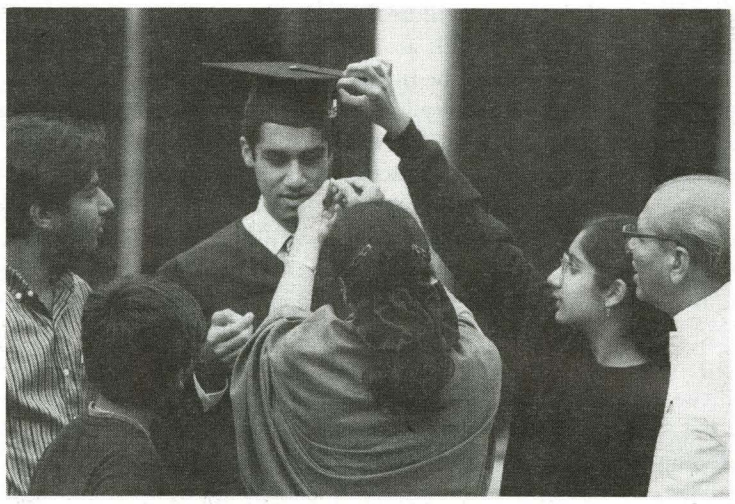


Ideas become reality as Stan Avery finds his motto carved in clay, as well as engraved on a dedication plaque (top photo). At the dedication ceremony, Avery welcomes the campus community to the innovative residence.

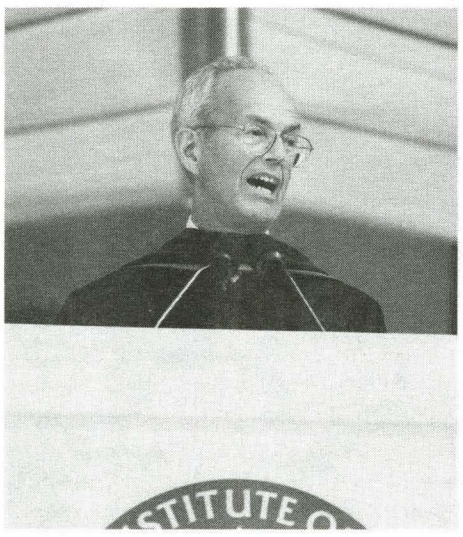
CAMPUS UPDATE

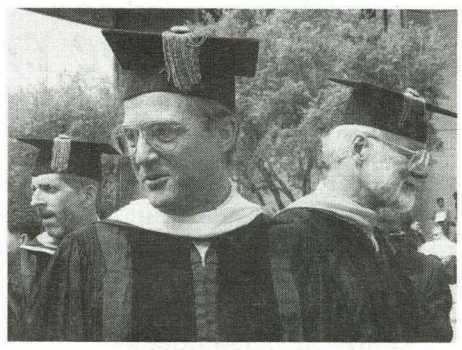
Commencement speech is short on words, long on challenges

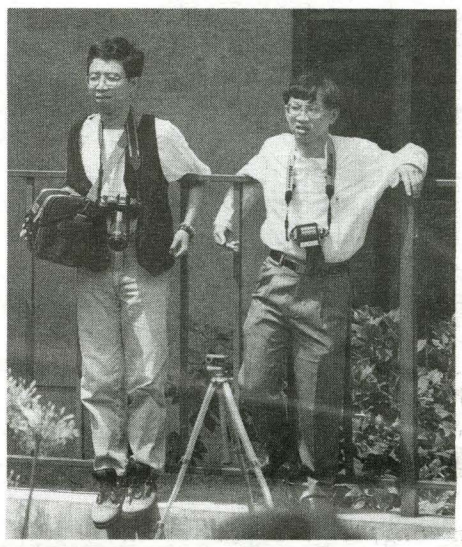




Glimpses of graduation (clockwise from left): Admiral Inman addresses, graduates get gleeful, division chairs congregate (left to right, John Seinfeld, of Engineering and Applied Science, John Ledyard of the Humanities and Social Sciences, and Charles Peck of Physics, Mathematics and Astronomy), cameras commemorate, and families festoon.







Caltech's 102nd annual commencement was well under way when Admiral Bobby Inman, a Caltech trustee, stepped to the podium to deliver the keynote speech. Introduced as former director of the National Security Agency and past deputy director of the CIA, among his many high-level responsibilities, Inman addressed the crowd with humility.

"I have read with great interest the national news articles about the competition and search for commencement speakers this year—the president of the United States, the vice president, the chief justice, cabinet officers. And you have a retread, retired admiral.

"At least one can say Caltech does not chase what is trendy. It's a great honor that you've bestowed on this history major, asking that I address you on this momentous day in your life."

Inman addressed a crowd that included 226 candidates for the bachelor's degree, 105 for the master's, and 1 for the engineer's. The number of PhD candidates totalled 164: 58 from Engineering and Applied Science; 52 from Chemistry and Chemical Engineering; 26 from Physics, Math, and Astronomy; 15 from Biology; 10 from Geological and Planetary Sciences; and 3 from Humanities and Social Sciences. Thirty-eight of the 164 were women, and 69 were international students.

Among the PhD candidates, electrical engineer Fernando Paganini Herrera would receive the Milton and Francis Clauser Doctoral Prize for his thesis, "Sets and Constraints in the Analysis of Uncertain Systems"—judged to exhibit the most original research.

And among the seniors honored at the ceremony, Esmeralda Nava, a graduate in Engineering and Applied Science, and Alison Slemp, an honors graduate in biology and history, would receive the Frederic W. Hinrichs, Jr., Memorial Award for their outstanding qualities of leadership, character, and responsibility and their contribution to the welfare of the student body, as judged by the undergraduate deans. Honor student Rebecca Blankenburg would pair her biology bachelor's degree with the Mabel Beckman Prize, which recognizes an upperclasswoman's "academic and personal excellence, contributions to the Institute community, and outstanding qualities of character and leadership."

The 226-member senior class (166 men and 60 women) included 25 international students, 71 Californians, and 16 students from the second most represented state, Texas. One hundred of the students graduated with honors. Tallying the numbers as above, the class included 120 candidates from E&AS, 37 from PMA, 30 from Biology, 24 from Chem&ChemE, 7 from G&PS, and 7 from H&SS, plus 1 who completed an independent studies program.

Of the master's candidates (76 men and 29 women), 70 were continuing on at Caltech for their PhDs; 21 of the continuing students were women.

Preceding Inman's speech, the candidates and their families and friends were welcomed by Gordon Moore, PhD '54, the chair of Caltech's Board of Trustees. He spoke of the Institute's recent successes—on the completion and near completion of Avery House, the Sherman Fairchild Library of Engineering and Applied Science, the Moore Lab, the Keck II telescope, and the site in Louisiana for LIGO (the Laser Interferometer Gravitational-Wave Observatory).

Moore called attention to the personal accomplishments of Caltech faculty and students, recognizing the Institute's newest Nobel laureate, Ed Lewis, the Thomas Hunt Morgan Professor of Biology, Emeritus. Of the student awards, he pointed out that there were 13 National Science Foundation Fellowships, a Department of Defense Fellowship, a Fulbright Fellowship, and a Weizmann Fellowship.

By now, the sun had broken decisively through the clouds, and audience members warmed to a bit of news about the keynote speech, offered by the commencement speaker himself.

Before preparing his speech, said Inman, he sought guidance from President Tom Everhart, who told him that the best talks are funny and short. So, said the admiral, "as we often do with our parents and presidents, I'll take part of this advice. It will be short."

Alluding to his title, "Pushing the Frontiers of a Rapidly Changing World," he expressed his hope "that the challenges provided to you during your years at this venerable institution will have helped you develop your capacities to seize the opportunities that await you and overcome whatever challenge lies in your path. Among you are those who will truly push the frontiers of science; those who will capture the possibilities of emerging technologies and hasten their use; and those who will create new policies, methods, and procedures that enhance the capabilities of so many others.

"As you go forth to seize these opportunities, permit me to offer you the simple goal in life that, in some way, you will have made this a better world for those that follow."

A graduate of the University of Texas (UT), in 1950, and the National War College, in 1972, Inman has held numerous positions in the Navy and in 1981 was distinguished as the first naval intelligence specialist to achieve the four-star rank of admiral. By that time, he had been director of Naval Intelligence, vice director of the Defense Intelligence Agency, director of the National Security Agency, and deputy director of the CIA.

In addition, Inman has been chairman and CEO of the Microelectronics and Computer Technology Corporation (MCC) in Austin, Texas, among other leadership positions. He is now an adjunct professor in public affairs and business at UT and a member of the boards of directors for several companies.

Continuing his commencement address, Inman spoke of the chaotic world that his generation has bequeathed to the new graduates, and of the frustrations of receiving instantaneous information about our world but not being able to devise instantaneous solutions to its many problems.

Telling graduates that they've had "the finest educational experience that can be found on the globe," Inman encouraged lifelong dedication to their work—whether in the international, national, individual (research), or commercial arenas. He reminded them that character does matter: "When you look in the mirror each morning, I hope the reflection you see will always be one in which you know your integrity is intact and that honesty and fairness are truly words you live by."

And when faced with frustration and self doubts in this rapidly changing world, said Inman, "it is important to find your bedrock, to touch that which is clear and certain, to find comfort in familiar surroundings. Remember, especially on those occasions, as well as on happier ones, that this Institute will always be home to you."

Presidential search committees formed; faculty committee seeks alumni input

This past spring, Caltech President Tom Everhart announced plans to retire by September '97, and now, as expected, Caltech Trustee Chair Gordon Moore has announced the formation of committees to seek Everhart's successor. The presidential search will be conducted by a Trustees Selection Committee, assisted by a Faculty Search Committee.

The members of the Trustees Selection Committee are Gordon Moore (chair), chairman of Intel Corporation; George Argyros, chairman and CEO of Arnel and Affiliates; Shirley Hufstedler, senior of counsel with Morrison & Foerster; Ruben Mettler, Caltech trustee chair, emeritus, and retired chairman and CEO of TRW Inc.; Stanley Rawn, Jr., private investor; Benjamin Rosen, chairman of the board, Compaq Computer Corporation; Walter Weisman, former chairman and CEO of American Medical International, Inc.; and Albert Wheelon, chairman and CEO (retired) of Hughes Aircraft Company.

Members of the Faculty Search Committee are Kip Thorne, PhD '62, the Richard P. Feynman Professor of Theoretical Physics (chair); David Anderson, professor of biology; Paul Jennings, PhD '63, Caltech provost from 1989 to 1995 and professor of civil engineering and applied mechanics; Julie Kornfield '83, associate professor of chemical engineering; Thomas Palfrey, professor of economics and political science; Thomas Prince, professor of physics; Douglas Rees, professor of chemistry; and David Stevenson, the George Van Osdol Professor of Planetary Science, and chair of the Division of Geological and Planetary Sciences from 1989 to 1994.

In a September 16 letter to the Caltech community, the faculty search committee has announced that it welcomes nominations and suggestions from all members of the campus community. The letter reads in part, "We envision the first phase of the search—our gathering of information, suggestions, and nominations—as an open enterprise, with participation by all parts of the Caltech community (faculty, students, staff, administration; JPL management and staff; alumni, associates, and friends of Caltech). We shall seek input via a series of meetings of our committee with representatives from these groups.

"We will also eagerly accept nominations for the presidency and suggestions about the search from all members of the Caltech community. We seek the most outstanding nominees wherever they may be found, and thus would appreciate your calling our attention to highly qualified individuals of either gender and any ethnic background, and from industry, government, and foundations, as well as academia.

"To make your nominations more effective, please try to provide the following: (l) the nominee's name and identifying information; (2) a paragraph describing why you think this person would make an outstanding president; (3) curriculum vitae or a suggestion of where we can get them; (4) a list of people who might provide insightful evaluations of the nominee.

"Please also send us suggestions about the search—for example qualities that we should seek in our new president, or issues that the president will need to address and that should influence the presidential selection.

"You may offer your input either verbally or in writing; but please follow up any verbal inputs with written summaries and details, and where readily possible, please use e-mail since that will assist us in organizing your inputs. E-mail can be sent to us individually, or to the following addresses: *Nominations and supporting material to:* Nominations@pressearch.caltech.edu *Suggestions to:* Suggestions@pressearch.caltech.edu

"If you wish to encrypt your e-mail via PGP, you can obtain our PGP Public Key by sending an e-mail message (whose contents will be ignored) to PGPKey@pressearch.caltech.edu. Information about PGP can be obtained from the web at http://web.mit.edu/network/pgp.html.

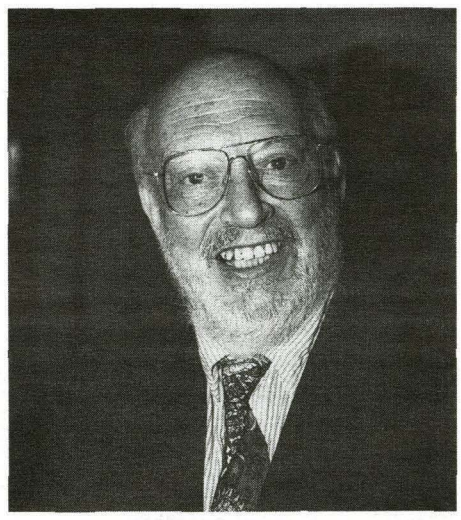
"You can also provide part or all of your input via regular mail to Presidential Search Committee, Caltech, P.O. Box 60070, Pasadena, CA 91116, or via FAX to 818/584-7198, or you can contact us individually.

"Please note that your nominations and suggestions will be kept strictly confidential. In recent years, some presidential searches at other institutions have been severely damaged by public disclosure of the names of leading nominees or names of people who had turned down the position. To avoid such damage, our Faculty Search Committee and the Trustees Selection Committee have agreed that our lists of nominees must be kept strictly confidential."

Revel named dean of students

Caltech has a new dean of students: he is Jean-Paul Revel, the Albert Billings Ruddock Professor of Biology, who has agreed to serve a three-year term. Revel succeeds Rod Kiewiet, who earlier this summer returned to regular duties as professor of political science (see story on page 8, this issue).

A professor of biology at Caltech since 1971, Revel conducts research in



Jean-Paul Revel

cell biology, cell-to-cell communication, electron microscopy, and scanned probe microscopy. Throughout his Caltech career, he has been known for his warm interest in students and his many contributions to their welfare. An ASCIT Teaching Award winner, Revel has served for many years as a pre-med advisor and as chair of BUSAC, the Biology Undergraduate Student Advisory Council, a student-faculty collaboration established to provide teaching feedback. With Scott Fraser, the Anna L. Rosen Professor of Biology, he is developing the new core course Biology 1, which they will teach this spring.

In the Deans' Office, Professor Revel will work with Associate Dean Barbara Green, who came to Caltech in 1989.

Class of 2000 up to the challenge

For the talented freshman class entering Caltech this fall, leading the way into a new millenium should be a piece of cake. After all, among them they've already: earned a pilot's license, become state debate champion, studied piano and classical dance, attended college-level classes, worked in a greenhouse, drawn comics/read physics texts since the age of nine, captained the swim team for three years, rebuilt their car's engine, done experiments in recombinant DNA, played violin alongside their identical twin (also entering Caltech) in a state orchestra—and all while achieving mean verbal and math SAT scores in the 98th and 99th percentiles, respectively. (The class also includes 42 National Merit finalists and two Westinghouse Science Talent Search finalists.)

As Caltech prepares to leave the 20th century behind (strictly speaking, the third millenium doesn't begin until the portentous year 2001), its student body is becoming increasingly diverse. Of this year's 219 entering freshmen, 67—or 31 percent— are women, up from last year's 29 percent. Seven students are from outside the United States; four are Native American, two African-American, ten Latino, and 52 Asian American. The Admissions Office has stuck colored pins into a big map of the US to provide a vivid representation of the geographic distribution of the class; there's a cluster (29 percent) in California, but the remainder range from Maine to Hawaii, Alaska to Florida. There was an increase of five percent in the number of applicants compared to 1995; 43 percent of those admitted accepted. And as testament to our often-criticized public school system, 86 percent of the entering freshmen come from public high schools.

The days may be shorter, but not the Caltech honors list

Professor of Geophysics *Tom Ahrens*, MS '58, has been selected by the Meteoritical Society to receive its 1997 Barringer Award, which recognizes outstanding contributions to the study of impact craters and associated phenomena.

Frances Arnold, professor of chemical engineering, will receive the Graduate Student Research Paper Award of the Separations Division of the American Institute of Chemical Engineering for her paper "Template Mediated Synthesis of Highly Selective Polymeric Ligand-Exchange Adsorbents." The award is sponsored by the Eastman Chemical Company.

The Associated Students of Caltech (ASCIT) have named the following faculty members as outstanding undergraduate teachers for 1995–1996: *John Baldeschwieler*, professor of chemistry; *Christopher Brennen*, professor of mechanical engineering; *Peter Hofstee*, instructor in computer science; *Michael Shumate*, lecturer in applied physics; and *David Stevenson*, the George Van Osdol Professor of Planetary Science.

Norman Brooks, PhD '54, the James Irvine Professor of Environmental and Civil Engineering, Emeritus, has been elected an Honorary Member of the American Society of Civil Engineering.

Associate Professor of Electrical Engineering *Slobodan Cuk*, PhD '77, has been elected a Fellow of the Institute of Electrical and Electronics Engineers.

Barbara Imperiali, associate professor of chemistry, has been selected by the American Chemical Society to receive a 1996 Arthur C. Cope Scholar Award, an honor whose purpose is to recognize and encourage excellence in organic chemistry. A bioorganic chemist, Imperiali and her group design synthetic peptides whose behavior elucidates the structure of proteins in nature.

Wolfgang Knauss '58, professor of aeronautics and applied mechanics, has been elected to the International Academy of Engineering (formerly the Russian or Soviet Academy of Engineering).

The Caltech Graduate Student Council has announced the recipients of its 1995–1996 teaching and mentoring awards. Two professors have received awards for classroom teaching—Professor of Electrical Engineering *Robert McEliece*, PhD '67, and Professor

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Honors

Continued from page 3

of Engineering Science *Theodore Wu*, PhD '52—and four have been recognized for outstanding mentoring: *Pamela Bjorkman*, associate professor of biology; *Joel Burdick*, associate professor of mechanical engineering; *Joel Franklin*, professor of applied mathematics; and *Steven Frautschi*, professor of theoretical physics. Five outstanding teaching assistants were also honored: *David Barksdale*, engineering and applied science; *Carlos Brody-Pellicer*, computation and neural systems; *Chris Eckett*, aeronautics; *Thomas Tsao*, electrical engineering; and *Jin Zhang*, engineering science.

Carver Meade, PhD '60, the Gordon and Betty Moore Professor of Engineering and Applied Science, was selected by the Institute of Electrical and Electronics Engineers to receive the IEEE John Von Neumann Medal for 1996. Sponsored by the IBM Corporation, the award recognizes "leadership and innovative contributions to VLSI [Very Large Scale Integration] and creative microelectronic structures."

Professor of Biology *Elliot Meyerowitz* and Enrico Coen of the John Innes Institute in England have been jointly honored with the "Science pour l'Art" Science Prize of LVMH—Moët Hennessy • Louis Vuitton. The prize is an international award given for work related to "professions with an artistic or aesthetic vocation." Both Meyerowitz and Coen study the genetics of flowering plants; specifically, the genes that govern the formation of flower organs. The prize includes 100,000 French francs, or about $19,000, which Meyerowitz and Coen will share.

Professor of History *Robert Rosenstone*'s book *Visions of the Past: the Challenge of Film to our Idea of History* has received the 1995 Best Book on Film Award from the Spanish journal *Film-Historia*. His book was selected for its "important theoretical and practical contributions to the understanding of the relationship between history and film."

Caltech's Division of Biology has chosen *Christopher Schoenherr* to receive the Lawrence L. and Audrey W. Ferguson Prize for an outstanding Biology PhD thesis. Schoenherr isolated a master regulatory protein that prevents inappropriate genes from being expressed in developing neurons. The prize includes an award of $2000. Two Ferguson prizes were also awarded for undergraduate teaching: a faculty teaching award, to Assistant Professor of Biology *Erin Schuman*, and a graduate teaching assistant award, to *Roian Egnor*, graduate student in biology. A special Ferguson Award for Biology Education was given to Professor of Biology *David Anderson*, for his organization of and contributions to Bi 0.1, the lecture series presented by biology faculty in the spring of 1996. Each of these prizes includes an award of $1000.

The Arnold and Mabel Beckman Foundation has awarded a 1996 Beckman Young Investigator Award to *Erin Schuman*, assistant professor of biology. The award provides $200,000 over two years to support Schuman's research into the "development of an adenovirus vector to deliver recombinant nitric oxide synthase into living neurons." Schuman studies how neurons communicate with each other at a molecular level; her new research will build on and extend recent discoveries implicating nitric oxide as an important intercellular communicator in the brain.

John Seinfeld, the Louis E. Nohl Professor and professor of chemical engineering, and chair of the Division of Engineering and Applied Science, has been elected a Fellow of the American Institute of Chemical Engineers.
For lifetime achievements in science and industry, *Edward Stone*, the David W. Morrisroe Professor of Physics, vice president, and director of JPL, has been selected by the California Museum of Science and Industry Foundation to receive the International von Kármán Wings award. Stone has also been presented with the Good Scout Award by the San Gabriel Valley Council of the Boy Scouts of America for his contributions to the community.

Kip Thorne '62, the Richard P. Feynman Professor of Theoretical Physics, has been chosen by the German Astronomical Society as this year's recipient of the Society's highest accolade, the Karl Schwarzschild Medal, to honor his "important achievements in gravitation and astrophysics and contributions to the creation of the LIGO gravitational wave program, one of the great scientific challenges at the end of the 20th century."

In responding to news of the award, Thorne had this to say, "Although I played a role, with Ronald Drever of Caltech and Rainer Weiss of MIT, in motivating and creating LIGO, it is really Drever, Weiss, and their fellow experimenters who will make LIGO a success—for example, Robbie Vogt and Stan Whitcomb of Caltech, who led the LIGO team in originally organizing the project, writing the proposal, and winning funding from NSF and Congress, and who continue to play key roles; Barry Barish and Gary Sanders, who are now leading the construction of LIGO and the planning of its operations; and most especially the team of talented scientists (such as Bob Spero and Seiji Kawamura at Caltech, and David Shoemaker at MIT), who are developing and perfecting LIGO's interferometers; and the talented Caltech engineers (such as Bill Althouse, Fred Asiri, and Albert Lazzarini), who have been designing LIGO's components and overseeing their construction and integration.

"To these scientists and engineers, theorists like me owe an enormous debt. They will make real our starry-eyed dreams of seeing gravitational waves and using them to explore the dark side of the universe."

Caltech and NIH researchers announce new diagnostic test for group of brain diseases that includes "Mad Cow" disease

A Caltech-NIH research team has developed a simple diagnostic test for transmissible spongiform encephalopathies (TSEs), a group of invariably fatal brain diseases that include "Mad Cow" disease in cattle and Creutzfeldt-Jakob disease (CJD) and kuru in humans.

According to Michael Harrington of Caltech's Beckman Institute, he and his colleagues at the National Institute of Health's National Institute of Neurological Disorders and Stroke have developed the test by identifying a diagnostic protein found in the spinal fluid of infected humans and animals. Their research was published September 25 in the *New England Journal of Medicine*.

Harrington says that the test is an important contribution to public health because it can help prevent future transmissions of the diseases. "This should reduce the risk of accidental transmission, allow better patient management, and could even provide an objective measure for any future treatment," Harrington says.

Kelvin Lee, Harrington's colleague at Caltech, adds that the test should be of considerable interest in Great Britain. In the last year, a form of the disease known as bovine spongiform encephalopathy (also known as BSE, or "Mad Cow" disease) has been linked to a new strain of CJD, which has affected several individuals in Britain.

"This test potentially enables us to screen cattle and herds for BSE and thus reduce the possibility that BSE-contaminated beef could enter the food chain," Lee says. "Moreover, it will provide a means for selectively destroying BSE cattle as opposed to unaffected cattle, and make the international exchange of animals more safe."

TSEs are degenerative diseases of the nervous system characterized by rapidly progressive dementia and uncontrolled limb spasms in both humans and animals. The diseases are always fatal, and postmortem examinations reveal spongelike holes in the brain.

The causative agent of these transmissible diseases is believed to be a prion, an infectious protein that accumulates in the brain and results in neuronal destruction. Prions have been shown to be particularly resistant to standard decontamination procedures.

Diagnosis of these disorders has relied on brain biopsy or postmortem examination for the presence of the prion. In work published by Harrington in 1986, he showed that a particular protein was present in the cerebrospinal fluid of patients affected with CJD and could serve as a useful molecular marker for this disease.

The new findings identify that protein as 14-3-3, a normal neuronal protein. "We hypothesize that 14-3-3, which is normally present in neurons, leaks into the spinal fluid as a result of the neuronal destruction that occurs in TSEs," says Harrington. The identification of the protein as 14-3-3 has enabled the development of a simpler test for the diseases.

Also involved in the study are Clarence J. Gibbs, Jr., Kimbra Kenney, and Gary Hsich, all of the NIH National Institute of Neurological Disorders and Stroke.

Caltech is "best buy" for Money

Caltech has been named "America's best buy in college education today" by *Money* magazine in its seventh annual evaluation of American universities. Caltech, cited as providing "the highest-quality education for the tuition," was chosen over more than 1,000 other undergraduate four-year colleges. The ranking is based on *Money*'s analysis of 16 factors, including educational quality, faculty resources and deployment, library resources, student services, and graduation rates. The magazine then weighs these data against the costs of tuition and room and board.

Caltech is no freshman to the list—it has ranked in the top ten for all seven years that the survey has been in existence. Also, Caltech has previously been ranked number one in two specialty categories—best science and technology school and best college in the West—ranks it also holds this year.

Only two other colleges besides Caltech have been in the top ten for all seven years of *Money*'s survey—Rice University, and New College of the University of South Florida, which had held the top position for three years until getting bumped by Caltech this year. Other universities in the top 100 this year included Yale, 25; Pomona College, 46; UC Berkeley, 53; Claremont McKenna College, 56; and Harvard, 70.

In selecting Caltech as the best college value in the nation, *Money* cited the fact that Caltech spends $46,613 per student on instruction, "the most of any college and nine times more than the average of $5,008." Rounding out the article's description are the student-to-faculty ratio of 3 to 1, the opportunities for undergraduates to do research, and the high SAT scores of incoming freshmen.

Avery House

Continued from page 1

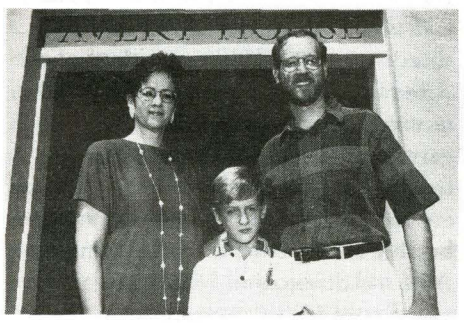
Tom Everhart stands with Ernestine and Stan Avery *before* the official ribbon-cutting ceremony.

grant to Avery House will be used to purchase books and other materials for the library and to support visits by entrepreneurial guests, while Avery Dennison has made the house a gift of $30,000 to purchase equipment for its student computer lab.

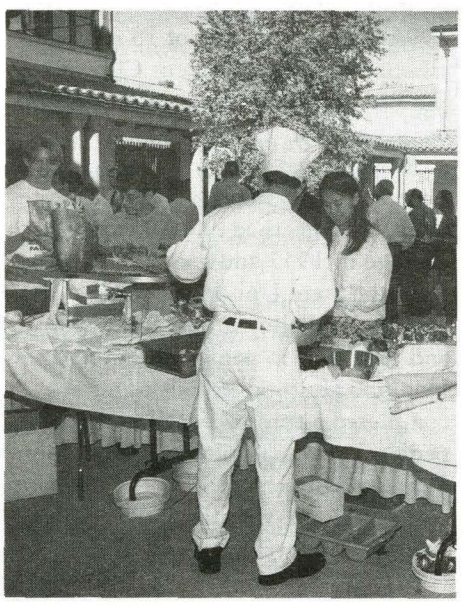
In his remarks at the dedication, Avery confessed, amid laughter, that when Caltech first approached him about donating a "dormitory," he was "less than enthralled. However as I listened to Tom [Everhart], I became strongly attracted to the idea of having students and faculty under the same roof on a daily basis."

Over the next several months, with Avery's active participation, this initial idea evolved into a plan for creating an entirely new type of campus residence—one that both embodies the "spirit of entrepreneurship" and that serves to promote social and intellectual interaction among all segments of the Caltech community. Said Avery, as he prepared to cut the dedication ribbon, "This beautiful building reflects those ideals and the quality and standards that are Caltech's. May I be the first to welcome you to Avery House."

With that invitation, the crowd flocked through the entrance, pausing on the walkway to admire the Avery House crest—a jewel-like mosaic designed by Stan Avery, in which the words "Creativity," "Integrity," and "Tenacity" each form one side of an equilateral triangle—before filing along a Spanish-style arcade that recalls such venerable campus buildings as Robinson, Arms, and Kerckhoff. In the dining hall groups of students—always mindful of free (excellent) food—were already talking around the tables, calling to mind President Everhart's earlier comment that at Caltech, informal spaces like the Athenaeum have been key in fostering creative ideas.



One of the First Families in Avery House includes (from left) Karen, Garrett, and Geoff Blake, associate professor of cosmochemistry. Not pictured are resident faculty members Jeremy Kahn, assistant professor of mathematics; and John Hall, associate professor of civil engineering, who is joined by his wife, Nancy Lan, and son, Galen. At the dedication ceremony, Gary Lorden (left) and Everhart (below, right) elicit applause from the crowd, and (below, left) the first house food elicits interest from students.

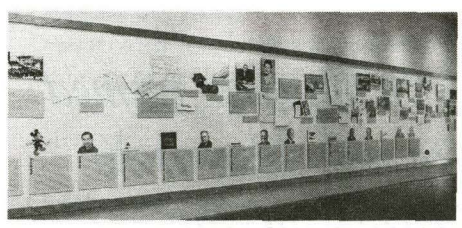


Certainly, creativity is abundantly evident in the elegant design of Avery House, from its arched corridors reminiscent of a California mission, to the trendy coffeehouse look of Avery Café; from the Ethernet cable connections in almost every room (after due consideration, the planners exempted the bathrooms) to the handmade copper light fixtures. It's a look that owes a great deal to the combined efforts of Lorden and other members of the Avery House building committee: Master of Student Houses and Professor of Mathematics David Wales; Director of Residence Life Kim West; Director of Auxiliary and Business Services Tom Mannion; and Student Affairs Administrator Stan Borodinsky. Throughout the planning and construction of Avery House, this group worked closely with the firm of Moore Ruble Yudel Architects & Planners and with Turner Construction Company to create a dwelling that combines the charm of the campus's traditional architecture with state-of-the-art technology, and that embraces both residential and community life.

To achieve this multipurpose ambiance, Avery House is divided into a commons area and a living area, surrounding three courtyards. The Commons encompasses the dining room and Avery Café—both of which will be open for lunch and dinner to all members of the campus community—as well as a conference room, the computer room, the Avery Library, and a lounge that offers an international collection of daily and financial newspapers.

In these various spaces, Avery House residents and other members of the campus community will be able to meet informally with a wide range of Caltech guests. Permanent displays in the library gallery highlight Avery's career, and rotating exhibits will showcase the achievements of the visitors.

When Avery House residents want to retreat to the privacy of their own rooms, they will enter the residential portion of the facility through a key-card-controlled wrought-iron gate.



People have something to look at while stretching their legs in the library (see entrepreneurial display) and while sipping latté in the café.

The living quarters within include single, double, and triple student rooms, student lounges, and five fully outfitted apartments—three for faculty, and one each for the building's resident associate and the visitor(s)-in-residence.

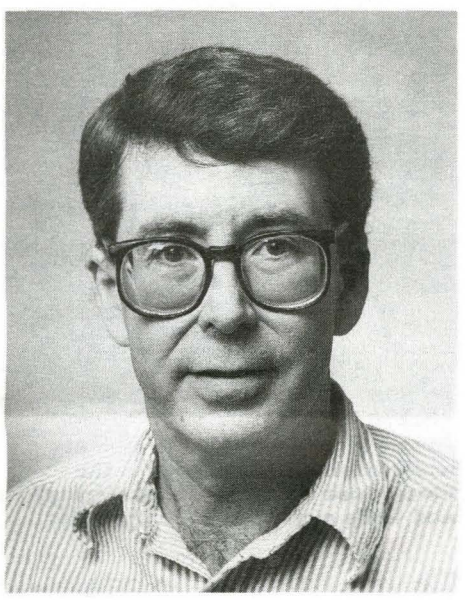
Among the house's signature features are its ingeniously deployed "free" spaces—roomy alcoves and corridors that variously look out on the San Gabriel mountains, over the grassy expanse of the Avery House grounds, or across the vista of the Caltech campus. They are designed for studying, thinking, socializing—a multitude of purposes in fact. There can be no doubt that Caltech students, as inveterate innovators, will be inventing new uses for Avery House's carefully planned and crafted spaces.

FRIENDS

Aschbacher named to new Hanisch Professorship

Michael Aschbacher '66, professor of mathematics, has been named Caltech's first Shaler Arthur Hanisch Memorial Professor. This professorship is one of two endowed chairs created by a gift from the estate of Shaler Arthur Hanisch, a longtime Pasadena resident, who died last year at age 67.

An Institute faculty member since 1970, Aschbacher studies mathemati-



Michael Aschbacher

cal group theory. He has a special interest in finite simple groups, which are to mathematics what elementary particles are to physics: basic building blocks. The general finite group can be very complicated, but still is built from its composition factors, which are simple groups.

Group theory provides an algebraic method for studying symmetry. To give two examples, chemists use finite groups to study crystals and electrical engineers use groups to study codes. Coding theory is concerned with transmitting or storing data without losing any information, and is used in recording music on CDs and in designing satellite communications systems.

The new Shaler Hanisch Chair, held by Aschbacher, has been broadly designated for a professor in the field of science or engineering, reflecting the interests of Shaler Hanisch. In addition to his early interest in radio communications, Hanisch studied psychology and education at UCLA and throughout his life he closely followed the development of several subjects, including physics, medicine, and the then-emerging electronics field. A second professorship, the Arthur and Marian Hanisch Memorial Professorship, has been named to honor his parents.

Caltech was chosen as the recipient of the Hanisch bequest largely because of the role the Institute played in the genesis of one of the family businesses. In 1941 Arthur Hanisch acquired the rights to a liquid vitamin developed by Henry Borsook, the Caltech professor of biochemistry who was noted for his contributions to nutrition. Borsook did pioneering research on the benefits of vitamins, and helped develop the first table of Recommended Daily Allowances of proteins, vitamins, and calories.

The liquid multivitamin was the first product of the company that Arthur Hanisch established in Pasadena, called The Stuart Company. The firm produced several successful products, including the well-known antacid remedy Mylanta; hematinics to treat anemia; products for the treatment of urinary tract infection; and analgesic, tranquilizer, and prenatal nutrition products. The Stuart Company was bought by Atlas Chemical Industries in 1961, which later merged with Britain's ICI Pharmaceuticals. Although the liquid vitamin was discontinued in the early 1980s, other Stuart products are still on the market.

In 1975 Shaler Hanisch established a trust, which conferred the authority to select the nonprofit beneficiary on Emrys Ross, the family attorney, and Joseph Galindo, a former Stuart Company executive and a family friend. In selecting Caltech, Ross and Galindo consulted with Stuart Hanisch, Shaler's brother, as the family representative.

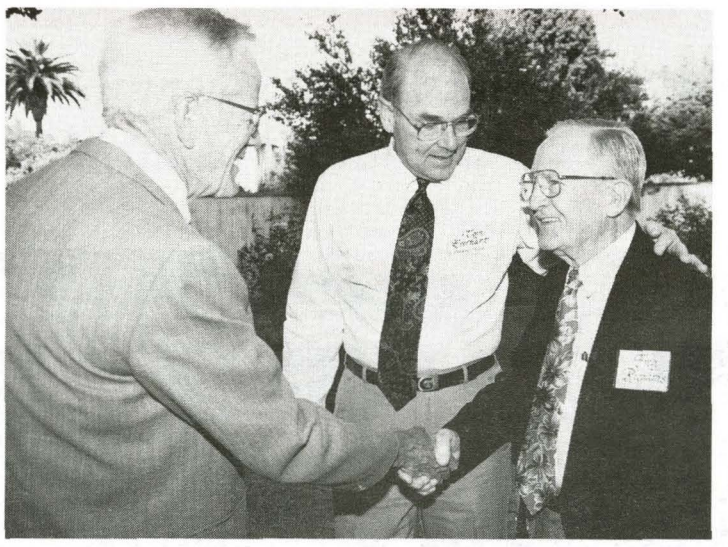
"Mr. Galindo and I felt that Caltech was a natural choice because the Hanisch family had lived in Pasadena for more than 60 years, and because of the high regard in which all members held the school, and the effect that Professor Borsook's work had on the founding of The Stuart Company," said Ross, a life member of the Caltech Associates and a member of the President's Circle.

After settling the estate, it was determined that enough funds remained to establish a second professorship, and the Arthur and Marian Hanisch Memorial Professorship was created. This chair is designated in the area of biochemistry since Arthur Hanisch had a wide-ranging interest in medical and nutrition research that went beyond his pharmaceutical business and included the development of synthetic-fiber arteries, widely used in patients with aortic and other aneurysms.

"These professorships are fitting reminders of the Hanisch family's relationship to Caltech through Henry Borsook many years ago," said Caltech President Tom Everhart. "Caltech greatly appreciates both of these generous gifts."

Caltech's first Hanisch Professor, Michael Aschbacher, was born in Arkansas. He spent most of his early life in the Midwest, and attended high school in Southern California. After receiving his BS in mathematics from Caltech in 1966, he earned his PhD in 1969 from the University of Wisconsin. Following a postdoctoral appointment at the University of Illinois, he returned to Caltech in 1970 as an instructor, and was named an assistant professor in 1972. He was promoted to associate professor in 1974, and to professor in 1976. He served as executive officer for mathematics at Caltech from 1991 to 1994.

Aschbacher was elected to the National Academy of Sciences in 1990 and is currently in the first year of a three-year term as vice president of the American Mathematical Society. He received a Sloan Fellowship in 1972, garnered the Cole Prize in Algebra from the American Mathematical Society in 1980, and was elected to membership in the American Academy of Arts and Sciences in 1992.



At the Associates' President's Circle Garden Party in June (top photo, left to right), the group's former president, George Smith '44, PhD '48, and Caltech President Tom Everhart congratulate Fred Richards, whose pledge of $25,000 to the Associates Endowed Undergraduate Scholarship Fund has just brought the fund to its goal of $1 million. Guests on hand to hear the good news include (below, from left) Milton Mohr, Marge Leighton, David Groce, Mabry Van Reed, and Barbara Ann Groce. Headed by Smith, the fund drive, which got under way in 1993, sold "scholarship shares" of $25,000 each to Associates, with the aim of establishing four Associates Scholarships for Caltech undergraduates.

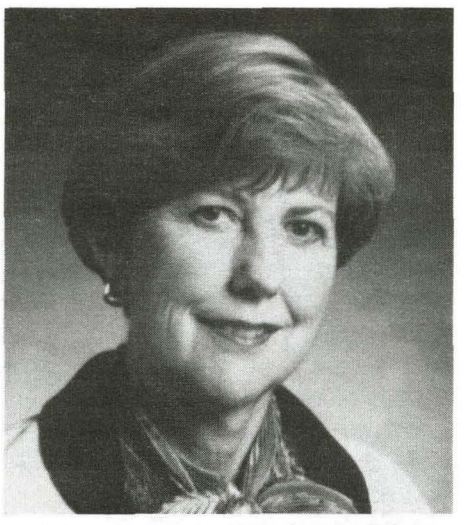
Virginia Weldon joins Caltech's Board of Trustees

Virginia Weldon, senior vice president, public policy, for the Monsanto Company in St. Louis, has been elected to the Caltech Board of Trustees. She is the tenth woman currently serving on the 69-member board.

At Monsanto, her responsibilities include identifying public policy issues affecting the company and planning for and orchestrating Monsanto's approach to these issues.

Prior to joining Monsanto in 1989, Weldon spent more than 20 years at the Washington University School of Medicine and Medical Center. During her career there she served as professor of pediatrics, deputy vice chancellor for medical affairs, and vice president of the Medical Center.

Weldon is a member of Sigma Xi and Alpha Omega Alpha and throughout her career has received numerous awards recognizing her achievements.



Virginia Weldon

She is a distinguished service member of the Association of American Medical Colleges, and in 1985–86 she served as its chair. She was appointed a member of the National Risk Assessment and Management Commission in 1992, and in 1993 was appointed by the National Institutes of Health to serve as Chair of the Women's Health Initiative Program Advisory Committee. In August 1994 Weldon was one of 18 individuals appointed by President Clinton to the President's Committee of Advisors on Science and Technology.

Weldon was born in Toronto, Canada, in 1935 and is a United States citizen. She earned her AB from Smith College in 1957 and an MD in 1962 from the State University of New York at Buffalo. Following an internship and residency in pediatrics at the Johns Hopkins Hospital in Baltimore, she completed a three-year fellowship in pediatric endocrinology at the Johns Hopkins University School of Medicine. Weldon, who lives in St. Louis, has two daughters.

Associates president gets wrapped up in his new role

As the first president of the Caltech Associates to come from outside Southern California, Carl Larson '52 can chart his increasing involvement with Caltech by reviewing his frequent-flyer records. "Eighteen trips to Burbank last year, going on thirty this year," he notes.

This from a man who otherwise prefers international travel with his wife, Shirley, "usually not to the same place twice," he says. "There are so many places to go," including India, where the Larsons journeyed with the Associates last January. But years of travel to Pasadena from the Bay Area's Portola Valley has had its own rewards.

After a career primarily in high-tech marketing, including a vice presidency at Versatec, Larson retired in 1987. Within a few years, he and his wife joined the Associates, and then he became a member of its executive committee. The Larsons have provided additional Institute support, for example to Caltech's Summer Undergraduate Research Fellowship program (SURF), and Carl Larson was chair of the SURF board from 1994 through 1996.

"Being associated with Caltech is an honor and a pleasure," he says. "For me, the main benefit of being an Associate is not membership at the Athenaeum or trips with the President's Circle. It's not the goodies, nice as they are. It has to do with getting to know members of the faculty and students and hearing about their work.

"And when you make a financial contribution, you move on from being merely a spectator of the great work done at the Institute and gain a sense of participating and being part of this extraordinary community. At least for my wife and me, that's what makes us feel good."

As Associates president, Larson wants to help more people establish a strong link with the Institute through this "unique organization." It's unique because, unlike an alumni association, it was founded as an organization of non-alumni and remains predominantly so today, explains Larson. In fact, it was 70 years ago that Robert Millikan helped gather about 100 local, prosperous men to contribute $1,000 per year to be members.

While preserving local support (now by men and women, alums and non-alums alike), Larson wants to also reach out to alumni beyond Southern California who might not be familiar with the group.

"I want alumni to know two things about the Associates: it exists, and they are welcome to join."

The group "is not in competition with the Caltech Alumni Fund," he adds, "but rather, it is an enhanced, parallel way for alumni to join others in supporting the work of the Institute."

Larson notes that since the long-distance audience already has links to the Institute, learns about it through alumni publications, and understands its mission, joining the Associates may represent the next logical step in supporting Caltech.

In contrast to the 1920s, when "there were no graduates with extra nickels," he says, alumni have become more affluent. Larson points out that many are of an age where they have raised their families and built their careers and may now want to turn their attention back to their alma mater in a very interactive way. That's the way it happened for him.

After he received his Caltech bachelor's degree in mechanical engineering in 1952, he says, "I didn't set foot on the campus for 30 years. I've always thought back to my Caltech days as good days with good friends." It's just that Larson didn't live in the area and was busy with family and a rapidly evolving career, he explains.

Having graduated during the Korean War, he joined the Air Force. The service sent him to the University of Washington to study meteorology and on to Korea as a weather officer, followed by two years of service in Japan. He then got to put his high-tech know-how to work at Varian Associates in Palo Alto, where the engineer built microwave tubes.

Larson met Shirley, then secretary to Stanford's provost, in 1956. They were married and eventually had daughter Cindy and son Ted. Now they also have their first grandchild, Megan.

Moving into marketing at Varian in the late fifties, Larson also began attending Stanford's Graduate School of Business. He then went abroad to help start an Italian factory for Varian in 1963.

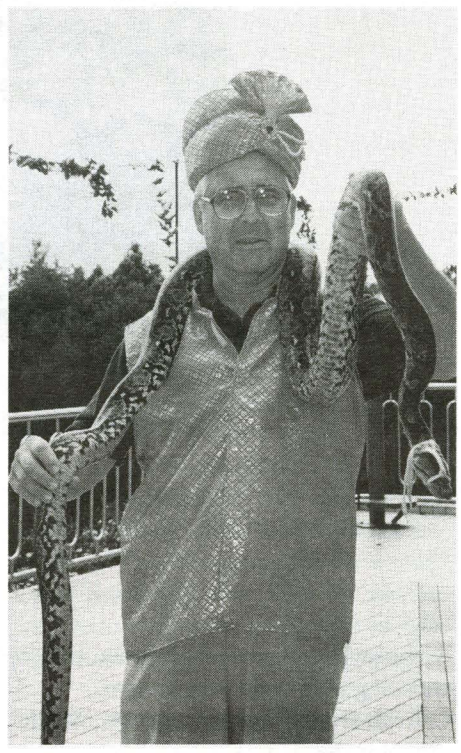
Six years later, in response to the 1965 Watts riots, he ran a Varian subsidiary that fostered minority businesses in the Bay Area by providing loans and voluntary advising services.

"That's where I gained a lot of knowledge about 'do-gooding'—about what worked and what didn't. It's not always successful, even if you mean well and you'd like something to happen," and even if you have enough money, says Larson. "I also learned about small businesses," he adds. He preferred the entrepreneurial climate because he found it less showy and more results-oriented.

In fact, these are similar qualities to those Larson admires in Caltech's climate: "informality, with a respect based on merit."

In 1974 Larson joined Versatec, a spin-off of Varian, and later became a vice president. The maker of electrostatic printing and plotting devices, Versatec was purchased by Xerox ten years before Larson's 1987 retirement.

"After I retired, I had the time to renew my relationship with Caltech and quickly looked for ways to become involved in some useful way with the Institute. Now I'm getting back into what's important," says the active supporter of the Associates, SURF, and other Institute programs.



On his way to India with the Caltech Associates, Carl Larson finds himself in Singapore, in close association with a python.

Although modest about his own role as a "do-gooder," he says that "Shirley is an enthusiastic supporter of Caltech." SURF Director Carolyn Merkel adds, "They've been extremely generous with the SURF program," endowing a fellowship among their contributions. The former chair of the SURF board, Larson has also advised SURF informally on its marketing strategy.

"He has great ideas that are easy to implement, have been successful, and have an impact," says Merkel, and he leaves it to her staff to decide if his ideas will work for them. A typical Larson suggestion from last year was to send potential SURF supporters photos of the SURF students with descriptions of the research they'd been doing printed on the back. Says Merkel, "It was a great way of keeping in touch with people."

She adds, "Carl has helped bring in other people who are enthusiastic about the program. He once told me, 'If there's someone you want me to talk to, I'll make a special trip down to do it.' And he has. That's commitment."

Focusing his commitment and travel schedule on the Associates this year, Larson is hoping alumni and others will share his enthusiasm for getting involved with Caltech.

And he'll continue to try to live up to his advice that "everybody who touches Caltech, at every level, should be striving for a Nobel Prize."

ASSOCIATES' EVENTS

October 10, *Associates/Faculty Dinner,* with Joanne Stock, associate professor of geology and geophysics: "Recent Geological Findings in Antarctica."

October 21, *President's Circle/Faculty Tour/Dinner and Program*—Tour of the Cosmic Background Imaging Laboratory, with Anthony Readhead, professor of astronomy: "An Instrument for Imaging the Infant Universe."

November 4, *President's Circle Avery House Tour and Dinner,* with Gary Lorden, professor of mathematics and vice president for student affairs.

November 15–17, *President's Circle Weekend Trip to Imperial Valley,* with Kerry Sieh, professor of geology.

November 21, *Associates/Faculty Dinner,* with Elliot Meyerowitz, professor of biology: "Unraveling the Mysteries of Flower Development."

January 1, 1997, *Tournament of Roses Parade Event.*

February 24–March 12, *President's Circle Trip to New Zealand,* with William Pickering '32, PhD '36, professor of electrical engineering, emeritus, and former director of JPL, and Clarence Allen, '51, PhD '54, professor of geology and geophysics, emeritus.

April 22–25, *All Associates Trip to Hawaii*, with Maarten Schmidt, the Francis L. Moseley Professor of Astronomy, Emeritus. Visits to the W. M. Keck Observatory and the Caltech Submillimeter Observatory. Accommodations at the Mauna Kea beach resort, Kohala, Hawaii.

To Be Scheduled, *Regional Associates Event in West Los Angeles.*

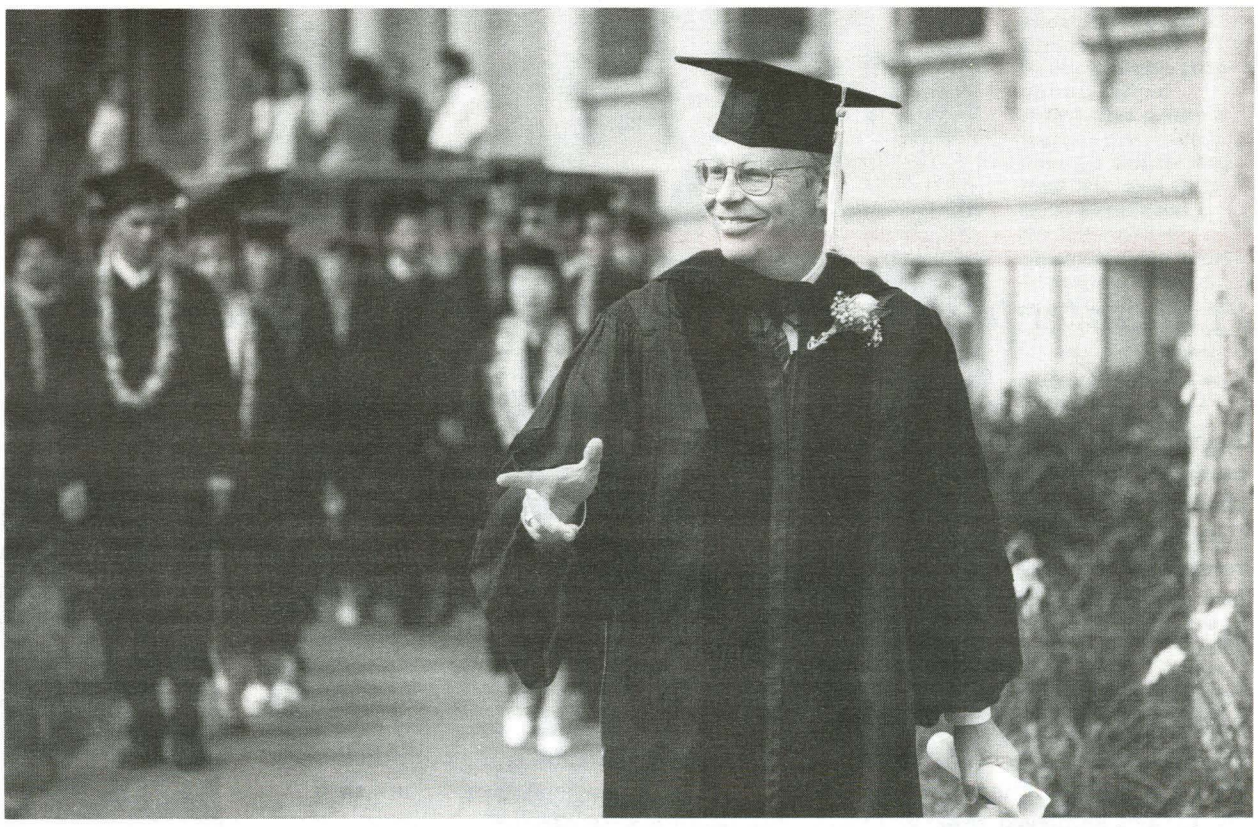
For more information about the Caltech Associates, please call the Associates' office at 818/395-3919.

The Caltech Associates are proud to announce their sponsorship of an All-Caltech Trip to the Galapagos Islands, June 18–26. All members of the Caltech community are invited to take part in this 7-day cruise of the islands that forever changed the course of biology and which today boast one of the most extraordinary collections of plant and animal life found anywhere in the world. The trip, which will be led by Institute biologists, is open to all generations—grandparents, parents, and children, ages 7 and up. More details, including cost and itinerary. will appear in the next issue of *Caltech News*. Or call the Associates Office at 818/395-3919 for more information.

"It's been like going back to college"

Rod Kiewiet reflects on the education he's received as Caltech's dean of students

By Betsy Woodford



Rod Kiewiet marches in his last commencement as dean (above) and (at right) sips his latest cup of coffee.

In an almost-emptied office, Dean of Students Rod Kiewiet talks on the phone with a Caltech undergraduate, telling her the results of a confidential matter. As the official part of the conversation winds down he asks, "Are you on your way to Stanford tomorrow?" When the answer is yes, he adds with concern, "Drive safely, take lots of breaks, every two hours. You should stop every two hours." Acting as dad and disciplinarian, watchdog and worrier, has all been part of the dean's job for Kiewiet. After four years of helping undergraduates survive and thrive amid the challenges of Caltech academics, Kiewiet stepped down on July 31.

As dean of students, a half-time position according to the job description, Kiewiet, who's also a professor of political science, advised and helped students through a myriad of academic and personal problems. His advice ranged from helping students chart a course to graduation, to diagnosing and treating academic overload and burnout, to discussing career paths and life after Caltech.

"It's been like going back to college for me," offers Kiewiet, who received his BA from the University of Iowa in 1974 and his PhD from Yale in 1980. "I've done a lot of hanging out with the students." However, Kiewiet's low-key style and self-effacing manner only temporarily hide the fact that his tenure as dean has included more than the central skill of "hanging out." The academic lives and accomplishments of Caltech students have been his main focus.

"My approach to the dean's job," says Kiewiet, "has been to emphasize academics, because I feel that is my strength." This emphasis has included daily sessions with students who were seeking advice on which courses to take. Kiewiet often went a step further and answered an unasked question on how many classes to take. "The biggest part of my counseling," says Kiewiet, "was to try to convince students to stay within what's manageable when they're choosing classes for a new term. Caltech students are so curious. When they get that list of courses they just can't say no. They want to learn everything. I tell them, 'You know, this course will increase your load to an outrageous number of units.' And they say, 'But I really want to take that course and learn what's in it.'"

Kiewiet said he tried to "act as the voice of practical reason," reminding students to keep an eye on their grade-point average as well. "I would tell undergrads that while I admire their curiosity, I really want them to get into graduate school."

The academic rigor facing Caltech students, Kiewiet says, is more fundamental than earning a grade, it's finishing all the work. "The pace of classes here is so fast that I've seen serious problems occur when a student falls behind due to illness or some other problem. It is crucially important for the student to stay current."

Kiewiet well remembers an incident from several years ago when a freshman was hospitalized with pneumonia. "She was really sick," he recalls. "It was obvious that she wasn't going to be able to come back to school anytime soon. Barbara Green [associate dean], Suzette Cummings [assistant to the dean], and I looked at how far behind the student was in each class, and which class assignments she could reasonably finish during the term. We figured out which classes she should keep, and which she should drop, and arranged for ways to deliver her work to her in the hospital and at home while she recuperated. She finished her freshman core courses, and even though she had to take additional classes in later quarters, she graduated on time. That student went on to medical school," Kiewiet says with a touch of pride.

Students with graduation problems also find their way to the dean's office. "There's a mythology that the dean is a miracle worker when it comes to graduation," says Kiewiet, "which is just not true. We can't do the impossible. But sometimes, because we [in the dean's office] know the way Caltech works, we can put a few things together.

"A few years ago, a student came to the office in a panic. Because of a miscalculation, he was three units short of graduating. He had a dozen family members visiting from Texas for commencement, and he was in a cold sweat because here at Caltech if you don't officially graduate, you can't march in the ceremony.

"I thought," says detective Kiewiet, "that perhaps he had done some work that he had forgotten about, so I asked about his Caltech activities. It turned out that he had been quite a good fencer and had competed on Caltech's fencing team for six quarters. He said that he had always done it for fun and had never gotten any course credit.

"I asked the athletic staff if they would be willing to give him three units of credit, which they were. So, I took his record to the faculty meeting [held each year two days before commencement to approve graduates] and asked them to retroactively give the student three units for fencing, which they did. That student just graduated from law school," says Kiewiet, adding jokingly, "Sometimes the problems students encounter inspire them to careers."

While Kiewiet was able to save the day for that particular student, he says firmly that the dean of students is no magician who can pull units out of a hat. "There have been many instances where students were short of the units needed to graduate, and they were just short. I felt terrible, but there was nothing I could do."

As Kiewiet's office focused on students' academic problems, personal problems often walked in the door at the same time. "Many students who have come to see us complaining of an academic problem have an underlying personal problem," relates Kiewiet. "In those cases, I would try to figure out what was wrong and recommend to the student a department that could help, such as the Counseling Center, Health Center, or Residence Life Office."

Occasionally, it was Kiewiet himself who provided the solution—based on his own experiences as a student.

"One student was having horrible headaches," he remembers. "It was really screwing up her work. This same thing happened to me when I started graduate school; I had these terrible headaches. I went to an ophthalmologist and discovered that the prescription for my glasses was wrong. So, I asked the student if she had had her eyes checked lately. She went to the doctor, got a new prescription, and her headaches went away." Tongue firmly in cheek, Kiewiet says, "Sometimes as dean you get to dispense medical advice."

While difficult class work has always been a constant for undergraduates at Caltech, recently there have been some changes that Kiewiet feels will improve student life both academically and socially. On the academic side, Kiewiet states that he is very proud of the recent changes to the core curriculum, which were made after two years of study by a faculty review committee. "I think these improvements have made Caltech an even better place for students," he says.

Changes to the core include more biology and other basic science courses, with no increase in the number of course credits needed for graduation, and the switch from pass/fail to grades in the third term of the freshman year. In the first year of the change, 1996, Kiewiet points out, "The frosh performed very well under the new system. I feel much better knowing that freshmen are getting A's and B's instead of P's. There's something concrete about a grade. However, the real proof

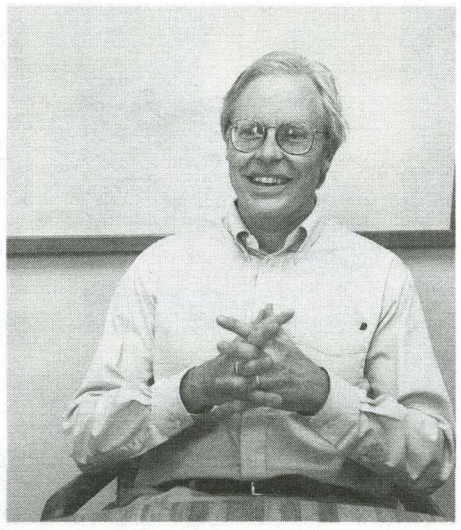
will be how well these students do next year as sophomores."

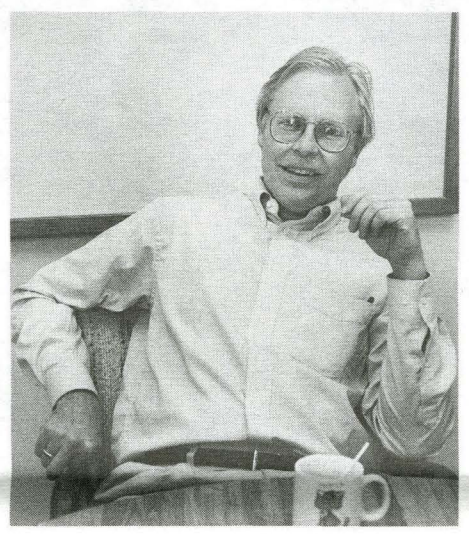
Another change to the core curriculum was the reorganization of the material presented in each course in order to better coordinate with other core classes. "The problem," says Kiewiet, "was that the math skills students needed to finish a first-quarter physics problem didn't show up in the math class until the third quarter. Much of the material in the physics and math core courses was rearranged in an effort to cut down on this problem. The new faculty committee, which has been appointed to oversee the core curriculum, can keep an ongoing watch on this."

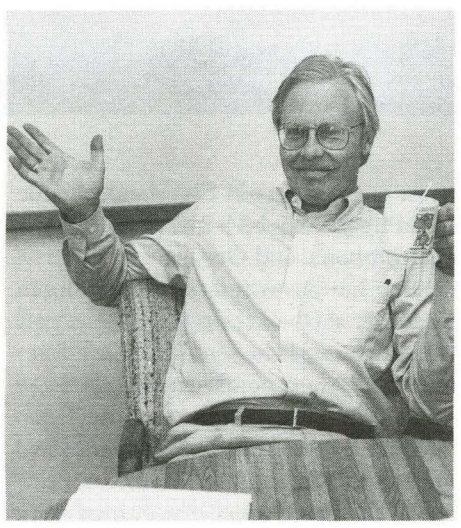
According to Kiewiet, the new faculty oversight committee will also recruit more professors to teach core classes, including professors from options and divisions outside the core classes. He cites the example of "somebody in aeronautics who could teach a dynamite intro math course." Previously, only math professors would teach math core classes. "This is a very positive change," he says. "Not only will students be exposed to a broader variety of professors, but faculty in academic options that never previously had contact with the core can now do so, and thus have an easier time recruiting students into their research areas."

On the social side of student life, a major addition, Kiewiet feels, is Avery House, the new student residence, which will also house faculty and graduate students. Avery House, which opened in September, is designed to be a place where all members of the campus community as well as academic and community visitors can interact in scientific, entrepreneurial, and arts activities. "Avery House is a terrific addition to campus life that will get people jazzed up," says Kiewiet, who served on the faculty committee that first explored the idea of building a new student house on campus. "It will give students an alternative to the current housing choices. Students who live in Avery House will have the chance to start new traditions and activities that, if successful, will spill into the other student houses." He concludes, "It's an energizing shot in the arm for student life at Caltech."

Caltech students have their own ideas about how to get energized, as Kiewiet discovered earlier this year when members of a student club approached him about holding a party that they wanted to bill as "the first Caltech rave." Dean Kiewiet was apprehensive about giving permission for such a large party. "I thought a rave was one of those completely out-of-control things. Another big concern was that the students wanted to include outside guests. As I talked with the students, they came up with a system where all guests were specifically invited by Caltech students, so I felt comfortable giving the party my blessings.







"It turned out to be one of the best parties I've ever seen," he says with enthusiasm. "Dabney Lounge was decorated with an amazing video montage, and the music was what's called techno-industrial. I dropped by on the night of the party to see how things were going, and I was really impressed by what a great party it turned out to be." He concludes, "As dean, you have to be willing to learn."

For Kiewiet, being a "student" while serving as dean applied not only to learning about the students' world but also to learning about the legal realm. "The world doesn't have the same sense of humor for college pranks that it used to," says Kiewiet. "Because of several court cases that have come down very hard on pranks at other universities, some of the fun has been lost. The Institute's administration and students have had to become aware that many Caltech traditions aren't acceptable anymore."

One tradition that went up in flames was the celebratory bonfire. Kiewiet points out that after the Los Angeles riots, California lawmakers dramatically toughened the laws on setting fires. "You don't have to burn anything of value to commit a crime," he explains. "The fire itself is a crime." As a result, Caltech has adopted the attitude of zero tolerance for fires. "Bonfires after football games were a longtime Caltech tradition," says Kiewiet. "It's tough to lose that link with the past."

The last student bonfire was about four years ago, when students lit a fire for a house event. The Pasadena Fire Department arrived on the scene, and, according to Kiewiet, they were "massively unhappy." The students were in trouble, so Kiewiet arranged for a mandatory fire-safety class, held at Caltech, every Saturday morning at 8:30 for one term. Kiewiet says proudly, "The students' attendance at the classes was excellent. The next year, on the traditional night for the house bonfire, the students put up big posters of flames. They had a virtual fire.

"Sometimes students may feel that administrators are taking away all their fun," he says. "Because of government regulations, the Institute must say that the fun has to take other forms."

Laws governing a university's responsibilities with regard to the quality of student life have also become more complicated in recent years, Kiewiet explains. "There are mandated drug and alcohol policies and protocols for grievances on sexual assault and harassment," he says, "which means that colleges must take a more interventionist approach. These are complicated matters and, as dean, I've had to do them right."

At times, doing things right may have meant acting as the bad guy, the disciplinarian. Did this ever bother Kiewiet? "As dean you're highly visible," he says. "Sometimes it is necessary for the dean to take action. I don't relish it, but I don't agonize over it either. However," he adds, "ninety percent of being the dean is being the good guy and helping students.

"Most of the students here have a good time despite how tough the studying is. They work hard, but they are very intrigued by learning physics or organic chemistry. Caltech students really dislike work that seems like drudgery." He continues, "When they believe they are doing a project that seems pointless—'grunging' is the word they use—they are very unhappy. But creative projects get them really excited."

In terms of evaluating his impact as dean, Kiewiet, the political scientist, falls back on a comfortable indicator—numbers. "Our graduation rates are creeping up slowly, which is good. I just wish that the increase had been more dramatic. Still, the one or two percent increase does represent four or five kids."

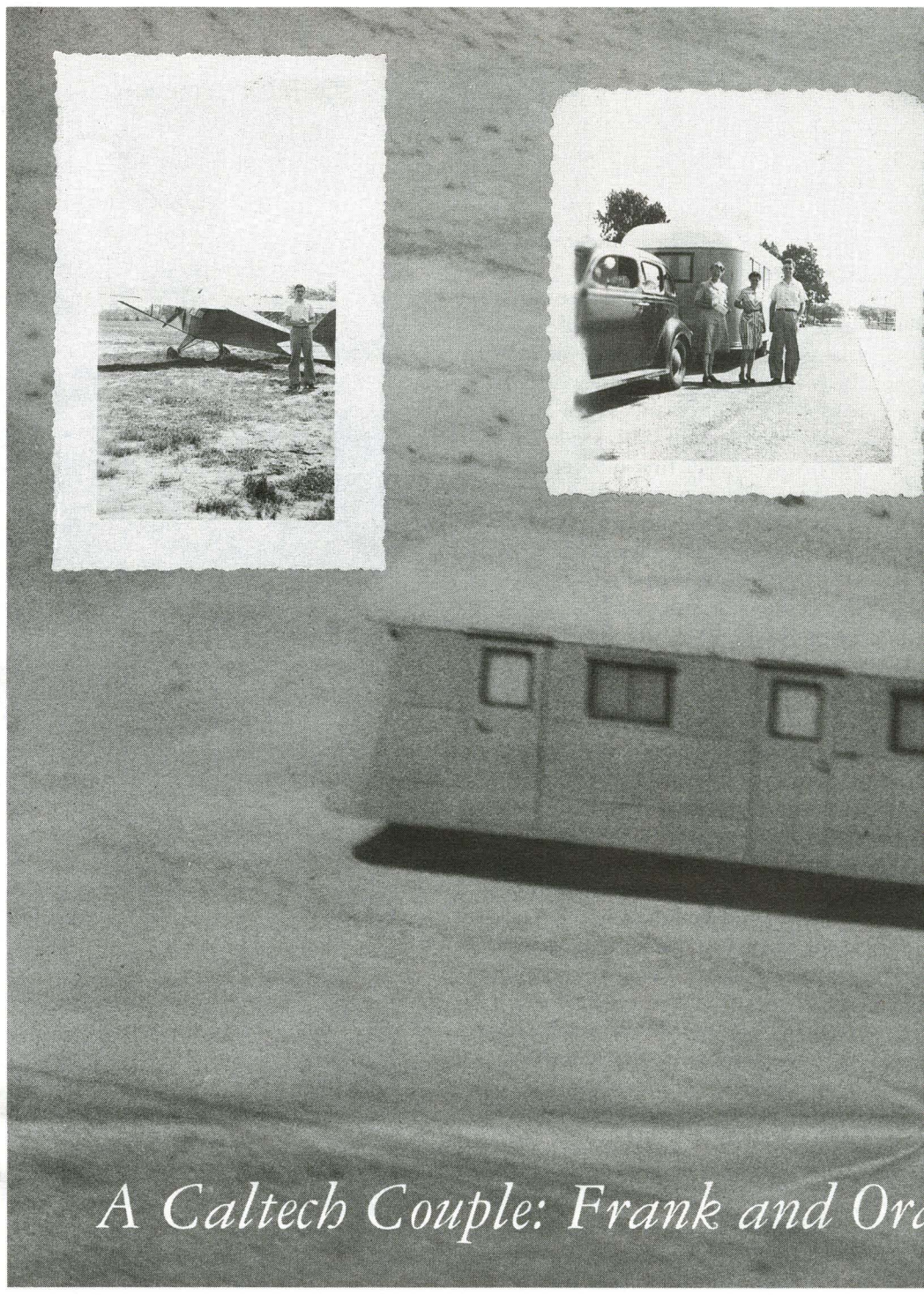
With his duties as dean behind him, Kiewiet will return to his research in the Division of the Humanities and Social Sciences. The author of two books—*Macroeconomics and Micropolitics: The Electoral Effects of Economic Issues* and *The Logic of Delegation: Congressional Parties and the Appropriations Process*—before he became dean, Kiewiet was able to continue his research interests during his tenure with projects in which he analyzed the voting patterns in the now-defunct Russian Congress of People's Deputies, and helped to compile a comprehensive database on all Russian election data.

Kiewiet will bank on that knowledge when he starts a new project on the three-year-old Russian stock market. "It's not exactly Wall Street," he understates, "but it is a market." Speculators shouldn't be getting out their checkbooks too soon, however. "I think that the Russian market is a very risky place to invest in right now because no one really knows what these Russian companies are worth," Kiewiet says. In his research, Kiewiet will be looking at how sensitively stock prices react to Russian political events. "It's a project that I'm very excited about," he says.

Money and politics were also the subject of another recent project. Working with Kristin Szakaly, PhD '94, when she was a graduate student, Kiewiet did a study on how much impact state constitutional restrictions have on the issuance of bonds in those states. "That has led me to the area I want to work on now," says Kiewiet, "comparing the business climates in all 50 states. I will be analyzing the many laws and regulations and cost-of-doing-business issues that make states differentially attractive to companies." He adds, "That is what's fun about academia—having a compelling focus to which one can direct one's energies."

Asked if fun in an academic setting is important he replies, "Yes, I think it is. That's one of the things I have repeatedly told students. Caltech is really hard and you've got to try to make it as much fun as you can. Fun has a bad connotation—it sounds like merely going out to Magic Mountain [amusement park]. That's not what I mean. What I mean is that school should be enjoyable—doing the problem sets, planning classes for next quarter. If students don't get their fun in college, a lot of opportunities will be lost."

Now that Jean-Paul Revel, the Albert Billings Ruddock Professor of Biology, has agreed to serve as the new dean (see story, page 3), what advice does Kiewiet have for his successor? "Enjoy it," says Kiewiet enthusiastically. "The greatest joy of being dean is working with the students. Not only are they the best students, they are also wonderful people."

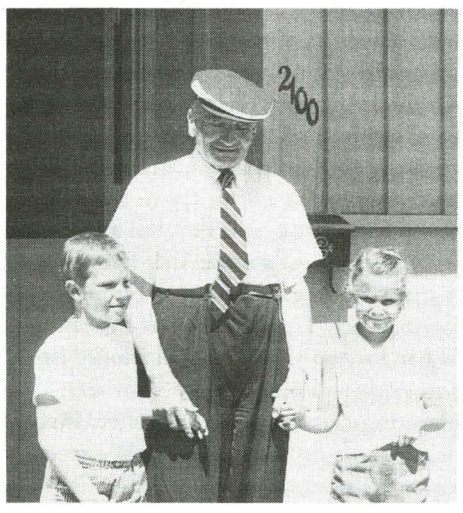


A Caltech Couple: Frank and Ora

When Ora Lee and Frank Marble headed West in the summer of '46, they had their own covered wagon, but it was complete with modern conveniences. Frank describes it as "a modest size, modest length, modest weight" house trailer, and it was pulled by their 10-year-old Plymouth, which had already logged 100,000 miles. It took the Marbles two weeks to make their way from Cleveland to Pasadena, partly because they stopped along the way to do some sightseeing. Frank's mother accompanied them.

A trailer park on Foothill, just west of Rosemead Boulevard, was their temporary address while Frank got started at Caltech as a graduate student in aeronautics. He had especially wanted to come to Caltech because Professor Theodore von Kármán was here.

Ora Lee had plugged for Harvard. Harvard had accepted Frank's application, as had Caltech. (He already had a National Research Council predoctoral fellowship in his pocket.) So the Marbles made a pact: they would come out to California for two years, and if they didn't like it, they'd return East. That decision was made 50 years ago. Not only are they still at Caltech, but throughout the intervening years, they have both been very actively a part of the Institute and its community.



In the top photo, Ora Lee and Frank Marble stand on either side of Richard Hayman, who, with his wife Dorothy, endowed Frank's professorship. Almost 30 years earlier, in 1959, children Stephen and Patty Marble visit with Theodore von Kármán.

Frank's contributions in a spectrum of fields involving aircraft propulsion have received special recognition, and although he officially retired as the Richard L. and Dorothy M. Hayman Professor of Mechanical Engineering and professor of jet propulsion in 1989, he continues to be greatly involved in his work.

Always looking for challenging problems, during his long career he has jump-started several new areas. One of these concerned so-called compressor stall, a phenomenon that limits the thrust of aircraft gas turbine engines. Another, which was his first project associated with JPL, dealt with maintaining a stabilizing combustion in aircraft gas-turbine engines. That work initiated a new field of chemical reactions in thin boundary regions between fuel and air streams.

Later, stimulated by the observed loss of performance of rocket motors due to solid particles in the exhaust, he established the fundamental mechanics of two-phase flow systems. A by-product of this work was his discovery of the considerable noise reduction caused by very small water droplets in air, a process that was initially of great interest to the manufacturers of aircraft engines.

In the early '80s he was responsible for a revolutionary theoretical development in swirling combustion, which became known as "the Marble problem" and has stimulated considerable work in the field of combustion research.

Frank received the Annual Propellants and Combustion Award from the American Institute of Aeronautics and Astronautics in 1991. In addition to his longtime membership in the National Academy of Engineering, in 1989 he had the further distinction of being elected to the National Academy of Sciences.

While Frank has been immersed in science and engineering, Ora Lee has turned her talents to the Caltech community, particularly the Coleman Chamber Music Association and the Caltech Women's Club—in which she has held numerous offices, including that of club president in 1975–76.

As enthusiastic participants in the social life of the campus, the Marbles have gathered many friends. They have always kept a close relationship with Frank's students, inviting them for many parties in their home and on occasional outings in the desert, and keeping in touch through the years via Christmas cards.

Whatever their interests have been during their 53 years of marriage, the Marbles feel they have worked as a team. One is struck by how clearly that theme resounds through their five decades of life and work on campus.

How did this Caltech couple meet? Well, they lived in the same apartment house as teenagers in Cleveland. Frank could frequently be heard practicing his trombone, and Ora Lee enjoyed playing her piano and the church organ whenever she had the opportunity. (They attended the same church.) So music became a bond between them.

In high school Frank concentrated on excelling as a solo trombonist. He now says, "Playing the trombone was one of the first things that ever gave me a feeling of being a success, of being a little different from everybody else. I wasn't physically great, and I was not an outstanding student up through high school, but I was an outstanding trombonist." In both 1935 and 1936 he won the Ohio state championship in solo trombone competition and placed second in the national competition in 1936—his senior year. He was offered a tuition scholarship by the renowned Curtis Institute of Music in Philadelphia, but he decided to attend the Case School of Applied Science (now Case Western Reserve University) instead.

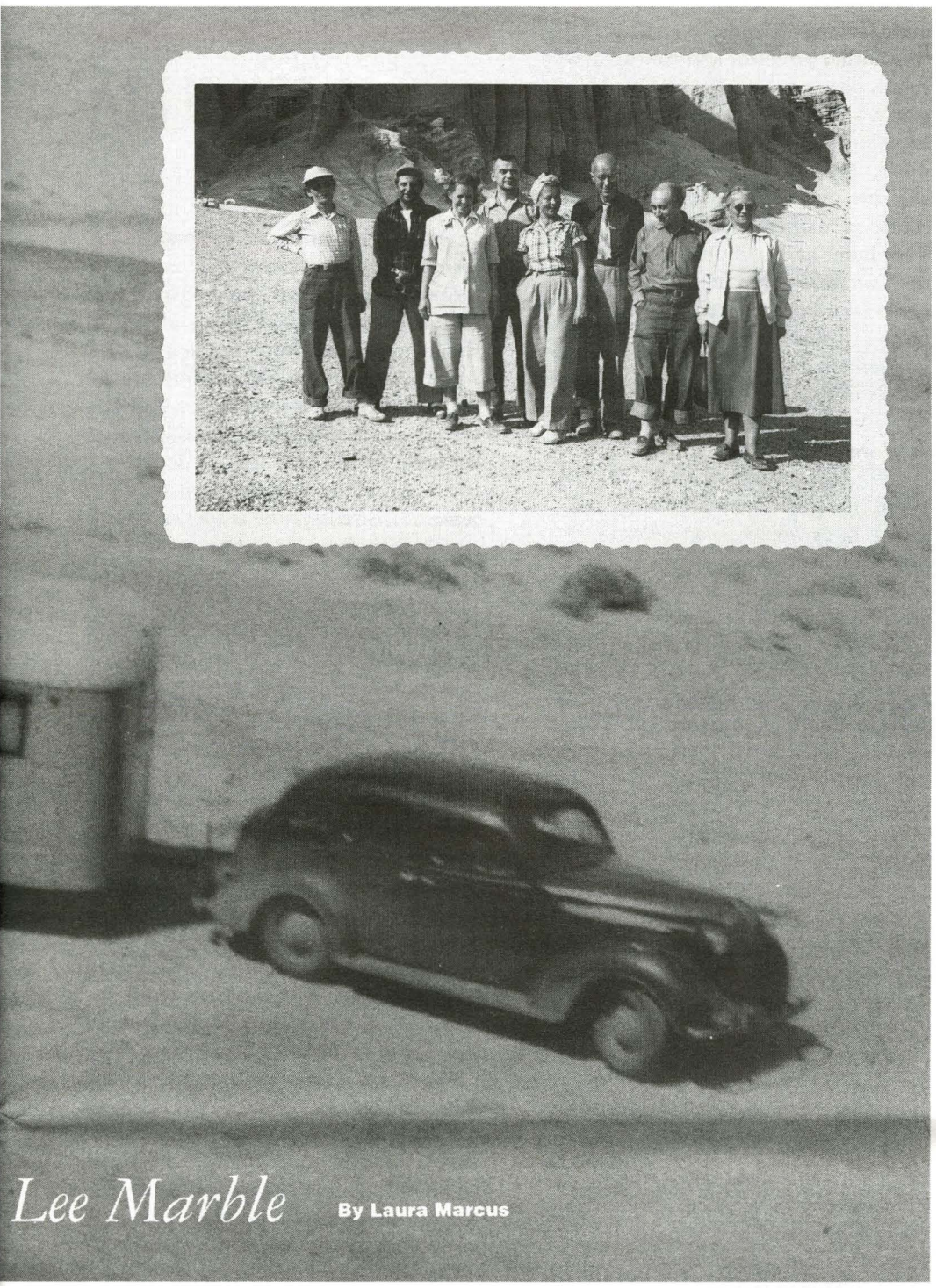
That decision reflected another early interest that turned out to have a lasting impact on Frank's choice of a field. As a boy he loved airplanes in air shows, and as models he could build, and eventually as aircraft that he could learn to fly. Shortly before World War II, the government set up the Civilian Pilot Training Program. Frank was among its first students, and in April 1940 he got his pilot's license—before getting his driver's license, he remembers.

"Learning to fly was very important to me—a big psychological step. I really felt part of the aeronautics field." By 1942, however, armed with both a BS and MS from Case, he had become involved in wartime research and administration at Cleveland's NACA Engine Research Laboratory (later called the NASA Lewis Flight Propulsion Laboratory), and this work left little time for flying. "The only flying I did was as a flight test engineer on the B-26 and the B-29 airplanes," he recalls. But in the late '50s, he took it up again, got his instrument rating, and flew fairly extensively on work-related trips and for the fun of flying.

Looking back he says, "The whole experience of flying myself was a vital and important part of my getting in and staying in aeronautics." It was that commitment that ultimately brought him to graduate school at Caltech in the fall of 1946.

"Caltech proved to be everything I had hoped for. I can remember the first day I walked into the Guggenheim Aeronautical Lab, and I was told to go see Ernest Sechler," then associate professor of airplane structures. "He was handling the incoming students." But before meeting Professor Sechler, Frank met his secretary, Geraldine Ellis. He had already corresponded with her about where he could park the house trailer. "She was so sweet and so nice, I felt immediately welcome.

"One person I really wanted to make contact with as soon as possible was Professor Hans Liepmann. He was the



Lee Marble

By Laura Marcus

Frank with his Taylorcraft in '40 (left); traveling westward with Mom and Ora Lee in '46 (center and background); and having arrived in Southern California (right). Here, a pregnant Ora Lee and Frank (third and fourth from left) join friends and colleagues on a desert camping trip in '51.

rising star in experimental fluid mechanics. I was looking forward to meeting von Kármán, of course, but he was not spending much time at the Institute, since he was still involved in his wartime activity in Washington."

Liepmann had come to Caltech in 1939, after receiving his PhD from the University of Zurich. He began as a research fellow in aeronautics and ultimately became the von Kármán Professor of Aeronautics. He has been emeritus since 1985.

Says Frank, "I found Liepmann utterly charming and enthusiastic. He welcomed me with such warmth that I really felt completely at home. In fact, my whole impression of the Guggenheim Lab—and consequently the Institute—was one of a great collection of scholarly folks interested in many topics and who also took a great personal interest in students." (At that time there were about 25 graduate students in Guggenheim, Frank estimates.)

"Everyone knows that Liepmann has great accomplishments as far as scientific and technological work goes, particularly in the fields of transonic flow and turbulence. But I think, when all is said and done, his greatest contribution to Caltech and to the scientific area was the enthusiasm he brought to his work, the confidence he gave to younger folks—convincing them how important they were and what their work meant in the context of the aeronautical world. It's hard to overstate this."

Eventually von Kármán spent enough time at the Institute for Frank to be able to work with him and to get to know him. "He was colorful, and also a wonderful person. First of all, he came out of an aristocratic background in Hungary, and consequently he never questioned his own stature. He never had to defend himself, he felt." This was not surprising, because in Frank's view "von Kármán was just a genius in the field of fluid mechanics and aeronautics."

Having graduated in 1908 from the University of Göttingen, in Germany, von Kármán was recognized early in his career as an "accomplished physicist, aerodynamicist, and applied mathematician," according to Caltech Archivist Judith Goodstein's history of Caltech, *Millikan's School.* Going back further in time Goodstein explains that it was George Ellery Hale, one of the creators of Caltech, who saw aeronautical research "as a way for the school to gain national stature" when America was entering World War I. Harry Bateman, an English mathematical physicist, and Paul Epstein, a German physicist, were added to the faculty, and both urged Robert Millikan, Caltech's "Chief," to bring someone with outstanding scientific and engineering credentials to the aeronautics department. Epstein had known Theodore von Kármán ever since both were students in Europe, and suggested his name to Millikan.

Von Kármán came to Caltech as a visitor in 1926 and became director of GALCIT (the Graduate Aeronautical Laboratories) in 1930. Under his leadership, the Institute's aeronautics department became an important resource for developing the aircraft industry in Southern California and for creating engineers with a sound scientific background. Aside from his professional standing, von Kármán was, in Frank's opinion, "extraordinarily kind and thoughtful. I never knew him to be harsh in the way he worked with somebody. I heard him work with many people, and I know the experiences I had when he worked with me. It was never a specific direction—'you do this'—but 'why don't you try this, and come back and we'll talk about it.'

"Every time that he'd come to Pasadena, we would know it because he would call us. Ora Lee would answer the phone, and he'd say, 'Oh, Ora Lee, Kármán here.' And Ora Lee would say to me with a little laugh, 'That takes care of the next six weeks.' He'd have some work he wanted done, something looked up, or some calculations done. His stay would cover between three and six weeks and then he'd be off again to Europe or Washington, or some other place.

"My first trip to Europe, which was in 1949, was made possible for me by von Kármán. He was giving a paper in Paris at the first International Congress of Astrophysics and Gas Dynamics, and—without telling me—he arranged through the Air Force for me to fly over to attend that meeting. And I did. I don't think I've ever had a more illuminating experience than my first trip to Europe."

Because of his own pleasure in finding his way around European cities, Frank decided Ora Lee should also have that experience. Her first opportunity came in 1955 when Frank was attending a meeting in Belgium. They traveled separately to Europe, and Ora Lee's adventures began.

A baggage-handlers' strike at the Paris airport resulted in her arriving in Paris from Brussels by train instead of plane. Her plane trip from Los Angeles to Copenhagen had taken 24 hours, followed by a plane to Brussels, and then a train to Paris. When she finally reached her Paris hotel, she was too tired to understand the taxi driver's French, so he obligingly wrote down his fare on the dusty surface of the taxi. Over the years she has concentrated on improving her French, and now, Frank says, her fluency far exceeds his.

Since taking that first trip, Ora Lee has enjoyed traveling on her own to Mexico City, Yucatan, Iraq, and the British Isles. "I had no fears any place I ever was. I liked wandering around and exploring a place." (With Frank she has made a number of trips to Europe, as well as traveling to India, Kenya, and Tanzania, and twice to China.)

Before coming to Caltech with Frank, Ora Lee had completed three years of college at Western Reserve. After they were settled in Pasadena, she began commuting daily from Pasadena to UCLA, mostly along city streets in their old Plymouth. (Frank rode his bicycle to Caltech.) A year of that regimen resulted in her getting a BA in English literature, with a minor in music, from UCLA, and a welcomed shifting of gears in the use of her time.

The Marbles' first child, Stephen, was born in 1951, and Patricia in '53. The two years of nursing training Ora Lee had undertaken following high school were put to good use at the Pacific Oaks Nursery School while the Marble children were enrolled there. She substituted for the regular nurse, as well as serving on the school's board and parents council. The League of Women Voters, the American Friends Service Committee, and the Descanso Gardens Guild also became major recipients of her "free" time, as did the Caltech Women's Club. She continued studying the piano, and took courses in a variety of subjects "just for fun."

The Coleman Chamber Music Association has especially benefited from her love of music. Established in 1904, the Coleman Concerts are the oldest continuing chamber music series in this country, and since 1965 they have been presented before large and enthusiastic audiences in Caltech's Beckman Auditorium. Ora Lee served on the Coleman board of directors for 20 years—for three years as president, a term of office that included the Association's gala 75th anniversary year. As a member of the Coleman Associates since 1961, she has held numerous other board positions dealing with the Assembly Room Concerts (which are held for Pasadena area school children), benefits, annual competitions, tickets, and advertising. For many years she was also a representative to the Pasadena Area Music Council.

In their early days in Pasadena, Frank played trombone in the Pasadena Symphony, but otherwise he had his hands full at Caltech. It was fortunate for both him and the Institute that the Guggenheim Foundation had decided to finance Jet Propulsion Centers at Princeton and at Caltech. The Caltech center was established in 1948—the year Frank got his PhD.

Hsue-shen Tsien, a former student of von Kármán's who was at that time a professor at MIT, accepted the Goddard Chair at Caltech and became head of the new center. Then an instructor in

Continued on page 12

The Marbles

Continued from page 11

Top right, Frank joins Hsue-shen Tsien in the Fragrant Hills near Beijing in 1982. In '88, some of Frank's former students help celebrate his birthday in style.

aeronautics, Frank was scouting job possibilities elsewhere, but when he was offered an opportunity to work with Tsien at the center as an assistant professor of jet propulsion and mechanical engineering, he cast his lot with Caltech. He began by teaching courses about aircraft gas turbines and about rockets, as well as applied mathematics.

"The plan was to develop courses in the propulsion sciences, particularly, since they involved both chemistry and gas dynamics materials. Guggenheim and his group were convinced that a new curriculum of courses was required to address in a unified way all these fields. They were right, and I have reason to believe it was Kármán who convinced them of this."

Housed in the same building as aeronautics, the center was designed to be a separate unit, but not to grant degrees. It accepted students from aeronautics, chemical engineering, and mechanical engineering. These departments and the center were grouped in the Division of Engineering and Applied Science, which was chaired by the same man for 24 years. Frederick Lindvall, who had received his PhD from Caltech in 1928 and had joined the faculty in 1930 as an instructor, was the highly respected chairman of the division from 1945 to 1969. Frank was very impressed with Lindvall's style of leadership.

"He did things in a much less formal way. For example, a faculty meeting with him was handled like a Quaker meeting in the sense that nobody would vote. He didn't ask for a vote. He would sort of get the sense of the meeting. He would make his decision on what he sensed the faculty wanted. It didn't breed arguments. Not all of the faculty were happy with all the decisions he made, but he never got into contentious situations. He avoided that. He got a lot done, and the division grew and established itself in new areas."

Clark Millikan, the oldest son of Robert Millikan, was another faculty member from that period whom Frank singles out for distinctive talents. Millikan became director of the Guggenheim Laboratory in 1949 and served until his death in 1966. "I had a lot of respect for him. He really kept the aeronautics department here going when Kármán was off somewhere. Kármán provided the inspiration, the insight, the humor, the great ideas, but Clark Millikan was the manager who kept the whole thing going well." (Von Kármán died in 1963, at the age of 82.)

Another longtime member of the aeronautics department was Homer Joe Stewart, whom Frank calls "one of the brightest people I've ever known. He's very, very clever. Before coming to Caltech, I had known about his stimulating work in airfoil theory and airplane wings, and later he did his new and novel work on rocket trajectories and planetary exploration for JPL and NASA." Now an emeritus professor of aeronautics, Stewart was awarded his PhD by Caltech in 1940 and made his career at the Institute.

When Hsue-shen Tsien returned to China in 1955, it was a great loss to Caltech, Frank feels. Having studied with von Kármán, and being "undeniably brilliant," it was fortunate that Tsien had served as the first director of the Guggenheim Center. He and von Kármán worked closely together, and Frank's admiration of Tsien remains undiminished. When Tsien and his family were having serious problems with the U.S. immigration service in the early '50s, Frank was one of his most steadfast friends.

Another professor and colleague who stands out in Frank's memory is Morgan Ward of mathematics. "He was an excellent teacher, very exact and organized. My first year as a student here, I was sure I had flunked the exam in his course in mathematical analysis. I went home and told Ora Lee to pack up—we were going home. I was very nervous and upset because I had thought I was competent in mathematics, perhaps even bright in it." A couple of days later he learned he had not failed the exam, but had actually done well.

"We became good friends. Morgan Ward liked mountain climbing, and several of us would go on hikes in the mountains with him—Leverett Davis from physics, Arthur Erdélyi in mathematics, and a few others."

For years, the Marbles took visitors out to the desert for weekend camping. Often they invited students, too, or after their own two children were born, friends with families. "I don't think people do that very much now," Frank says.

A tradition this couple continued for even more years was to have a Christmas afternoon party for their student families and other friends. A special feature was a huge bowl of popcorn, plus Ora Lee's simmering minestrone served late in the afternoon. She liked to cook and entertain, especially during the 25 years they lived in their large home on East Mountain Street in Pasadena.

She also likes to write Christmas cards with an annual note—the Marbles' way to keep in touch with as many former students as possible. "We have always felt the students were part of our extended family," she says. Of course, she keeps track of names and addresses—about 250 at last count.

That list includes a number of JPL names, because in 1949 Frank began to split his time between the campus and the Jet Propulsion Lab. He was chief of combustion research there with a group of about 18 until his return to the campus full-time in 1957—some of his graduate students worked with him at the Lab. In all, he has directed the research of 45 students.

His own work has led to invitations to be a visiting professor or lecturer for an extended time at Cornell, Cambridge University, MIT, the École Centrale des Arts et Manufactures at Chatenay-Malabry, in France, and the University of Science and Technology of the Chinese Academy of Sciences, in Beijing. Over the years he has also had a number of Distinguished Lectureships, and membership in advisory groups and committees of the National Academy of Sciences, the National Research Council, and NASA, and has found time to be an active consultant to various companies in his fields of specialization.

He had an interesting 10-day visit to Russia in 1989 as a result of the Moscow Aviation Institute's invitation to him and to two MIT professors. "The Russians were eager to develop cooperative research efforts with the United States at that time, and we were the first visiting group to be shown the Russian moon-landing module. Incidentally, it was never launched, but we enjoyed seeing it."

Although Frank reached mandatory retirement seven years ago, close ties to former associates and students keep him frequently on the road. For example, at the invitation of former student and collaborator Professor Jack Kerrebrock, he goes to MIT several times a year as a consultant in the Gas Turbine Lab of the aeronautical engineering department. He attends student research seminars, discusses the students' research with them, and gives an occasional lecture. His last PhD student, Ian Waitz, who received his degree in 1991, is also on the MIT faculty.

He travels to UCLA about twice a month in his role as an adjunct professor in the mechanical and aerospace engineering department there. Professor Ann Karagozian of UCLA obtained her PhD at Caltech in 1982, and did her research under his direction.

Says Karagozian, "It was a wonderful experience to work with Frank. He has extraordinary insight into very fundamental as well as very applied research problems in a broad number of subjects. So much of his work has been truly seminal and has influenced hundreds of other researchers. I know that the problem we worked on together opened up a number of different applications of the subject for me, and when he comes over to UCLA, not only my students come in to talk with him but other faculty members discuss their research with him. He's really invaluable."

Another of Frank's former students joined the Caltech faculty. Edward Zukoski, now professor of jet propulsion and mechanical engineering, emeritus, received his PhD in 1954. "Ed is an outstanding experimentalist. The physics of a problem is still his focus, and the instrumentation comes next. It is gratifying to know that some results we obtained together 40 years ago are still being used," Frank mentions. Like Frank, Zukoski is still actively pursuing his work despite retirement status.

In 1988, some of Frank's erstwhile students organized a symposium at Caltech in honor of his 70th birthday. Another special occasion came in 1993, when he and Ora Lee celebrated their 50th wedding anniversary at the Athenaeum with family and friends.

When the Marbles reflect on the experiences they have had since their arrival on the Caltech campus those many years ago, they unhesitatingly agree, "It's been a very rewarding life."

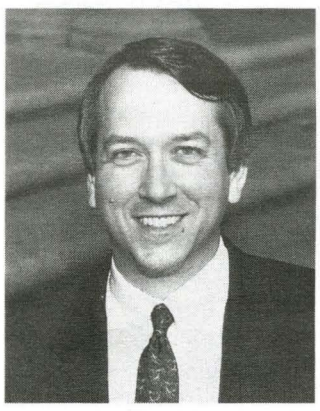
Laura Marcus's last story for Caltech News *was "The E.T. Bell that Caltech Knew." This article is based principally on interviews with Ora Lee and with Frank Marble, and on Frank Marble's oral history in the Caltech Archives. Added information came from* Millikan's School *by Judith R. Goodstein, and from Caltech Catalogs.*

ALUMNI

Priorities for our centennial year

By Edward Lambert '82

In 1897, a group of the earliest graduates of the newly formed Throop University founded an alumni association. Of the five officers they elected in their first meeting, four were from the "Normal School"—a teacher's school—and one from the College. Their alma mater had graduated its first class two years earlier, in June 1895. Throop University, of course, evolved into the California Institute of Technology, and its alumni association evolved with it. In the last 100 years, more than 22,000 students have graduated from Caltech and gone on to make innumerable and significant contributions to society.



Association President Edward Lambert

I feel privileged to lead the Caltech Alumni Association in this centennial year. In future editions of *Caltech News*, I plan to share some of the interesting stories about Institute alumni over the last century. These stories will highlight not only the titans of science and technology that we all know, but also others who have made great contributions in many other areas. In fact, the theme of the Alumni Association's Centennial is "Celebrating a Century of Achievement." This theme will be illustrated in centennial events throughout the coming year, including special celebrations during Seminar Day and at commencement. You will be receiving more information about these celebrations later.

Given the importance of the centennial, the Association wants to do its part to better serve its constituents—the entire alumni body. Accordingly, we are adopting an ambitious set of priorities for the coming year:

• *Build on the recommendations of the Alumni Relations Task Force*

Under the leadership of Trustee Ron Linde, PhD '64, the Alumni Relations Task Force has completed its work and offered far-reaching recommendations to the Institute on how to strengthen relations between the Institute and its alumni. Many of the recommendations suggest how the Institute can increase support of its alumni and better demonstrate how it values them. But several recommendations illustrate opportunities for the Association to improve its service to all alumni. In particular, the Association must improve communication with alumni, offer opportunities for continuing education, and increase service to current students. The Association intends to aggressively adopt and respond to many of the recommendations from the Task Force to ensure that their efforts are translated into actions.

• *Strengthen support of students and student life*

Surveys of Caltech alumni consistently demonstrate that service to students is an area of primary importance to alumni. The Association has consistently offered strong support to students through its Student-Faculty/Alumni Relations Committee. This year the Association hopes to expand its services by strengthening relations with the individual student houses and establishing a formal mentorship program for students to obtain career and other guidance from alumni.

• *Improve communications*

Linking alumni together and with the Institute is the most important function of the Association. Currently alumni are served by *Caltech News* and *Engineering & Science.* Several options to strengthen communications will be explored, including expanding the content of the Association's website, increasing distribution of publications from various campus entities, and initiating new publications. A key component in making these efforts successful will fall to you, since alumni are always interested in hearing more about their fellow alumni. Consequently, we will need your input for alumni news and information.

• *Continue strengthening relations with the Institute*

Due to the successful efforts of past alumni and Institute leaders, the Association and Institute are working closely to improve service to alumni. Many of the recommendations of the Alumni Relations Task Force offer additional ideas on how alumni can strengthen both formal and informal ties with the Institute. The Association will respond to these recommendations by seeking new methods to bring together alumni with the Institute.

• *Use the centennial to celebrate alumni*

The centennial offers a perfect opportunity to illustrate the remarkable accomplishments of Caltech alumni. These achievements go beyond the 13 Nobel Prizes won by alumni and include major contributions in business, the arts, education, public service, and, yes, even in athletics. Caltech alumni, though, may set standards of excellence for themselves that are almost impossible to live up to and consequently don't celebrate what they have accomplished. We intend to use venues throughout the year to correct this and offer alumni the recognition they deserve.

To complement these initiatives, we actively seek your input to focus the Association on programs and efforts that best fit your interests and needs. Please take the time to contact the Association staff or an Association board member to provide your input. Feel free to e-mail me with your suggestions and comments at eml3011@aol.com. (Please note: the "l" in "eml" above, is the letter l.)

"For their support of the aims and activities of the Caltech Alumni Association," four members of the Caltech community were recognized as honorary alumni at the Association's annual dinner in June. New honorary alumni are, from left: Edith Roberts, whose "decades of service" to Caltech have included serving as president of the Caltech Women's Club, chairing Caltech's Centennial Subcommittee on Art, and serving on many other campus boards and committees; Judith Amis, executive director of the Caltech Alumni Association; and Rosemary (Romy) Wyllie, founder and lead docent of the Caltech Architectural Tour Service (CATS), which has introduced countless campus visitors to the Institute's rich and varied architectural history. Not pictured: honoree Tom Anderson, Caltech's former vice president for Institute relations. Now a graduate student at the Harvard Divinity School, Anderson is continuing to provide regional representation for Caltech.

The results of Election '96 are in—for the Alumni Association board of directors, that is. Board officers for 1996–97 are (left to right) Tom Tyson '54, PhD '67, vice president; Warren Goda '86, treasurer; Edward Lambert '82, president; Lisa Anderson '74, PhD '82, secretary; and Frank Dryden '54, MS '57, past president.

Newly elected board members include (from left) Madeline Shea '77; Nancy Krehbiel-Brownell '83; and Roger Goodspeed '72. New members not pictured are Robert Jenkins '65, MS '66, and James King, PhD '58.

Focus groups to eye alumni-Institute relations

In an effort to better serve Institute alumni, the Caltech Alumni Association will meet with alumni focus groups around the country this fall and next spring. Discussion at these meetings will revolve around what alumni want from the Institute and the Alumni Association; what alumni would like to do for the Institute; the kinds of Caltech programs in which alumni might be interested in participating in their local areas; and different ways in which alumni might like to become involved with local chapters and other programs of the Association.

Meetings will be held in areas where there are large concentrations of alumni, including Seattle; San Francisco; Orange County, California; San Diego; Chicago; Houston; Albuquerque/Santa Fe; Boston; the Tri-State area (New York, New Jersey, and Connecticut); and Washington, D.C. Expansion to other areas of the country where alumni interest is strong is possible as well.

If you are interested in participating in a focus group, or would like to be included by sending comments, please write or e-mail Arlana Bostrom at the Caltech Alumni Association, Caltech 1-97, Pasadena, CA 91125. The e-mail address is arlana_bostrom@starbase1.caltech.edu.

Regarding roses

Caltech alumni looking to experience "life's shining moments"—which happens to be the theme of the 108th Tournament of Roses Parade—from a choice perch above Hill and Colorado are cordially invited to take part in the Alumni Association's annual Rose Parade Event. The $57 package includes reserved seating at the aforementioned location, parking on campus, and a post-parade lunch at the Athenaeum. The deadline for fees and reservations is December 1; call Patsy Gougeon at 818/395-8366.

ALUMNI ACTIVITIES

Caltech President Thomas Everhart will be the guest of alumni chapters nationwide over the next several months. These are the dates and places: **October 30,** Orange County; **November 19,** Washington, D.C.; **December 10,** Chicago; **January 17,** San Francisco; **February 13,** San Diego; **March 21,** Seattle; **April 2,** Tri-State; **April 3,** Boston; **April 28,** Houston; **April 29,** New Mexico.

November 14, *Winemaker Dinner,* Athenaeum, 6:30 p.m., with guest speaker Janet Trefethen, Trefethen Winery.

December 1, *Alumni on Ice,* the Pasadena Ice Skating Center. From 11:30 a.m. to 1 p.m., the rink will be open exclusively to alumni and their guests. All family members are welcome; all skate rentals are free.

January 1, 1997—*108th Tournament of Roses Parade.* Association viewing, followed by lunch at the Athenaeum. See article, page 13.

January 11, *Lunch and Magic Show for Alumni at the Magic Castle,* 11 a.m–4 p.m. Children ages 5 and up are welcome to attend. The Association has booked the Castle for the day, and for this Caltech alumni event, the Castle has agreed to lift its formal dress code.

February 8–18, 1997, *Egypt and the Nile.* See article, page 15.

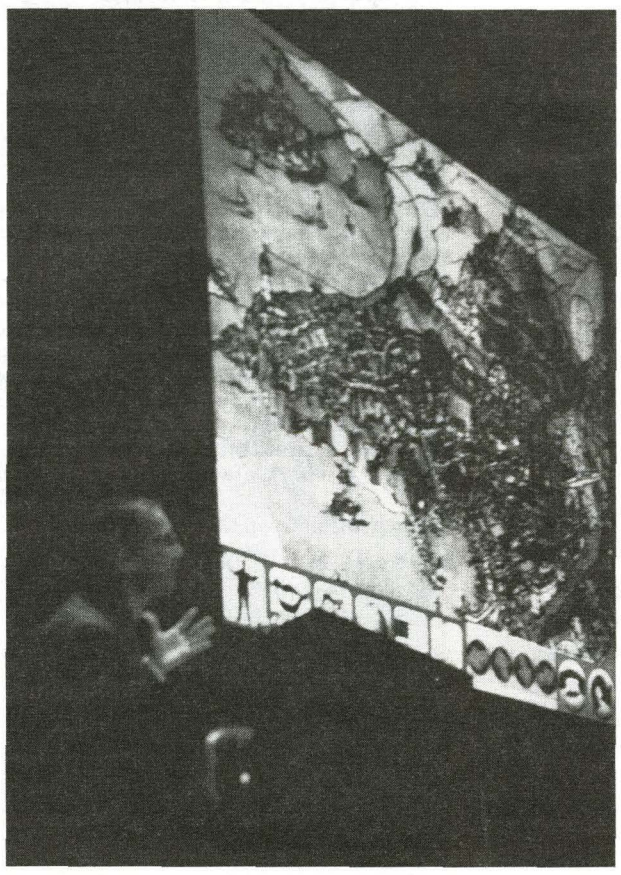
April 19–26, *Big Bend, the Last Frontier of Texas: National Park Travel/Study Program,* led by William Muehlberger '49, PhD '54, professor of geological sciences, University of Texas at Austin.

May 15–17, *Alumni Association's 60th Annual Seminar Day and Alumni Reunion Weekend.* Reunions will be held for the classes of '27, '32, '37, '42, '47, '52, '57, '62, '67, '72, '77, '82, '87, and '92; and divisional reunions for the divisions of Biology and Chemistry and Chemical Engineering.

June 21–July 2, *Alaska Travel/Study Program,* led by Robert P. Sharp '34, MS '35, the Robert P. Sharp Professor of Geology, Emeritus; and Leon Silver, PhD '55, the W. M. Keck Foundation Professor for Resource Geology, Emeritus.

For more information, please contact Judy Amis at 818/395-6594 for foreign travel/study programs; Arlana Bostrom at 818/395-8363 for domestic travel/study and chapter programs; and Patsy Gougeon at 818/395-8366 for local programs and Seminar Day/Reunion Weekend programs.

Notes from a Seminar Day



Overview. . .

Date: May 18, 1996

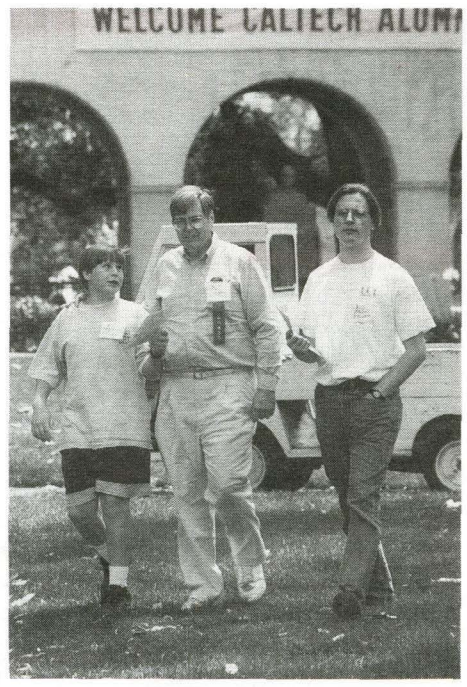
Place: the Caltech campus

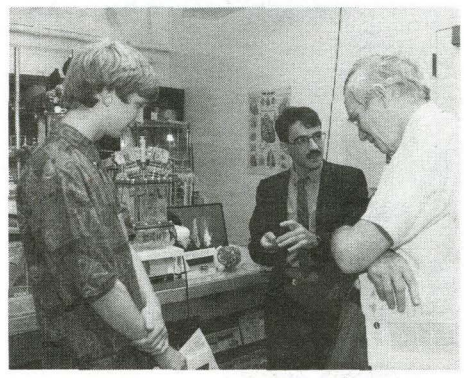
Total attendees: 1,580

Most senior alum in attendance: Bill Holladay '24, past president of the Caltech Alumni Association

Most distant points of embarkation: Shanghai and Tokyo

Most missed alum: Ray Clough MS '43, whose recent bout with pneumonia prevented him from being on hand to receive the Distinguished Alumni Award.



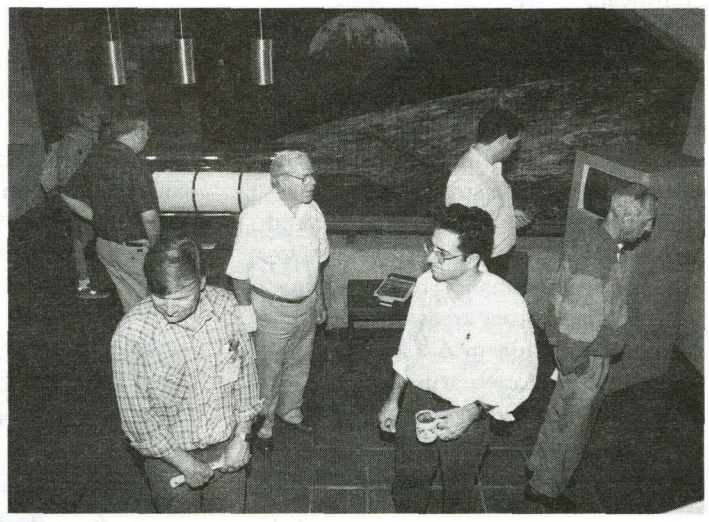


As always the events and activities of Seminar Day (top photo) give new meaning to the phrase "Caltech family." Returning alumni get to the heart of the research in Caltech's cardiovascular fluid dynamics laboratory during a chat with Professor of Aeronautics Morteza Gharib (above) and (below) register their impressions of the seismo lab. Above left, Bill Gross displays a screen from Knowledge Land during his General Session address.

General Observations. . . From the General Session

"You'll see a Knowledge Land you'll be able to navigate around in," said Bill Gross '81, gesturing toward a colorful overhead projection of a computer screen in Beckman Auditorium. Gross wasn't exactly talking about Seminar Day, but the capacity alumni crowd that had gathered to hear him could certainly be excused for thinking otherwise. After a morning filled with research exhibits and displays, and talks on such subjects as the origin of life on Earth, history on film, the Mandelbrot set, and the human side of economics, and much more of the same ahead for that afternoon, what had the Caltech campus become but an arena where, as Gross put it, "you can explore all the different areas of the world—art, literature, science, mathematics"?

As it turned out, Gross, the successful founder of four companies and Caltech's first Young Alumni Trustee (see "Bill Gross's Excellent Adventure," *Caltech News,* Vol. 29, No. 3, 1995) was referring to one of the latest products under development at his company Knowledge Adventure—a Glendale-based firm that creates educational software for children—and, in a larger sense, to his vision for integrating such computer programs with the vast new capabilities of the Internet to enrich the learning environment for children everywhere. And yes, there was a Caltech connection. "Caltech helped instill such a love of learning for me in my own life and that has really led me on the path I have taken," said Gross. That path has now led to Knowledge Land—an interactive learning product that is emblematic of Gross's determination "to make real learning software —the kind that would reward you with true moments of discovery. It's hard to do, but we're getting better and better. We want the learning goose-bumps—those ah-ha! moments."



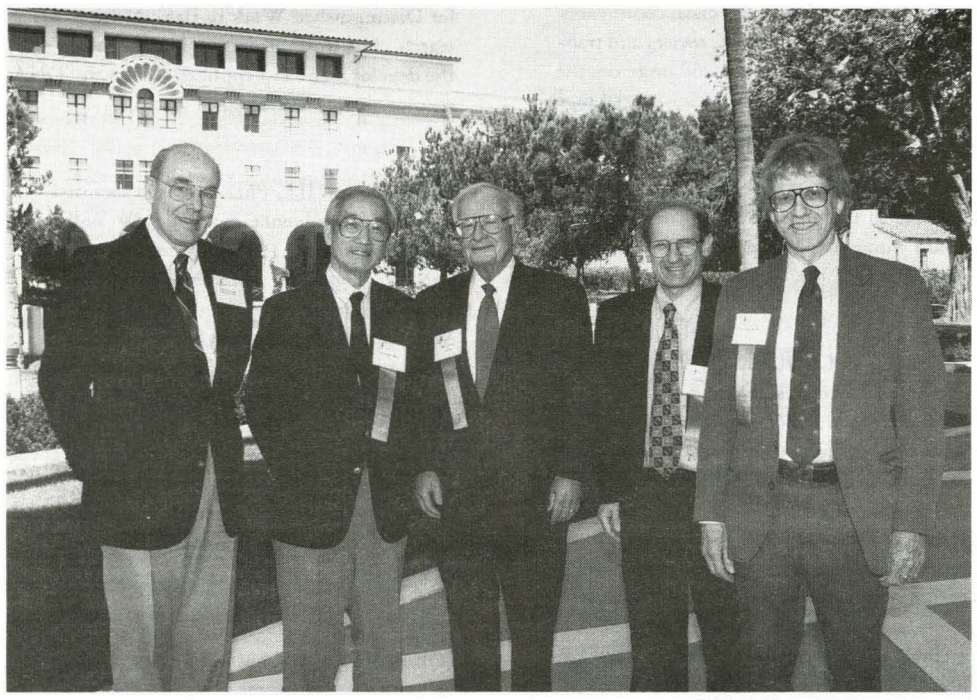
In this regard, said Gross, "the Internet opens up some amazing new possibilities. I believe it will revolutionize education." Two key reasons, he said, are the "Internet's potential for collaboration" and the possibility it creates of enabling the "essence of great teachers to reach millions of kids worldwide. We believe we can tie people together in a way that's never been possible before."

The Knowledge Land demo that Gross showed alumni is a prototype of a product scheduled to go on the market later this year. Already, a few hundred children have had online access to it during the development stage. Children select an avatar—Gross used a skeleton—to move around an appealing landscape (a pastoral one in this case) and explore attractions that may ultimately range from an amusement park that helps kids learn about physics, science, and math, to an observatory that sends them on tours of the solar system, to a Tree of Knowledge that links them to information sites across the Internet.

"Ultimately," said Gross, "we want to build in more than just movement—we want children to be able to modify and alter their environment." He foresees "challenges that oblige children to work together online—for example, a project to construct an actual bridge to get from one land to another. It's a very powerful learning-by-doing method."

Aren't some kids already overly addicted to virtual reality? Noting that "many of the virtual-world products out there now are shooting games, which hardly encourage collaboration," Gross suggested that "collaborative projects that tempt children with scientific and other experiences will make them more, not less, receptive to exploring what goes on in the real world."

The title of Gross's talk was "Future Education and the Internet." Knowledge Adventure aims to be on the cutting edge of that future, and beyond Knowledge Land other frontiers beckon. As his engrosssed audience watched the avatar skeleton hail a dinosaur (whose operator flashed over a cordial "hello" from somewhere in cyberspace) before ambling off on a new intellectual quest, Gross commented, "This is just a framework for what's possible."



From left, President Tom Everhart joins Caltech's newest Distinguished Alumni San Chiun Shen, PhD '51; William Carroll '48, MS '49; Nicholas Turro, PhD '63; and Vernon Smith '49. Not pictured: Ray Clough, MS '43. Honored for his achievements in civil and environmental engineering, Clough was unable to attend the awards presentation because of illness.

Distinguished Remarks. . .

From the Distinguished Alumni Presentations

"I think I've come to the wrong place."

—William "Bud" Carroll '48, MS '49, recalling his dismayed reaction many years ago at Freshman Camp, when a casual question from a classmate revealed he "didn't even know what a log log duplex decitrig slide rule was."

"Fifty-five years later, I can tell you I came to the right place."

—Carroll, after President Everhart presented him with the Distinguished Alumni plaque. Carroll is known for his worldwide contributions to water and water-waste engineering, work that has involved him in projects throughout the United States and in 15 foreign countries, and that has included the codesign of the San Diego Metropolitan Sewerage Project, the expansion of Manila's sewerage system, and the planning and design of water systems for seven cities in Indonesia. Now retired, he is currently director and vice chairman of the board of Montgomery Watson, Inc., a Pasadena environmental engineering firm, with which he has previously held the positions of chief engineer, president, CEO, and chairman of the board.

"During the past decades my scientific life has not been smooth. However, my conviction on the freedom of science can never be shaken. The Chinese proverb runs: 'When one drinks the water from the well, one should not forget who digs the well.' Caltech is truly the well of wisdom."

—San Chiun Shen, PhD '51, who returned to his native China after receiving his Caltech doctorate and whose career has emphasized the dual themes of scientific research and scientific freedom. Today an honorary professor in the biological science department at Shanghai Jiao Tong University, Shen played a key role in expanding the focus of contemporary microbiological research in China and has worked throughout his career to promote scientific communication and collaboration between China and other countries. As deputy director of the Academia Sinica Shanghai Institute of Microbiology/Plant Physiology, he devoted considerable effort to changing the institution's research focus from "cultural revolution" to scientific fundamentals and was instrumental in founding a molecular genetics laboratory that is now known worldwide.

"I have very warm memories of Caltech. I had Linus Pauling for freshman chemistry. I heard J. Robert Oppenheimer give several lectures in physics. And I also mowed every lawn within five blocks of the Caltech campus."

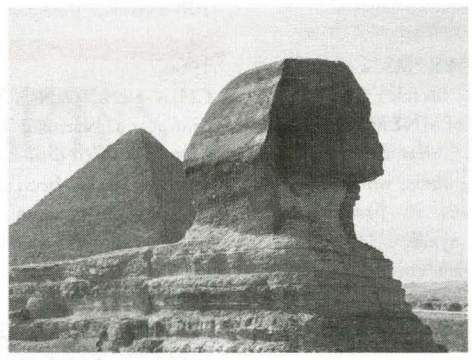
—Vernon Smith '49, who went from mowing lawns to founding fields and is today known as the "father of experimental market economics." Now the Regents' Professor of Economics at the University of Arizona, Smith was elected in 1995 to the National Academy of Sciences (NAS), an achievement that, it has been noted, "is not an easy one for an economist."

"Being a Caltech graduate is award enough. My teachers at Caltech taught me many things. One of the most important was to remain a student—you've gotta keep learning."

—Nicholas Turro, PhD '63, an internationally acclaimed leader in organic photochemistry, and currently the William P. Schweitzer Professor of Chemistry at Columbia University, where he heads a research group working to develop the new field of "supermolecular" photochemistry.

Join Alumni Association on Nile journey

Come with the Alumni Association to explore Egypt, Land of the Pharaohs —a civilization that flourished for more than 3,000 years. From the din and bustle of Cairo to the breathtaking majesty of desert pyramids and temples, Egypt is a land of amazing culture and rich contrasts that 40 alumni and guests will be able to experience on this special "Wings over the Nile" travel/study program, February 8 through 18.



Our guide will be Francis Clauser '34, PhD '37, the Clark Blanchard Millikan Professor of Aeronautics, Emeritus. A 1966 recipient of the Distinguished Alumni Award, Clauser has a longstanding interest in Egyptology, honed during three years of graduate study in Egyptian history and hieroglyphics at the Oriental Seminary at Johns Hopkins.

Our journey will begin in Giza overlooking the Great Pyramid of Cheops. In addition to the pyramids and great Sphinx at Giza, we will visit the ancient city of Memphis and Sakkara, home of the famous Step Pyramid. Next we will fly to the magnificent Temple of Abu Simbel, where 60-foot tall figures of Ramses II were cut into pieces and reassembled 90 feet above the original site to save them from the rising waters of Lake Nasser upon construction of the Aswan Dam.

Leaving Abu Simbel, we will fly to Aswan and board the Oberoi Philae for a four-day cruise through the valley of the Nile. In Aswan we will visit Kitchener's Island, the Mausoleum of Aga Khan, as well as the Old Dam and the High Dam, and the Temple of Isis at Philae.

Our cruise down the Nile includes stops at Kom Ombo, Edfu, and Esna. At each stop we will explore temples and colorful marketplaces. Arriving at Luxor, Egypt's eternal city, we will journey across the Nile to the Valley of the Kings—site of the Tomb of King Tutankhamen—and the Valley of the Queens, where 70 tombs have been unearthed. We will also visit the ancient city of Thebes and see the well-preserved temples of Karnak and Luxor.

Returning to Cairo, we will visit the Citadel, the Muhamad Ali Mosque, the Khan el-Khalili Bazaar, and tour the Egyptian Antiquities Museum.

Among the highlights of our trip will be an excursion to St. Catherine's Monastery in the heart of the Sinai. Religious tradition holds this to be the site where Moses saw the burning bush and received the ten commandments.

The cost of the trip begins at $4,099, per person, double occupancy, from Los Angeles. This price includes round-trip scheduled flights from LAX, all flights within Egypt, all meals aboard the Oberoi Philae, all sight-seeing and shore excursions, and all breakfasts and many other meals. For those who wish to visit Petra and Amman, an optional three-day post-trip extension to Jordan will be offered for $589 per person, double occupancy.

Brochures are in the mail, but if you do not receive one or would like more information, please contact the Association at 818/395-6594, or email judy_amis@starbase1.caltech.edu, or fill out and return the coupon below. Space is limited, and priority will be given to Alumni Association members.

Caltech Alumni Association Travel/Study Program
"Wings over the Nile"
February 8–18, 1997

I am interested in learning more about the travel/study program to Egypt.
Please send information to:

Name_____

Class Year_____ Phone number_____

Address_____

_____

Please return to Egypt Travel/Study Program
Caltech Alumni Association, 1-97, Pasadena, CA 91125

PERSONALS

1942
FRED H. FELBERG, MS '45, was honored at a luncheon on May 28 for his 18-year tenure on the board of directors of the Parsons Corporation. A graduate of the executive program of the Stanford School of Business Administration, Felberg is a former JPL executive, where he held several senior-level positions. Prior to joining JPL he served as a lecturer in aerodynamics and was director of the Southern California Cooperative Wind Tunnel. He is a member of the American Institute of Aeronautics and Astronautics; a member and past president of the Pasadena Rotary Club, the Twilight Club, and the Pasadena Breakfast Forum; a past director of the Pasadena Chamber of Commerce; and former chairman of the advisory board of the Pasadena Foundation. He and his wife, Jean, have three grown children.

1943
FREDERICK W. BOLLINGER, MS, a retired research chemist, writes: "At Merck I am remembered as a coinventor of SINEMET® for Parkinson's Disease." He adds that although he's retired, he's not running out of work. He recently coauthored two papers: the first appears on page 144 of *Organic Syntheses 1995*, volume 73; the second, a review entitled "Diazotransfer Reagents," has been published in the May issue of *Synthetic Letters 1996*, on page 407.

1953
GORDON P. EATON, MS, PhD '57, director of the U.S. Geological Survey, received the American Geological Institute's Ian Campbell Medal on November 6, 1995, in New Orleans, at the Geological Society of America's annual meeting.

1956
GENE BARNES and Susan Rautine announce their marriage, which took place on January 27, 1996, in Monterey, California.

1958
DALE R. SIMPSON, MS, PhD '60, has been honored by Lehigh University upon his retirement from the position of professor of geology. He joined Lehigh's faculty in 1960 as an assistant professor and was promoted to associate professor in 1964 and full professor in 1966. A specialist in zeolite and phosphate mineralogy and petrology, he has written extensively on apatite, the mineral of teeth and bone. He has also researched zeolites, especially mordenite, which may be applied to many environmental and energy problems, and has received two U.S. patents for his work, and he plans to continue his research on the synthesis, modification, and use of zeolites. He was awarded the Lindback Award for distinguished teaching in 1964. He and his wife, Dr. Margaret Jean Simpson, reside in Bethlehem, Pennsylvania, and they have two children.

1959
AKIRA KOBAYASHI, MS, is now a professor of mechanical engineering at the Science University of Tokyo and is also a professor emeritus at the University of Tokyo. He has been appointed Japan's national delegate to the International Committee on Aeronautical Fatigue, and he has been the chair of the Aeronautical Fatigue Research Committee, Japan Society for Aeronautical and Space Sciences, since 1986.

JOHN W. WESNER, MS, writes with two personal updates: "With the breakup of AT&T, I am now employed by Lucent Technologies, as a member of the Bell Laboratories unit serving the Business Communications Systems business unit. I have begun a three-year term as Vice President for Systems and Design in the American Society of Mechanical Engineers (ASME International)."

1965
SCOTT W. BECKWITH, MS, president of Beckwith Technology Group, Murray, Utah, has been selected as the 1996 recipient of the J. H. "Jud" Hall Composites Manufacturing Award, which is sponsored by the Composites Manufacturing Association of the Society of Manufacturing Engineers (CMA/SME); the award was presented on January 23 at the Composites '96 Manufacturing and Tooling Conference, in Anaheim, California. He has spent over 30 years conducting and supervising work related to solid rocket propulsion and composite structures. Prior to founding Beckwith Technology Group, he was manager of composite structure technology at Hercules, Inc., and he remains an advisor to the U.S. Department of Commerce. From 1976 to 1989 he was manager of Hercules' materials engineering department and superintendent of its materials group. He also worked on materials and manufacturing technologies while a captain in the U.S. Air Force during the late '60s. An SME member since 1989, he became a CMA/SME board member in 1993. He has authored more than 100 technical publications.

1966
CHIU-SEN WANG, PhD, of Taipei, Taiwan, a professor at National Taiwan University, has been appointed dean of its College of Public Health. He has been teaching at the university since fall 1991, when he returned to his native country from the States.

1967
ROBERT W. CLAYTON, MS, of Brentwood, Tennessee, is leading a $300 million project to build a new plant that will cast and roll aluminum foil for the packaging and automotive industries.

1968
LARRY WILLIAMS, PhD, a professor of biology at Kansas State University, is one of six K-State teachers who are the first recipients of that university's new Presidential Awards for Teaching Excellence. Williams, according to the university, "plays a key role in delivery of principles of biology, a freshman-level course with an enrollment of 2,000 students a year. Williams teaches the course and also serves as its coordinator during the spring semester. As coordinator, he leads all faculty and graduate students involved with the class; coordinates exams and grades; develops, revises and publishes the teaching manual; and upgrades the course study materials for audio-tutorial tapes. Williams also teaches molecular biology in the fall and biology of aging in alternate spring semesters. Williams became a K-State faculty member in 1970. He is a two-time Stamey award winner and has received the Conoco Award."

1969
CHARLES B. CROUSE, MS, PhD '74, has been appointed a vice president and officer of Dames & Moore, international engineering and environmental consultants. Crouse has worked for 20 years in the fields of earthquake engineering and engineering seismology and, since joining Dames & Moore in 1988, has managed technical projects involving the determination of seismic design criteria for new structures and seismic safety surveys of existing structures. He is a member of the American Society of Civil Engineers, the Earthquake Engineering Research Institute, and the Seismological Society of America.

CLYDE A. HUTCHISON III, PhD, Kenan Professor of Microbiology and Immunology at the School of Medicine, University of North Carolina at Chapel Hill, was one of six recipients of the North Carolina Award, presented by Governor James B. Hunt, Jr., on November 13, 1995, at a dinner in Raleigh. A pioneer in the field of protein engineering, Hutchison is a member of the National Academy of Sciences. The North Carolina Award is the state's highest civilian honor.

1970
RONALD W. DAVIS, PhD, of Menlo Park, California, has been awarded an honorary Doctor of Science degree by his undergraduate alma mater, Eastern Illinois University; the degree was conferred at the university's fall commencement, on December 9, 1995. The recipient of Eastern's 1984 Distinguished Alumnus Award, Davis is professor of biochemistry and genetics at Stanford Medical Center and director of the Stanford DNA Sequencing and Technology Center. Among his honors are the Eli Lilly Award in Microbiology and Immunology, the National Academy of Sciences' United States Steel Award, and the Louis S. Rosentiel Award for Distinguished Work in Basic Medical Research. His work focuses on biotechnology and the development and application of novel DNA methodologies to biological systems.

1971
CLIFFORD WILL, PhD, has been awarded both a J. S. Guggenheim and a J. W. Fulbright Fellowship for the 1996–97 academic year. He will take a one-year sabbatical leave from his position as professor and chair of physics at Washington University in St. Louis and will spend six months each in Paris and Jerusalem. The Fulbright Fellowship was awarded for his sojourn in France. Together with colleagues at the Observatoire de Paris in Meudon, and at the Hebrew University of Jerusalem, he will be conducting theoretical research on gravitational radiation from coalescing neutron stars and black holes.

1973
JOE ELMERS, MS, has been granted tenure in his position as assistant professor of engineering technology at the University of Toledo, Ohio.

1974
JERRY H. GRIFFIN, PhD, of Pittsburgh, Pennsylvania, and a professor at Carnegie Mellon University, has been named a fellow of the American Society of Mechanical Engineers. He is also a member of the American Institute of Aeronautics and Astronautics.

JESSICA TUCHMAN MATHEWS, PhD, senior fellow at the Council on Foreign Relations, was elected to the Brookings Institution board of trustees at its annual meeting, held on November 8 and 9, 1995, in Washington, D.C. A D. C resident, Mathews was deputy to the undersecretary of state for global affairs in 1993, vice president of the World Resources Institute from 1982 to 1993, director of the National Security Council's Office of Global Issues from 1977 through 1979, and a Congressional Science Fellow and member of several committees of the American Association for the Advancement of Science. She writes a column for the *Washington Post* that appears nationwide and in the *International Herald Tribune*, and she has also written for the *New York Times*, *Foreign Affairs*, and other scientific and foreign-policy journals.

DOUG MCELROY writes: "After 21.5 years away from the L.A. basin, we have returned. I got a job at JPL working on the Cassini Project. It's an 11-year mission, so I expect to be here a while. I'm still married to Linda, 22 years this June. We have four offspring now, Wendy, 14; Bryan, 11; Amy, 4; and Stephanie, 1. We are currently living in posh Palos Verdes (where Linda and I grew up, in fact), but expect to settle in the San Gabriel area as soon as our house in Maryland sells."

1975
JOHN F. LAND has been named managing principal in the Southern California office of Fish & Richardson P.C. Land's law practice emphasizes patent prosecution in electronics and computer-related technologies and includes client counseling in copyright, trade secrets, trademarks, and unfair-competition matters, as well as technology and intellectual property licensing.

1979
WALTER BRIGHT and his wife, Trish, are pleased to announce the birth of their son Max Apollo Bright on July 1.

1982
ELLEN D. WILLIAMS, PhD, a professor in both the Department of Physics and the Institute for Physical Science and Technology, and a former director of the Chemical Physics Program, all at the University of Maryland at College Park, has received the 1996 Outstanding Woman of the Year Award from the President's Commission on Women's Affairs at the university. An internationally recognized condensed-matter physicist, Williams is known for her commitment to students and her active role in support of women in physics.

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NEWS_____

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1984
ANTHONY SKJELLUM, MS '85, PhD '90, is the recipient of a National Science FoundationFaculty Early Career Development Award. He will be receiving $95,000 over three years to develop advanced software for parallel processing. He is also coinvestigator for a Department of Energy project that, in cooperation with Sandia National Laboratories, is developing parallel solutions to high-performance computing issues in turbo machines.

1985
JAMES F. GARVEY, PhD, has been promoted to the rank of full professor in the department of chemistry at the State University of New York at Buffalo. He has also recently received two SBIR grants for the development of a novel technique for thin-film manufacturing, and he was awarded a Fulbright Fellowship to work at the University of Sussex, England, this past summer.

ANIRVAN GHOSH and his wife, LEEANNA (MORELAND) '86, moved to Baltimore in September 1995 after spending the previous few years in Boston. "LeeAnna is working at Becton Dickinson Instrumentation," he writes, "and I am an Assistant Professor in the Department of Neuroscience at Johns Hopkins School of Medicine. Our two kids (Rhyan, 5, and Akaina, 2) keep us busier than ever." The move has brought them closer to many '80s Rudds, including KARLA PETERSON '86 and DAVID SAHNOW '84, SHELDON (MICHELE COSTA [WALTERS] '85), HOS (CHRIS MIHOS '87), VANYA (MICHAEL VANYA, Ex '87) and ICH (ICHIRO TAKEUCHI '87), all of whom live in the Baltimore–D.C. area.

JOHN H. MORRISON began law school at the University of Houston in August. He received his PhD in physics three and a half years ago, he writes, "so this should be a new and interesting experience."

NABEEL A. RIZA, MS, PhD '90, writes that, after initiating and leading the Optically Controlled Phased Array Radar Project from 1989 to 1994 at the General Electric Corporate Research and Development Center, Schenectady, New York, he in spring 1995 joined the Center for Research and Education in Optics and Lasers, University of Central Florida, as an associate professor of electrical and computer engineering. His research focus is the development of photonic information-processing systems, and, recently, to further his research work in advanced photonic controllers for phased-array antennas, he has received a $1 million grant from the Office of Naval Research. On the personal side, the Rizas are pleased to announce the birth of their first child, a son, Mehdi Nabeel Riza, born in March 1996.

Alum seeks autographs

Physicist/Collector Jeffrey Shellan, BS '75, PhD '78 (president of JBS Technologies, Inc.), is interested in purchasing autographs (letters, manuscripts, notes, and photographs) of Einstein, Bohr, Fermi, Millikan, Oppenheimer and other famous scientists. Caltech News readers who have either items or leads to offer may contact him by phone at 303/652-3426 or via e-mail at 102562.1161@compuserve.com.

1987
CHARLES MILLER, Ex, writes: "As the sun was setting on July 19th, I was on my knees in a yacht on San Francisco Bay, beneath the Golden Gate Bridge, asking Ms. Margo Deckard of Dayton, Ohio, to marry me. (Of course, she said 'Yes!') We had our first date at the conclusion of a pro-space lobbying trip in Washington, D.C., this past March, and our first kiss at the Jefferson Memorial. Currently, I am the owner of Miller & Associates, which provides leadership training, community development, and political-action services to Indian tribes in California, and a volunteer officer in two nonprofit organizations—the vice president of the Space Frontier Foundation, and the president of ProSpace. I currently live in Vallejo, California."

1988
TIMOTHY SWAGER, PhD, has accepted a position as professor of chemistry at MIT. His continuing research interests are in the areas of liquid crystals, polymers, and supermolecular chemistry.

1991
SAM DINKIN writes that he has been married to Lynn Baker since October 1994. It is ironic, he reports, that in a recent "knockout" bridge match he was sitting south and she was sitting north, since he will be moving to Boston to become a senior associate at Charles River Associates, where he will be working on international privatizations, and she, a full professor at the University of Arizona, will be visiting in Austin, Texas. This fall, Dinkin will be finishing an economics PhD at the University of Arizona in electronic auctions; he started his electronic auction research while at Caltech, using the Internet bridge server. His dissertation advisor is VERNON SMITH '49, who, Dinkin says, is an experimental economics pioneer. Regarding the knockout match, he writes, "the theme of the day was we were playing the wrong strain two levels too low. The hand makes 6(, which is less lucky than 3NT. The most interesting contract is 4(. . . 3(was a game try that became a slam try after the game invitation was turned down. In 4(, the opening lead was won on the table and a spade was led to the queen. This was won by the ace (a duck can hold the hand to 4) and a club was continued. Declarer pitched the (T! This preserved declarer's trumps to draw trump and claim, which is just what he did when east won and switched to hearts."

ANTHONY WEXLER, PhD, associate professor of mechanical engineering at the University of Delaware, recently received the Kenneth T. Whitby Award from the American Association for Aerosol Research for "outstanding contributions to aerosol science and technology as a beginning scientist." He has three major projects under way in the field of aerosol science: the first is a theoretical approach to deduce the processes that govern the composition of the atmosphere; the second involves complex mathematical computer simulations of urban air quality; the third is the development of an instrument that separates particles from ambient gas—an ultraviolet laser ablates and ionizes the particles, and the resulting ions are then analyzed in a mass spectrometer. In addition to these projects, Wexler is using mathematical modeling in biomedical research to learn how kidneys concentrate urine and the effects of ambient particles on human lungs, and is developing mathematical models of skeletal muscle response to functional electrical stimulation. His research is being funded by IBM, the Electric Power Research Institute, the National Science Foundation, the Environmental Protection Agency, the California Air Resources Board, and others.

1992
GREGORY S. CHIRIKJIAN, PhD, an assistant professor at Johns Hopkins University's Whiting School of Engineering, will receive the 1996 Pi Tau Sigma Gold Medal award at an international conference in November. Noted for his development of innovative robots for medical and industrial applications, Chirikjian has designed and constructed a snakelike robot arm that can configure itself into thousands of positions. Pi Tau Sigma is the national mechanical engineering honor society. In cooperation with the American Society of Mechanical Engineers (ASME), Pi Tau Sigma awards the Gold Medal each year for outstanding achievement in mechanical engineering within 10 years of receiving an undergraduate degree. Formal presentation of the award will take place during the ASME's International Mechanical Engineering Congress in Atlanta.

EDWARD E. DENG, MS, PhD '96, has joined the GE Research and Development Center as an electrical engineer.

1995
SIMON R. SANDERSON, PhD, of Niskayuna, New York, has joined the GE Research and Development Center as a mechanical engineer.

OBITUARIES

1921
LLOYD E. MORRISON, of Corona Del Mar, California, on February 5; he was 98. He had started at Caltech when it was still Throop College of Technology, but his studies were interrupted by a stint with the Coast Artillery during World War I. Back at Caltech, he was president of the Gnome Club his senior year. After graduating, he worked for 20 years at the Sprinkler Risk Department of the Board of Fire Underwriters, evaluating fire sprinkler systems and rising to head of the department. He later was head of the Los Angeles office of Grant Birkholm, an insurance brokerage, and after it was sold to Marsh McClennan, he worked for that firm as an account executive until he retired in 1963. He was also active with the Boy Scouts for over 30 years, including more than 20 as a scoutmaster. He was married to Rachel Stillwell Morrison for 54 years and to Dorothy Schussler Morrison for seven years, and he is survived by three sons, Richard, Edward, and Roger; three stepchildren, Jack Schussler, Sue Pickens, and Sally Chesebro; and 15 grandchildren and 10 great-grandchildren.

1923
WILLIAM L. BANGHAM, of Pasadena, California, on March 16; he was 94. From his graduation until his retirement in December 1990, he worked as a civil engineer in Pasadena and Los Angeles, and briefly in San Francisco and for a year in Mexico as well. He was a life member of the American Society of Civil Engineers and the American Congress of Surveying and Mapping, a former director of the Pasadena Historical Society, a longtime supporter of the Caltech Alumni Association, and, in 1963, a founding member of the Friends of Soochow, a support group for the University of Soochow, in Taiwan. He is survived by Margaret, his wife of 72 years; three sons, Rodney, Larry, and Willard; a daughter, Margaret Strand; and seven grandchildren and 10 great-grandchildren.

1926
ALVAH S. BULL, Ex, of Annandale, Minnesota, on August 2, 1995; he was 91. After leaving Caltech, he received a degree in architectural engineering from the University of Minnesota. He was a member of Phi Beta Kappa. A 40-year employee with Boise Cascade Corp., his last position was that of technical service manager. Strongly interested in the environment and Minnesota history, he served as president of the Wright County Historical Society. He is survived by a daughter, Betty, and by three granddaughters and three great-grandchildren.

1927
THEODORE R. GILLILAND, of Marshalltown, Iowa, on June 11, 1995; he was 92. "He fondly recalled his days at Caltech." His many life accomplishments included the development of the variable frequency ionosonde. He is survived by a daughter, Karen Packer.

W. LAYTON STANTON, PhD '31, of Balboa, California, on December 10, 1994; he was 89. After a 30-year career with Union Oil Company, he retired as director of exploration. He is survived by his wife, Sally; two daughters, Sandra Rados and Sheryl Soden; and four grandchildren and three great-grandchildren. His father was Fox Stanton, athletic director and football coach at Caltech in the '20s and '30s, after whom the Caltech athletic field is named. Layton Stanton himself played varsity football at Caltech for three years and was team captain his senior year.

1928
RICHARD G. FOLSOM, MS '29, PhD '32, of Napa, California, on March 11; he was 89. President emeritus of Rensselaer Polytechnic Institute (RPI), he was considered one of America's top authorities in the theory and practice of fluid dynamics. During World War II he was instrumental in developing the landing vehicles used at Normandy and in the Pacific, and during his career he was involved in diverse areas, including the development of upper-atmosphere research, the machining of tough metals, high-temperature metallurgy, acoustics, industrial air pollution, and the building of structures to resist bomb blasts. His studies were published in numerous professional and technical journals, and he presented over 60 papers in the fields of mechanical and chemical engineering and higher education. He held academic positions at Caltech, UC Berkeley, and the University of Michigan before becoming president of RPI in 1958, and over the years he was an advisor, consultant, or board member for a variety of corporations, political entities, and academic, technical, scientific, and military institutions and organizations. His many awards include Caltech's Distinguished Alumni Award, the U.S. Navy's Distinguished Public Service Award, the American Society for Engineering Education's Lamme Award, and the RPI Alumni Association's Distinguished Service Award, as well as honorary degrees from a number of academic institutions. In 1976, the Folsom Library on the RPI campus was dedicated in his honor. The engineering, education, and research associations in which he was a participant included the National Academy of Sciences, the National Academy of Engineering, the National Research Council, the Association of Independent Engineering Colleges, the American Institute of Aeronautics and Astronautics, the American Institute of Chemical Engineers, the American Society of Engineering Education, the American Society of Mechanical Engineers (ASME), and the Sigma Xi and Tau Beta Pi professional fraternities. During his association with ASME, he was an honorary director, president, Wright Lecturer, and Centennial Medallion Award recipient. He was married to the late Carroll Greene Folsom and is survived by three children, Gerry Escalera, Ronald Folsom, and Margot O'Neal, and by 10 grandchildren and 10 great-grandchildren.

1929
KENNETH E. KINGMAN, on August 26, 1995. He is survived by a son, Stuart.

1930
JOHN D. HAMILTON, of Los Angeles, on August 7, 1995. He is survived by his wife.

S. STEWART WEST, MS '32, PhD '34, of Atascadero, California, on February 23; he was 86. His career included a postdoctoral appointment in the department of physics, Washington University at St. Louis; exploration geophysics in Texas and Oklahoma; and teaching and research in physics at the University of Alaska, Fairbanks. Pursuing an interest in the sociology of science, he earned an MA in sociology at the University of Washington in 1956, and conducted research at the Institute for Social Research at the University of Michigan, Ann Arbor. At the time of his retirement in 1974 he was chief of research and statistics for the Alaska Department of Health and Social Ser-

vices. Among his postretirement interests was a survival analysis of his Caltech class of 1930. He is survived by his wife, Mary Ann; their son, Stephen West, and daughter, Anne West; four sons and daughters from a previous marriage, Gerald West, Sheila Steger, Diana Thompson, and Patrick West; and nine grandchildren and one great-grandchild. He was predeceased by a daughter, Helen Shaw, in 1989.

1931
MAYNARD M. ANDERSON, of Irvine, California, on March 11; he was 85. He went to work for the Metropolitan Water District the year he graduated, and in 1937 became a partner with the building contractors B. W. Anderson & Sons, in San Diego. He worked with the federal government in 1939, and from 1940 to 1946 was on active duty as an engineer for the U.S. Navy, continuing as a reserve officer after the war and retiring with the rank of captain. He returned to San Diego and worked as a construction engineer for the San Diego County Water Authority. In 1948 he returned to the Metropolitan Water District, where he later became chief construction engineer and was assistant general manager when he retired in 1975. After retiring he enjoyed bicycling, tennis, bridge, music, theater, and travel. He is survived by Helen, his wife of 57 years, and two sons, Ronald and James.

J. CARTER BIGGERS, of Whittier, California, on February 4; he was 86. He was a member of the American Institute of Real Estate Appraisers and worked for the Bank of America for 41 years, retiring as assistant vice president in 1974. He is survived by his wife, Catherine; three daughters, Shera Thomson, Bonnie Bradley, and Beth Lance; and five grandchildren.

RUDOLF C. HERGENROTHER, PhD, of Sarasota, Florida, on November 5, 1995; he was 92. He is survived by his wife, Louise, who writes: "At his remembrance service, rather than have a sad, doleful time, we made it a celebration of his long, fruitful, and productive life. He loved Caltech with all his heart and never forgot what a wonderful experience it had been for him."

1932
E. MOTT PRUDAMES, on August 6, 1995. He is survived by his wife, Ida.

1933
CHARLTON M. LEWIS, PhD, of Altadena, California, on March 12; he was 90. His postdoctoral fellowship at Princeton was interrupted by a two-year bout with tuberculosis, but in 1937 he was invited by Robert Emerson to the Carnegie Institute at Stanford to do research in photosynthesis. Later he also worked with Lawrence Blinks in marine biology. During World War II he did research in optics at the Mount Wilson Observatory, helping to design bombsights. When the war ended, he entered patent work in Pasadena in partnership with Trimble Barkelew, which he continued until his retirement. He is survived by his wife, Catherine, whom he married in 1929; a son, Charlton M. III; a daughter, Meredith Stout; and five grandchildren and two great-grandchildren. A second daughter, Joan, died in 1985.

THEODORE S. MITCHEL, of Houston, Texas, on February 3; he was 86. He worked for Shell Oil Company for 39 years, retiring in 1971. After retiring, he worked at several careers, including real estate. He was active in civic affairs as well, serving as secretary of the community water board for seven years and as president of the local civic association for two years; in addition, he wrote the association's bylaws. He started two computer clubs, one of which is still active, was elected chairman of the steering committee of Shell retiree volunteers and wrote their bylaws, and was active in local theater. He was also very active in the Alumni Association; he recruited eight alumni volunteers in Houston, and between them, over two years, they raised "a good bunch of money." A talented trombonist, he had played in and directed Caltech's marching band, and, while waiting for a job after graduating, had put together a band to play gigs. His piano player and arranger was Stan Kenton, and after Mitchel was offered an engineering job, Kenton took over the band and, of course, eventually hit the "big time." An excellent photographer, Mitchel was known as the "Dance Man" by his friends. "He was a wonderful, kind, and gentle person and will be missed by all who knew him." He was predeceased by his first wife, Lucile, after 46 years of marriage, and by a sister, Judy Armstrong. He is survived by his wife, Dorothea; a son, William; two stepdaughters, Stephanie Whited and Holly Drake; and nine grandchildren and 15 great-grandchildren.

ROBERT L. SMALLMAN, on December 5, 1995. He was a Gnome. He is survived by his wife, Elaine.

1934
WILLIAM D. CHAWNER, MS, of Milton, Florida, on August 20, 1994.

YUN P. LIU, PhD, of Tianjin, China, on August 4, 1994. His granddaughter, Jin (Jeannie) Liu, writes of her grandfather: "During the Cultural Revolution, a professor with an American degree was as bad as a criminal. He had many difficult years. I remember that it was in the later 70s that he started receiving newsletters from Caltech; it was a sign that connections with the outside world were back to normal, and so was the civilized life. My grandfather had a contented, quiet life in his later years; he kept reading till his last days."

FRANCIS G. TRACY, JR., of Carlsbad, New Mexico, in April 1994.

RALPH E. WHISTLER, Ex, of Kent, Washington, on September 5, 1995. After attending Caltech for two years, he went on to receive a bachelor's degree in physics from USC. He worked as a draftsman for American Potash, then for Southern California Edison, retiring in 1974 to Leisure World, in Laguna Hills, California. He enjoyed traveling, crosswords, golf, and bridge. He is survived by Dorothy, his wife of 58 years; a son, W. Art; a daughter, Patricia Kerr; a sister, Hazel Bullock; and four grandchildren and three great-grandchildren.

1935
JAMES S. RUSSELL, MS, of Tacoma, Washington, on April 14; he was 93. Known variously as Gentleman Jim, the Gray Eagle, the Father of Naval Aviation, and, finally, the Ancient Mariner, Russell retired from the U.S. Navy a four-star admiral. Prior to enrolling at Caltech, he had attended the U.S. Naval Academy, and he used both his education and his experience as a naval aviator when he helped design the Essex-class aircraft carrier before the start of World War II; of the 17 built by the start of the war, none was sunk. During the war he was lieutenant commander of a patrol squadron, and received both the Distinguished Flying Cross and the Air Medal. After the war, he commanded nuclear tests in the Marshall Islands. He rose to become second in command of the U.S. Navy, and when he retired in 1965 he was commander in chief of NATO forces in southern Europe. His honors include the Legion of Honor (France), the Order of King George I (Greece), the Order of the Republic (Italy), the Great Cross of Naval Merit (Peru), and the Order of Naval Merit (Brazil). Russell married Dorothy Johnson in 1929 and they had two sons, Donald and Kenneth. Dorothy Russell died in 1965, and Russell married Geraldine Rahn in 1966. She survives him.

1936
RALPH L. HAVER, on March 15, 1995.

1937
BRUCE F. MORGAN, MS '38, of Seattle, Washington, October 3, 1995. He is survived by his wife.

VSEVOLOD TULAGIN, of Boulder, Colorado, on November 25, 1995. After receiving his PhD in organic chemistry from UCLA, he went to work as a research chemist for the General Aniline and Film Corporation, where he created a color photographic film based on a novel set of organic dyes. He then joined 3M, where he focused on another color imaging system, this time based on the electrolytic deposition of ionic dyes on zinc oxide paper. In 1962 he moved to Xerox, where he was best known for his invention of photoelectrophoresis, a revolutionary single-step color imaging process. He retired from Xerox in 1978. As an inventor, he had hundreds of invention proposals, at least 70 U.S. patents, and three major color imaging processes to his credit. He is survived by his wife, Isabel.

1938
EMANUEL WINDSOR, MS '48, PhD '51, of Sylmar, California, on July 24, 1994.

1939
JAMES R. MCKINLAY, of Los Angeles, on March 18; he was 78. During World War II he served as an officer in the Signal Corps and was stationed most of the time in southern China. After the war he worked for Northrop for over 20 years, helping to develop the telemetry on an acceleration test sled and designing parts of the Snark missile as well as guidance systems for the Ranger moon probe and the Mariner Mars probe. He left Northrop to work for Eubanks Engineering Company, in Monrovia, California, retiring in 1982. He earned his pilot's license at age 68. He is survived by his wife.

1940
WILLIAM A. SPOONER, of Columbus, Ohio, on April 2. He worked as a chemist for Firestone until joining the U.S. Navy as an ensign. He served in the Pacific theater as a radar officer, then continued his military service for 20 years, becoming both a lighter-than-air and heavier-than-air pilot, serving as an electronics officer, earning his master's degree at Harvard Business School in 1956, and serving as a planner and director of various naval programs until retiring in 1963 with the rank of commander. He worked with several companies as a planner and comptroller, then in 1965 moved to Columbus, where he began his own planning business, William A. Spooner Associates, which he continued until this year. He also taught planning at Central Michigan University and was active in several Columbus groups for retired military. He is survived by Rita, his wife of 50 years; a son, William; a daughter, Eileen; and a grandson, Anthony.

1942
CARL H. SAVIT, MS, '43, of Houston, Texas, on March 21. He was a teaching fellow in mathematics at Caltech until 1944, and served as a statistical consultant to the U.S. Army Air Force Long-Range Meteorology Project 1943–44 and a project officer in research in upper atmosphere physics, also for the USAAF, at Wright Field, Ohio, and Alamogordo, New Mexico, 1944–46. He then returned to Caltech, again as a teaching fellow in mathematics, 1946–48. From Caltech he went to Western Geophysical Company of America, where he worked from 1948 until 1986, when he retired. While at Western Geophysical he rose from chief mathematician to senior vice president and also served (1970–71) on the White House staff as assistant to the President's Science Advisor as well as chairman of the Interagency Committee for Atmospheric Sciences, and (1956–60) as associate professor of mathematics, San Fernando Valley State College, Northridge, California. After retiring, he worked as a consultant and held academic positions as visiting professor, Institute for Earth Sciences, National University of Utrecht, the Netherlands, and as adjunct professor, geology and geophysics, at Rice University. He is survived by his wife, Sandra.

1943
SAMUEL W. BRADSTREET, JR., MS, of Lake Oswego, Oregon, on November 12, 1995. He was in the U.S. Army Air Force from August 1941 to March 1946 with a commission through the ROTC, serving as a weather forecaster in the Pacific theater 1944–46 and attaining the rank of colonel. After the war he began his career as a materials scientist and was the author of numerous books and papers on materials research and was cofounder of the Refractory Composites Working Group, a high-temperature materials research information exchange. He was a fellow of the American Ceramic Society and a member of several organizations, including the British Ceramic Society and the American Rocket Society. He is survived by Mary, his wife of 56 years; three sons, Samuel, Peter, and Steven; a daughter, Mary; a brother, David; a sister, Margaret Smith; and five grandchildren.

ABRAHAM FIUL, of Encino, California, on September 5, 1995. He is survived by his wife.

1944
RAYMOND L. ELY, MS, of Kensington, Maryland, in September 1995. He is survived by his wife.

EDWARD A. GOLDSMITH, of Augusta, Georgia, on June 4, 1995. After graduating from Caltech, he enlisted in the U.S. Navy and attended Annapolis. He is survived by Harriet, his wife of 45 years.

THOMAS W. NORSWORTHY, of Dallas, Texas, in September 1995. He is survived by his wife, Frances.

1947
CHI-HSUN HSUEH, MS, of Taipei, Taiwan, on February 9, 1992. He is survived by a son, Conrad Hsueh.

ROBERT H. UTSCHIG, of La Jolla, California, on July 7, 1995; he was 68. He is survived by his wife.

1948
EARL BEDER, MS '49, of Los Angeles, on January 19, 1995.

1949
WILLIAM E. HENRY, Eng, on June 24, 1995; he was 75. At the time he received his aeronautical engineer's degree, Henry was an officer in the U.S. Navy. He returned to carrier aviation during the Korean War, and also served at Pensacola and in Washington, D.C., before retiring in 1961 with the rank of commander. During his career as an aviator he achieved the status of ace, particularly as a night fighter, and he has been accepted into the Fighter Pilots Museum, in Mesa, Arizona, which has on its rolls 90 men from World War I through Korea. After leaving the Navy he worked for McDonnell Douglas in the area of aerospace R and D for the government, retiring in 1982. He is survived by a sister, Betty Barney.

JAMES T. KENNEY, JR., MS '50, of Davis, California, on October 14, 1995; he was 70. He served as an officer in the Seventh Air Force in the Pacific. He is survived by Marjory, his wife of 48 years; four sons, James III, John, Neil, and William; a daughter, Ann Shaw; and seven grandchildren.

JACK A. MONES, of San Diego, California, on December 20, 1995.

1951
GLENN A. FISCHER, MS, PhD '54, of Barrington, Rhode Island, in August 1993.

ROBERT F. O'CONNELL, of Northridge, California, on October 20, 1995. He went to work for Lockheed in June 1952, initially in an organization known as the Math Department—where he soon earned a reputation as the "wizard of the network analyzer," an electrical tool used at the time to solve dynamics problems—and then in the famous "Skunk Works" during the period when the SR-71 Blackbird was being developed; he worked out advanced analytical methods in the area of flutter and structures, methods that were ahead of their time. He helped design a version of a supersonic transport and then was appointed a department manager on the L-1011 Tristar, with responsibility for

ensuring that the aircraft would be flutter free. Known for making aircraft safety his first priority, he was appointed by the Federal Aviation Authority as its designated engineering representative. In addition, he held the position of division engineer for aeromechanics at Lockheed, with responsibility for design loads, structural mechanics, and flutter safety for all Lockheed California commercial aircraft. The author of a number of technical papers, he was an associate fellow of the American Institute of Aeronautics and Astronautics as well as a member of its structural dynamics technical committee. He also served on the structures and materials panel of the Advisory Group for Aeronautical Research and Development, a NATO agency. In the early 1980s, he returned to the Skunk Works, where he worked as division engineer for aeromechanics on classified programs including the F-117 Stealth Fighter. He retired from Lockheed at the end of 1988. In private life he was active in organizing the Northridge Little League, and he enjoyed singing in choirs. He is survived by his wife, Delia.

WINSTON W. ROYCE, MS '52, PhD '59, of Clifton, Virginia, on June 7, 1995. He was a member of the Gnome Club. He is survived by his wife.

1953

GORDON L. GWINN, of Santa Rosa, California, on September 13, 1995. He was a member of the Army Air Force during World War II, and it was while stationed in occupied Germany as a radar maintenance crew chief that he met and married his wife, Anneliese. After graduating from Caltech, he opened a U.S. Geological Survey field office in Santa Rosa, where he was in charge of collecting stream-flow data on rivers and streams in Northern California. He and his wife enjoyed operating their small ranch near Santa Rosa for many years. He is survived by Anneliese.

1954

JOSEPH J. MURRAY, JR., PhD, of El Granada, California, on January 29; he was 72. After receiving his Caltech doctorate, he worked with Luis Alvarez's group at Lawrence Berkeley Laboratory, where he participated in the bubble-chamber experiments and in the analysis of several of the newly discovered resonant states. His major contribution was the design of the particle beams that fed the chamber, including innovative electrostatic separators of his design, which selected the particle types entering the chamber. When the 82-inch bubble chamber was moved from Berkeley to the newly constructed Stanford Linear Accelerator Center (SLAC), he transferred with it. Especially interested in electromagnetic theory, he was, beginning in 1966, involved in the design of almost every new primary and secondary beam at SLAC, including, as a member of the Beam Dynamics Task Force, the arcs and final focus for the SLAC Linear Collider. A member of the SLAC faculty since 1972, he retired in 1989. He enjoyed playing piano and guitar and, because he was very concerned about the environment, he served on the board of the local sanitary district. He is survived by his wife, Maisie.

1955

CARL BIRDWELL, JR., Eng, of Bradyville, Tennessee, on April 12; he was 68. During his 30-year Navy career, which lasted from 1945 to 1975, he logged more than 800 carrier landings. After receiving his bachelor's degree in aeronautics from the U.S. Naval Post Graduate School, he furthered his education with his aeronautical engineer's degree from Caltech. He was then stationed at Miramar Naval Air Station. During two tours in Vietnam, he led 177 air strikes from the aircraft carrier *Hancock*. Commanding officer and chief test pilot at China Lake from 1970 to 1972, he oversaw the flight testing of new air-to-ground weapons and electronic countermeasure systems. He also directed a team of engineers and technicians in the restoration of an F4U Corsair I to flight readiness and exhibited the aircraft at the Reno Air Races and at Tailhook Association reunions. His final duty station was the test-pilot school at Patuxent River, Maryland, where he oversaw the testing of 36 different types of aircraft. He retired with the rank of captain. During his career he was certified for 150 types of aircraft, and his commendations included a Silver Star, the Legion of Merit, the Distinguished Flying Cross with three gold stars, a Bronze Star, and 16 Air Medals. For three years after retiring, he instructed flight mechanics at the University of Tennessee Space Institute, in Tullahoma. Active in Alcoholics Anonymous, he served as the organization's Tennessee Assembly chairman. He is survived by Jean Mary, his wife of 46 years; three sons, Carl, Hugh, and Robert; a sister, Barbara Earp; a brother, J. R. "Dick" Birdwell; and four grandchildren.

STANLEY L. GROTCH, MS '56, of El Cerrito, California, on October 10, 1995. He is survived by his wife and a daughter.

1956

RAYMOND J. LEMETTRE, MS, of Francueil, France, on October 30, 1994. He is survived by his wife.

1958

LAURENCE E. BERRY, of Camarillo, California, on December 15, 1995. Employed by Procter & Gamble for 36 years, he began by doing process development for a variety of products. He then spent five years in the international division, at plants in Lima, Peru, and Amiens, France; 19 years in the company's environmental engineering department, consulting on projects for plants throughout the United States; and, finally, three years as environmental engineer for the Oxnard, California, paper plant. He retired from Procter & Gamble in 1994 and was working at UCLA toward certification as a financial planner at the time of his death. In Ventura County, he was chairman and founder of the Community Awareness and Emergency Response Team for environmental problems, and chairman of the Camp Fire Boys and Girls. In Cincinnati, he devoted many years to coaching soccer for both boys and girls, and was involved in the Boy Scouts, including for six years as a scoutmaster. He and his wife also chaired the American Field Service High School Exchange Program for eight years and hosted two students in their home, one from Ecuador and one from Japan. He is survived by Carolyn, his wife of 37 years; three sons, Douglas, Edward, and Kenneth; a daughter, Kathryn; Kenneth's wife, Amy; and two grandsons. He had several relatives who graduated from Caltech: his father-in-law, Lawrence Henderson '25 (deceased); a brother-in-law, Lee Henderson '54; and a niece, Lisa Henderson '86.

1959

MICHAEL TALCOTT, Ex, on September 17, 1995. He is survived by his sister, Jane; two nieces; and numerous friends. Stuart Goff '58, MS '59, writes that, after leaving Caltech, Talcott "completed his studies at the Pasadena Playhouse and then returned to direct numerous ASCIT productions including *The Hasty Heart*, *JB*, and *Murder in the Cathedral*."

1962

CHARLES M. FLYNN, JR., of Reno, Nevada, on October 28, 1994.

1986

DERRICK H. NGUYEN, of Sunnyvale, California, on August 24, 1995. He is survived by his parents, Mr. and Mrs. Chuong Nguyen. A memorial fund has been established at Caltech. Those wishing to contribute should write to the DERRICK H. NGUYEN Memorial Fund, Caltech, 1200 East California Boulevard, Pasadena CA 91125.

1991

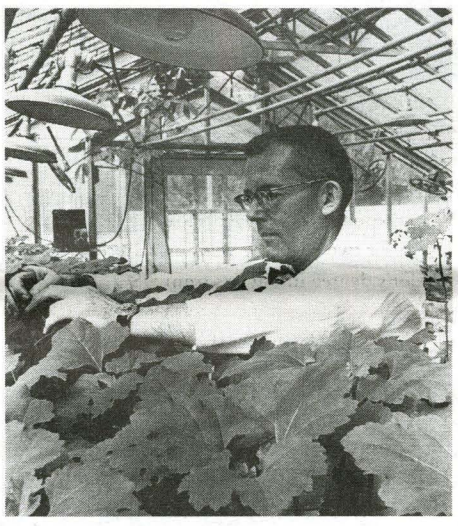
SURESH SHANMUGAM, of Bangalore, India, on December 31, 1995, in an accident. He received his MBA from UC Berkeley in 1995, and he was a senior executive at MLC Industries Ltd. and the managing director of Morpheus Technology Pvt. Ltd., both of which are India-based companies. He is survived by his father, S. Shanmugam.

James Bonner
1910–1996

James Bonner, PhD '34, professor of biology, emeritus, at Caltech and a member of the National Academy of Sciences, died September 13, at the age of 86. He had been a Caltech faculty member for 50 years.

Born in Ansley, Nebraska, Bonner earned a BA in chemistry and mathematics from the University of Utah in 1931. After completing his Caltech PhD, he spent a year in Germany and Switzerland as a National Research Council Fellow. He came back to Caltech in 1935 as a research fellow, and received his faculty appointment the next year.

Bonner's research interests included plant biochemistry and the genetic engineering of agricultural crop plants. He was the inventor of a novel way to increase the yield of rubber trees—which led to the approximate doubling of rubber yield per acre per year in Malaysia—as well as co-inventor of the



Bonner, carrying out research into plant physiology in the 1960s.

method used by most Florida citrus growers for the mechanical harvesting of oranges.

His research covered almost every facet of plant biology, from the study of plant growth hormones and the discovery of new plant hormones, to the biochemistry of respiration, photosynthesis, rubber biosyntheses, and chemical ecology. For the last quarter-century of his career, he concentrated on the isolation and study of the genetic material, its chemistry and packaging into chromosomes, and the control of gene expression in plants and animals. Bonner was also active in discussions concerning the future of industrial civilization, particularly with regard to food, population, and the outdoors.

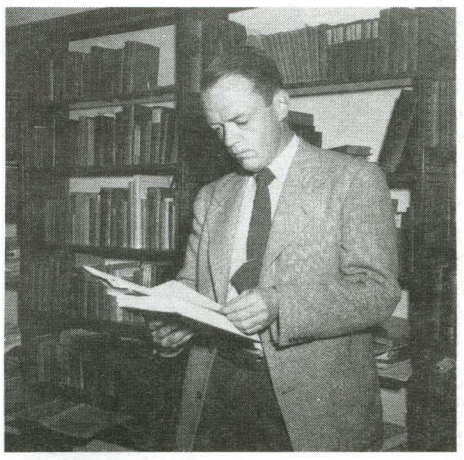
An avid member of several alpine and skiing organizations, Bonner climbed in the Himalayas and served as a ski patrolman for the National Ski Patrol System.

He was married to Ingelore Bonner, who died in 1995. He is survived by his siblings, Dr. Lyman Bonner, PhD '35, who served as Caltech's registrar from 1966 to 1985; Priscilla Horton; Robert Bonner; and Dr. Francis Bonner; by two children, Dr. Joey Bonner and Dr. James José Bonner; by two stepdaughters, Pamela Mandel and Terry Mandel; and by one grandson, James Justin Bonner.

Hallett Smith
1907–1996

Hallett Smith, Caltech professor of English, emeritus, died of pneumonia on his 89th birthday, August 15. One of this century's most eminent Elizabethan scholars, Smith served as chairman of the Institute's Division of the Humanities and Social Sciences from 1949 to 1970.

Smith came to Caltech in 1949 as professor of English, and went on to



Division Chair Smith in his Caltech office, in the 1950s.

serve as division chair for more than two decades. He became a senior research associate at the Huntington Library in 1970 and was named professor emeritus at Caltech in 1975.

Smith's principal area of research was 16th- and 17th-century English literature, and he was the author of many books and articles on Elizabethan literature with a special emphasis on Shakespeare. In 1952 he published *Elizabethan Poetry: A Study in Conventions, Meaning, and Expression* (Harvard University Press), a work considered one of the most authoritative studies on the subject. His later works included *Shakespeare's Romances: A Study of Some Ways of the Imagination* and *The Tension of the Lyre: Poetry in Shakespeare's Sonnets.*

Smith was an editor of *The Norton Anthology of English Literature*, to this day the most widely used and influential anthology of literature in American colleges and universities. He was also the editor of the "Romances" and "Poems" chapters of *The Riverside Shakespeare* (Houghton Mifflin).

A graduate of the University of Colorado, he received his PhD from Yale University in 1934. He was a member of the English Department at Williams College, Williamstown, Massachusetts, from 1931 to 1949, and had been a visiting professor of English at Columbia University and at the Claremont Graduate School. In 1947–48 he was a Guggenheim Fellow, and in 1952 he won the Chapbook Prize of the Poetry Society of America.

Smith was married to the late Mary Elizabeth Earl (1931–1994) and is survived by two children: Diana Russell (Mrs. David Gordon) and Hallett Earl.

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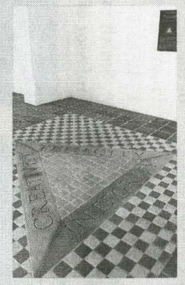

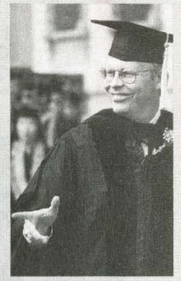

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