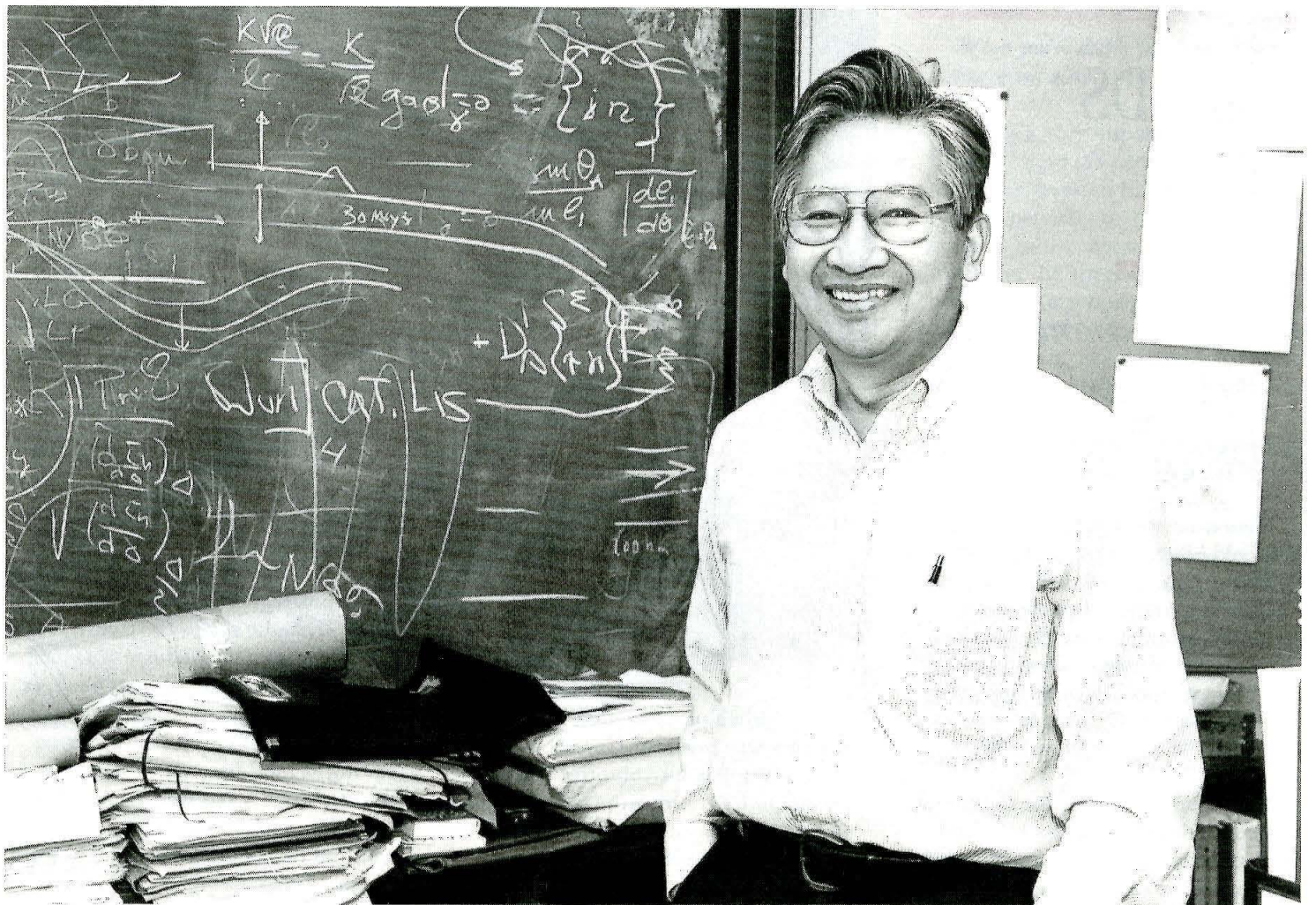


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Driving his 1965 Buick, dressed —as ever— in brown slacks and a blue shirt, the man who has earned a reputation as the world's foremost seismologist arrives at 6:45 a.m. at his office in South Mudd to begin another day. Chances are the day will be filled with some new adventure for Hiroo Kanamori, who reacts to unique research opportunities "like a kid at a Christmas tree."

"We deal with seismic waves," says the director of Caltech's Seismological Laboratory, "and nature gives us a lot of puzzles. We constantly have something new to investigate."

Quiet and good humored, Kanamori smiles more often than he laughs. But he is well known among his colleagues and his graduate students for his keen sense of humor and an endearing ability to laugh at himself, as well as at his science.

He is also known as a person who —despite his low-key, gentle manner—is consistently stimulating, imaginative, brilliant, incisive, prodigiously hard working, and filled with an infectious enthusiasm that makes him particularly effective in his work with graduate students.

Almost every inch of his oversized desk is piled high with stacks of papers, a foot-square space in the center providing him with work space. The paper stacks belie a highly developed sense of organization ("he can find anything on that desk in a minute") that contributes strongly to his reputation as a remarkably effective teacher and lecturer.

"He has incredible mental discipline," says colleague Clarence Allen. "When he starts to do something, by god, he gets it done. We were delighted that he was willing to take over the directorship of the lab. He's never enjoyed administrative work, but he stepped into the role with great gusto, and he's doing a tremendous job."

"He's always coming up with novel solutions to problems," adds Don Anderson, Kanamori's predecessor as head of the seismo lab. "He's one of the most innovative scientists in the

Hiroo Kanamori:

Every day, a new adventure

By Winifred Veronda

world today. He loves explaining things that have never been explained. We have a new instrument at Caltech, the TERRAScope. It's like a telescope that enables us to look into the earth and see things we've never seen before. Seismically, it records everything happening anywhere inside the planet. When we got the TERRAScope, Hiroo was like a kid in a candy store."

Kuo-Fong Ma, a PhD candidate who studies tsunamis and the focal mechanisms of earthquakes, first heard of Kanamori when she was studying seismology in Taiwan. "Everyone talked about him as if he were a god," she says. "It was kind of a shock to come here and have him become my adviser. The first year, I only talked to him about research. Now I talk to him about personal things, too."

"He's very good at showing you the ropes and getting you started," adds Lorraine Hwang, who earned her PhD last November. "Then he leaves you pretty much on your own. As an adviser, he gives you the pros and cons and lets you decide. He never forces you into a particular path."

The man who was destined to become known as one of the world's most creative seismologists, and who today is the John E. and Hazel S. Smits Profes-

sor of Geophysics, was born in Tokyo in 1936, just a few years before the onset of World War II. One of five children, he had two brothers and two sisters. His father, moderate in his political views, was a cabinet member in the Japanese government until 1936, when he was removed after a military takeover. Kanamori remembers that his father was often home during the war years, leading a quiet life of retirement, busying himself by reading and gardening. During the MacArthur era, he would be restored to his cabinet post, to help fashion a new constitution for his country.

Kanamori entered kindergarten at age five, soon after intensive bombing of Tokyo commenced. His early education was chaotic, at best. During his first three years of elementary school, the school was relocated several times because of bombing. Near the end of the war, it was moved to the country because 80 percent of Tokyo had been destroyed.

"Bombs seemed to be falling constantly, and we could have been killed at any time," he says. "Many nights the air raid warning would sound and we would get up and go to the shelters. But we took it all for granted. When you're in the middle of something like

that, you don't think much about it. Actually, for a young boy, life was exciting in many ways."

Often, wartime chaos was so severe that there was no school at all. Some days, there were no teachers to greet incoming young people, and students read and worked on problems on their own. Perhaps this experience set a pattern for Kanamori, who in the future would enjoy working on problems of his own devising, more than on those given to him by a mentor. The shortage of paper and pencils was acute, and the margins of newspapers were much in demand for writing space.

One of the most serious problems, particularly toward the end of the conflict, was the lack of food. "Most of the time I was hungry, and that was hard for a growing boy," says Kanamori. "But you would be surprised at what you can eat if it's necessary. For example, there was an edible weed growing in the back yard, and my mother cooked it; it didn't taste too bad. She was ingenious at preparing those kinds of things. I never knew for sure what we were eating."

"The whole experience was very important in teaching me to survive a

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FRIENDS

Hopfield honored as 1991 California Scientist of the Year

Neural-network pioneer John Hopfield has been chosen the 1991 California Scientist of the Year by the California Museum of Science and Industry. Hopfield, the Roscoe G. Dickinson Professor of Chemistry and Biology, was presented with the \$5,000 award on October 16 at a dinner at the Regent Beverly Wilshire Hotel.

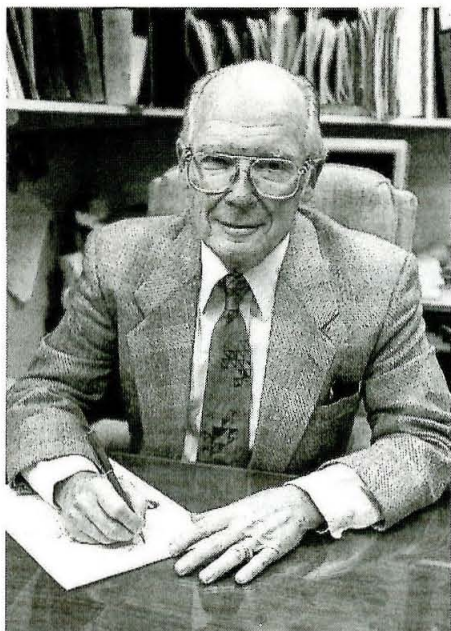
In issuing the award, the California Museum Foundation cited Hopfield for his "interdisciplinary contributions to neuroscience and practical computational procedures through development of a most brilliant, imaginative, and stimulating theory of neural networks, now generally known as the theory of Hopfield networks."

Since the creation of the California Scientist of the Year award in 1957, 12 of the 36 honorees have been Caltech faculty members. Those currently on the faculty include Jesse Greenstein, Maarten Schmidt, Norman Davidson, Peter Goldreich, Lee Hood, Gerry Neugebauer, and Harry Gray. Of the total 36, nine of the honorees have gone on to win the Nobel Prize. This select group includes Caltech professors emeriti Willy Fowler and Roger Sperry.

Hopfield received his AB from Swarthmore in 1954, and his PhD from Cornell in 1958. He came to Caltech in 1980 as the Dickinson Professor, and holds dual appointments in the biology and chemistry divisions. He leads Caltech's new PhD program in computation and neural systems, which was established in 1986.

Hopfield's research uses mathematical descriptions of the way the brain functions, studying problems such as associative memory and how sensory information is processed. These ideas are being applied to silicon chips which "compute" using the high connectivity typical of the brain rather than the simple hierarchical structure of conventional digital hardware.

In 1983 Hopfield received a MacArthur Award, popularly called the genius award. He has also received the Buckley Prize in condensed matter physics from the American Physical Society, as well as its biological physics award, and the Michelson-Morley Prize. Hopfield is a member of the American Philosophical Society, the oldest learned society in the country.



Gordon McClure

"Give something back" is McClure's philosophy

"Asking alumni to give to Caltech is a two-way process," Gordon McClure always counsels his volunteers in the Special Gifts II campaign of the Annual Fund. "When you ask people to contribute, find out if we can do something for them."

Some are surprised at the offer—and some respond with requests. McClure remembers the oil geologist in Texas who had switched careers and was now growing begonias; he asked for help in determining the acid in begonia sap. A few calls resulted in contact with a plant physiologist in Washington, D.C., who supplied the information.

McClure, chairman of Special Gifts II for four years, has been a volunteer for the Annual Fund since 1966, when he lived in Redlands. In his present role, he works with 28 volunteers who contact those alumni contributing between \$1,000 and \$4,999 annually. There are three women in his group. "The influx of women into this giving level is just beginning," he says. "As the years increase since women were admitted, we will see more of them giving at this level." Forty-three percent of the members of his group range in age between 40 and 59.

Most volunteers are assigned a maximum of eight prospective donors, all of them in a particular geographic area, and they talk with the alumni personally. However, one of the newest donors in the Special Gifts II group is an alumnus from Japan, who had not been heard of for years and whose gift of \$10,000 last year was totally unexpected. McClure personally contacts those alumni who live in communities where there are no other graduates; one of his calls a few years ago resulted in a 45-minute chat with the late Frank Capra.

Not surprisingly, McClure and his volunteers find most of their 350 alumni to be highly enthusiastic about the Institute and eager to support it. "They have a sense of responsibility and they want to give something back," he says. "They want Caltech to maintain

its preeminent reputation. Many of them are so enthusiastic when we make contact that we can scarcely get a word in."

McClure, who is high on the list of Caltech boosters, graduated with a BS in electrical engineering in 1947 after serving in the Navy. He went on to a 40-year career in the electronics industry, spending 19 years with Bourns, Inc., where he became corporate vice president and assistant to the president. Prior to that, he spent 19 years with Sylvania Electric Products, Inc., where he rose to become head of all manufacturing for the Western Electronic Systems Operation. He retired in 1987 after he and Mrs. McClure had moved from Redlands to a condominium a block from the Caltech campus. He jogs regularly on the Caltech track and works out regularly in the weight room. Here he shares the facilities with Caltech postdocs, graduate students, and staff, most of them years younger than he.

"Every so often I notice someone staring at me," he says. "The other day, someone asked me, 'Hey, how old are you?' I told him, 'Before you're my age, you have another 40 years of working out.'"

McClure met his wife, Elie, when both were high school students in Phoenix. They have four children—three boys and a girl—all of whom live in the Los Angeles area. They, along with three grandchildren and two stepgrandchildren, provided another incentive for the move to Pasadena.

Active in The Associates, the McClures regularly attend Watson Lectures and other events in Beckman Auditorium, along with productions at the Ahmanson Theater. McClure devotes time to responsibilities as a trustee for the Orme School, a prep school in Arizona, and he is active in the Pasadena Presbyterian Church.

But much of McClure's time goes into work for the Annual Fund—an activity on which he sometimes spends 40 to 50 hours a week.

He, like the alumni in his group, feels a responsibility to the Institute—and he also loves what he's doing.

Kulkarni receives Flintridge Foundation grant

Shrinivas Kulkarni, associate professor of astronomy, is the recipient of a 1992 grant from the Flintridge Foundation. The \$48,000 award will be used to support the young astronomer's research involving adaptive optics on the Hale 5-meter telescope. Kulkarni has received wide recognition for his work, including receipt of the National Science

Foundation's Presidential Young Investigator Award.

Kulkarni received his MS degree in 1978 from the Indian Institute of Technology, New Delhi, and his PhD degree from the University of California, Berkeley, in 1983. He came to Caltech in 1985 as a Robert A. Millikan Research Fellow. He was appointed assistant professor of astronomy in 1987, and named associate professor in 1990. Kulkarni is recipient of the Helen B. Warner Prize of the American Astronomical Society and the David and Lucille Packard Fellowship in Science and Engineering. He was named an Alfred P. Sloan Research Fellow by the Alfred P. Sloan Foundation of New York City, and he was recently awarded the Vainu Bappu Memorial Prize.

Kulkarni's research is principally concerned with observational studies of pulsars, or neutron stars, and the development of astronomical instrumentation. He has played a leading role in developing instrumentation for optical interferometry, a technology aimed at greatly increasing the resolving power of large optical telescopes, such as the one at the W. M. Keck Observatory, currently being completed in Mauna Kea, Hawaii. His other interests also include the birth and evolution of millisecond and binary pulsars; the identification of new pulsars in the remnants of supernovae and in the centers of globular clusters; and the physics of the interstellar medium.

The Flintridge Foundation is a California nonprofit public benefit corporation organized in 1984. The purpose of the foundation is to provide support for charitable purposes including, but not limited to, scientific research.

Gifts by will

Trusts and bequests provide welcome support to Caltech's operating and endowed funds. Recent gifts received by the Institute include:

Frederick J. Converse—a distribution of \$55,651 from Mr. Converse's estate has been received for earthquake engineering. Mr. Converse was a faculty member, and an expert in soil mechanics.

Alice Hicks Burr—A bequest of 600 shares of Security Pacific Corporation stock was made for unrestricted purposes. A bequest of one-half interest in the balance due on a \$900,000 promissory note was made for use in biology. Mrs. Burr was a longtime friend of the Institute.

Helen Sue Read—The Institute has received \$73,914 for cancer research from Ms. Read's estate. Helen Sue Read was a friend of the Institute.

For information about wording for bequests to the Institute, call the Office of Gift and Estate Planning: 818/356-2927.

Not everyone remembers that the student newspaper at Columbia University was printed with a black border the day it was announced that Harry Gray was coming to Caltech. The popular, dynamic chemistry teacher lost no time in achieving the same degree of popularity at the Institute. Described by a colleague as an individual who "keeps science interesting and makes it accessible to anyone he talks to," Gray has become a campus legend for mixing creativity and pranks, once wearing a horse's costume to class and once teaching from a tiny chalkboard in the rear of the lecture hall after students reversed the seats. As he likes to say, "You've got to keep people excited."

A dedicated educator, Gray continues to teach courses at all levels at Caltech. He is the author or coauthor of 14 books, many of which have become standard texts. Meanwhile, he has earned a reputation as one of the most eminent chemists in the world, and has won virtually every award given in his field. The Arnold O. Beckman Professor of Chemistry, he is now the director of the Beckman Institute. In 1991, he was named recipient of the Priestley Medal, the American Chemical Society's highest honor, a distinction which he preceded by winning the Gold Medal of the American Institute of Chemists, and the American Chemical Society's Alfred Bader Award. In 1986, he won the National Medal of Science and the Pauling Medal.

Gray received the Priestley Medal in recognition of his research, as well as for his work in education. His research in inorganic photochemistry has helped point the way toward artificial photosynthetic systems; and his bioinorganic studies, which focused on long-range electron transfer in proteins, have provided details of some of the most important reactions in biology. In this interview, he talks about the creative process, and what it is like to be a scientist.

What first influenced you to become a scientist?

It was curiosity. I liked to play with chemicals when I was a kid. I liked to mix things, and I was particularly fascinated with colors and color changes and explosions. I always wondered about the explanations for the colors.

How old were you when you got interested in chemistry?

Around 10. By the time I was 12, I had a lab in my basement and would buy chemicals from anyone who would sell them to me. I made some spectacular smoke bombs and conducted lots of experiments that involved special effects. But I didn't understand what was actually involved in the reactions I was running.



Harry Gray:

"You've got to keep people excited"

By Winifred Veronda

But what influenced me the most was that I had so much fun playing with chemicals. Of course, I never believed I could make a living that way. To think you could make a living doing something that was so much fun would have seemed stupid. After all, earning a living had to involve work, not play.

Do many unexpected things happen to a research scientist?

Yes, almost everything that happens is unexpected. In my career, I'm surprised almost every week, and that's a lot of fun. Chemistry is pretty unpredictable but with all the fancy instruments that we have now, and theory that's much better than it used to be, we aren't being surprised as much as we used to be—only about half the time. And if we get to the point where we know so much about chemistry that we can predict everything, then, for me, it's going to be very boring. Most of us went into science because it was so full of surprises. If my research area becomes too predictable, I'll probably try something new.

Do you derive joy from your work?

Yes, much of it through my interactions with students. There's so much pleasure in seeing people gain new insights. There is magic in the way they light up. There's great joy in being part of that process.

In my view, teaching is good for one's own research, for one's own creativity. A scientist thinks about problems more deeply in the course of teaching. Students are stimulating to work with, and they provide a lot of valuable feedback. In many instances, they've changed the direction of my work.

Undoubtedly, some young scientists stand out as the ones to watch, the ones that are going to go places. What distinguishes them?

Enthusiasm! The exceptional ones tend to bubble over all the time. They can't wait to tell you about their work. In this way, they make an immediate impact. Later, you find out how creative and productive they really are. It takes a long time for a student who isn't enthusiastic to get attention. Someone who's quiet has a hard time being recognized. Of course, it also is true that it takes much more than enthusiasm to do great science.

Another scientist said that sometimes he feels that nature wants to be discovered. Do you ever get that feeling?

Yes, I've heard it said that nature is out there, begging you to figure her out. Personally, I think that view is too simple—too good to be true. Often nature is very complicated, very obscure. At least, that's been my experience.

When you're deeply involved in research, is your mind almost always at work?

That's a very important point. I firmly believe it's necessary to be immersed in research full time for a substantial period—that you can't do research in the morning and administration in the afternoon. To make progress on a problem, I have to block off a period of several days to work on it. After that, I can go back to my other duties in the Beckman Institute.

With your administrative responsibilities, it must be hard for you to find that kind of time.

I can find time on weekends, and every month or so I make the time to get into a problem and work on it for a while. Then I return to real life and I try to put out fires and do other things. Of course, I have to work much harder than I used to to find time.

There are only two jobs on the campus that are so demanding that it isn't possible to do research—the jobs of president and provost. Those are real jobs!

What has been the most exciting moment in your research career?

There have been several—probably 10 or 15 come to mind. One involved some successful work in solar-energy conversion. Then there was the time my students and I first observed electron transfer in proteins over long distances. Now we're doing some tremendously exciting work in the laser lab, based on that discovery.

My work keeps evolving—one piece of work leading to the next piece.

Then I look back, and I see many advances that have been important, but it's not as if there's been one big breakthrough.

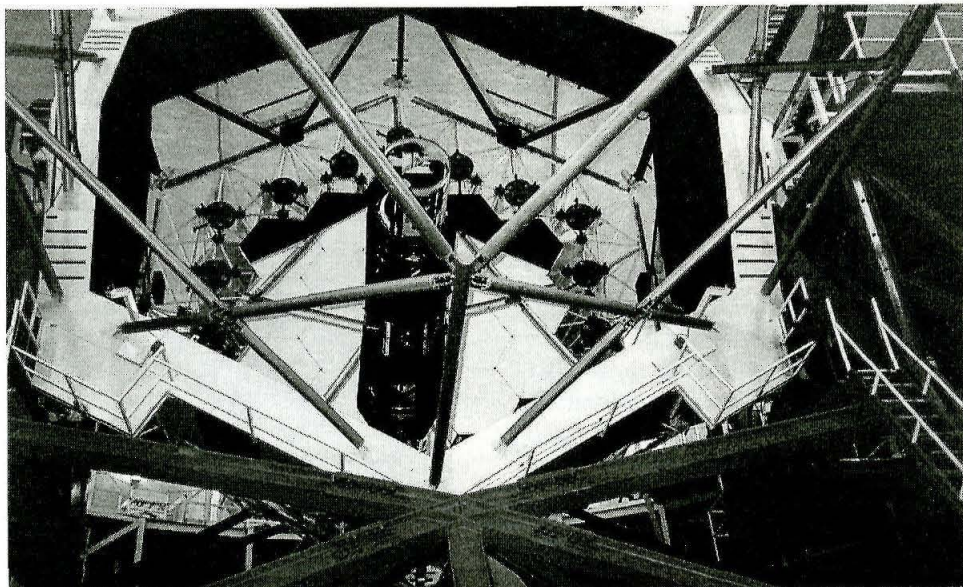
What about the role of intuition in the scientific process?

Intuition makes a real difference. It's the characteristic that separates the scientists from the worker bees. Great scientists all have great intuition. But of course that's not enough. A scientist also has to work very hard. But intuition is really critical.

Do you think scientists tend to be different from other people?

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The 18 hexagons already installed in the primary mirror. The two 'scopes together should be able to detect Jupiter-sized planets around the 100 nearest stars.



Job market competitive for 1991 graduates

Despite a competitive employment market this year, 43 graduating Caltech students with BS degrees received salary offers ranging from \$21,000 (for a U.S. government position), to \$50,000 offered by a small software-development company. Fewer graduates than usual received multiple job offers this year; many accepted the only offer they received. Of the job offers reported, 23 of the salaries are below \$35,000 and 42 are at this level or above. This year, for the first time, the few offers in the biology and chemistry areas were comparable to offers in engineering (research with genetic engineering firms attracted several graduates; a number of these plan to work for one to three years and then go back to graduate or medical school). The average offer for all options was about the same as for 1990 graduates.

Of the 186 bachelor's degree recipients, 151 had made plans as of August 1991. Forty-five accepted full-time employment and 100 chose to attend graduate school. Of those continuing in school, 10 have received NSF fellowships and most others have received some type of graduate fellowship or other support. In addition to the students attending MS and PhD programs in science and engineering, six are attending law school; two, business school; and five, medical school. Others have chosen graduate study in psychology, industrial engineering, manufacturing systems engineering, earth resources, and economics.

One student joined the Peace Corps; another the U.S. Navy. Several plan to work abroad for a year or two before attending graduate school. One plans to pursue photography full time for a year, and, if he is successful, will make this his permanent career.

Of the 160 MS degree recipients, 115 are continuing in school, 109 at Caltech, and six at other universities. This is a higher percent continuing for the PhD than in the past several years. So far, 24 have accepted positions in industry, with three returning to positions in their home country. Most of the salaries reported were in electrical engineering, where the average salary was more than \$42,000, compared with \$39,500 last year. Offers in other disciplines ranged from \$37,000 to \$42,000. One master's recipient entered Caltech after completing medical school and has entered residency training after graduation. An electrical engineering student with an MS degree accepted an analyst's position with the Paris office of J. P. Morgan.

This year, Caltech awarded 154 PhD degrees. Of the degree recipients, 44 accepted positions in industry; 63, postdoctoral fellowships; and 23, academic faculty positions; 24 had other plans. The average salary reported for a

9- or 10-month academic position was \$44,200. The average salary reported for postdoctoral positions this year was \$28,836, similar to 1990. This average includes five postdoctoral offers in either industry or government laboratories. Because of the economy, many of the state universities' budgets were so tight this year that they stopped recruiting. The average for industrial positions was \$53,000, with offers in 11 different PhD options.

Most in demand were PhD candidates in chemical engineering; several of these had multiple job offers, the result of general prosperity within chemical companies and the oil industry.

Lee Hood leaving Caltech for new post

Biologist Lee Hood, director of the NSF Center for Molecular Biotechnology at Caltech, will be leaving the campus in the summer of 1992. He has accepted a position at the University of Washington's medical school as chairman of the department of molecular biotechnology. The new department is being started with a \$12 million gift from William Gates III, chief executive officer of Microsoft Corp.

The Center for Molecular Biotechnology was awarded to Caltech by the National Science Foundation in 1989 under Hood's directorship. President Everhart has appointed a committee—Paul Jennings, Eric Davidson, Norman Davidson, Peter Dervan, and Scott Fraser—to study the issues on the future of the center.

Hood, the Bowles Professor of Biology, first came to Caltech 35 years ago as a freshman. After receiving his BS in biology he earned an MD from John Hopkins and returned to Caltech for his PhD. He was a senior investigator at the National Cancer Institute from 1967 to 1970. Hood then joined the Caltech faculty as assistant professor, and was named the Bowles Professor in 1977. He served as chairman of the biology division from 1980 until 1989, when he was named director of the Center for Molecular Biotechnology.

Hood received the prestigious Lasker Award in 1987, was named the California Scientist of the Year in 1985, and was awarded the 1987 Pasteur Award, among other honors. He also holds five honorary degrees.

Hood's research has included mapping the human genome, the entire blueprint of human heredity; creating machines that analyze and reproduce genes and proteins; and analyzing the role of DNA in diseases such as AIDS and multiple sclerosis.

Keck Telescope has second site

On Thursday, November 7, some 150 invited spectators from Caltech, the University of California, and the W. M. Keck Foundation joined the observatory staff to witness the dedication of the W. M. Keck Telescope and the groundblessing of the site of Keck II, whose construction begins this spring, with completion in 1996. The twin telescopes are the latest addition to an international collection of 8 others on the summit of Mauna Kea, on the Big Island of Hawaii—the world's finest astronomical site.

It was a bright, windswept day at 13,600 feet, well above the clouds that perpetually cling to Mauna Kea's slopes. Style took a back seat to comfort, as gloves, wool hats, and winter coats supplanted—or at least camouflaged—the jackets and ties normally associated with such rituals. The bulk of the ceremony took place in the telescope's dome, which shielded the crowd from the 15 mile-per-hour wind, but also blocked the sunshine that took the chill off of the 40-degree day.

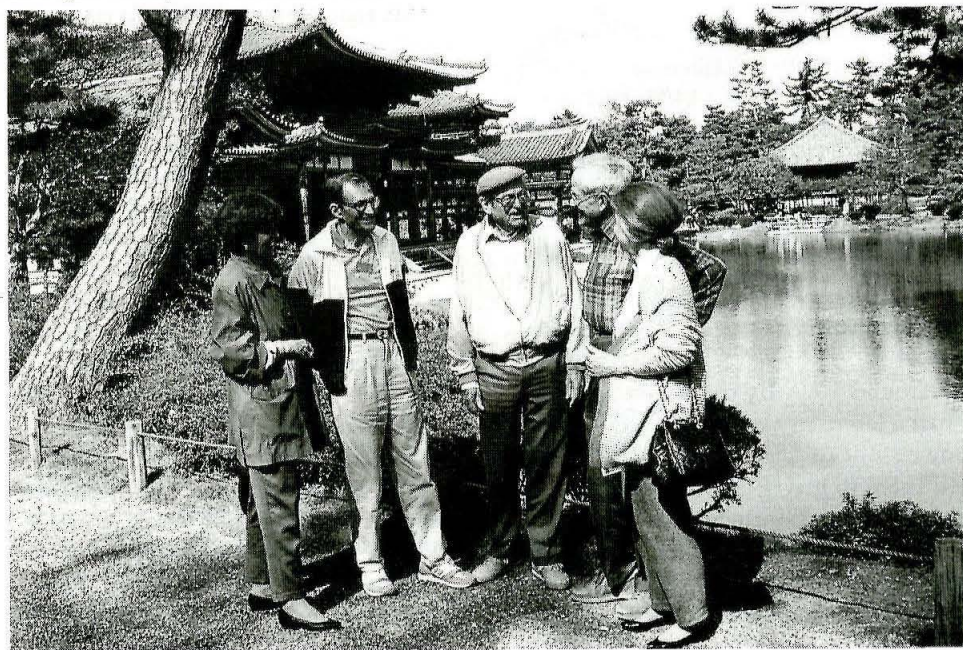
If the thin, cold air wasn't enough to take the breath away, the sight of nine tons of mirror supported by a blue-painted steel truss that would do credit to a railroad trestle certainly was. At 7 meters (nearly 23 feet) in diameter, Keck I is already the world's largest telescope, yet only 18 of its 36 hexagonal mirror segments have been installed. When the final segment is

gently lowered into place some time in the spring of 1992, the 10-meter Keck will have twice the diameter and four times the light-gathering power of Caltech's venerable Hale telescope, the world's premier optical telescope for more than 40 years.

The Keck telescopes are being built and operated by the California Association for Research in Astronomy (CARA), a partnership of Caltech and the University of California. The bulk of the construction is being funded by the Keck Foundation, and the land is being provided by the University of Hawaii.

Among the participants at the dedication, groundblessing, reception, and dinner were President Thomas E. Everhart of Caltech, who read a letter of congratulations from George Bush; David P. Gardner, president of the University of California; Edward C. Stone, whose many hats include chairman of CARA, director of JPL, and vice president of Caltech; Howard B. Keck, chairman of the board of the Keck Foundation; Albert J. Simone, president of the University of Hawaii; Keck Observatory Project Scientist Jerry Nelson, (BS '65), whose innovative segmented-mirror design made the telescope possible; and Keck Observatory Project Manager Gerald M. Smith, late of JPL, who is overseeing the observatory's construction. Walter Cronkite presided at the dinner.

Byodoin Temple, Kyoto, Japan, is remembered with pleasure by 78 members of The Associates who traveled to Japan and Korea during October. At the temple are Phyllis and Robert Henigson, Howard Smits, George Smith, and Joanna Muir.



Harry Gray

Continued from page 3

They're brighter than average, and they work with material that is so incomprehensible to the average person.

I don't think that I'm any different than a nonscientist. I've had lots of contacts with people who aren't scientists—through high school athletics, Little League, stuff like that. Scientists may be more curious than most people, but then I'm not sure that's true either. All sorts of people are curious.

Somebody once said that scientists have to be able to do lots of grubby work but still maintain a romantic attitude about what they do. Otherwise, they become stalled by the grubbiness and forget what lies beyond it. How does one achieve that balance?

First, a scientist must be willing to accept an infinite amount of grubbiness. People who don't succeed in science are the ones who think it's possible to cut corners—that everything is romantic and that answers come quickly. Successful scientists have to be so excited about what they're doing that they're willing to endure the long hours of training that equips them to do their work—willing to take courses they don't want to take and do things they don't want to do because they love science. Meanwhile, they have to keep focused on the big picture. People who can do this are very successful and do big things. Some people are so caught up in the glitz that they won't put in the hard work, and they get nowhere. Others get so buried in the nitty-gritty that they never escape from it.

What do scientists tend to do when their own body of work is put into jeopardy?

It depends on the scientist. A lot of people get very defensive and try to fight off the scientific world. Of course, if they're wrong, they're doomed to defeat. Other people come clean right away and relish the new beginning. The really good scientists are simply looking for answers. If they find out their theories are wrong, they discard them and go on. Successful scientists have to be able to deal with constant challenges to their research conclusions. And the challenges mean that there are new directions to explore and new ways to go that are more exciting than the previous ones.

I think chemists are used to the idea that their theories are imperfect. Theories, you know, are transient devices to get to the next level. In chemistry, you don't expect your ideas to be right that long, and you expect change. And you're better able to deal with it.

Scientific research falls beyond the comprehension of most people. Does this create any feelings of loneliness?

No, there's no loneliness. There are lots of people to talk to. It's a very exhilarating experience to discuss science with colleagues. I think other people are much lonelier than scientists; many of them have nothing to talk about.

When you're not involved in scientific work, how do you like to spend your time?

I like to listen to music, and I play tennis. I wish I had more time to play tennis. I like sports a lot—either playing or watching. I enjoy art. But sports are second only to science. Both are a lot of fun.

If you had chosen another field of science, what would it have been?

Probably applied physics. Or biology or geology. I certainly would have enjoyed astronomy. I look around Caltech and I'm interested in almost everything that's going on. I think I could have enjoyed almost any area of science. To start over in another field would probably be more fun than anything else I could do.

If you had chosen a field other than science, what do you think it might have been?

I would have liked newspaper work. I worked for a newspaper when I was in high school. I wrote stories, got interested in people. It would have been very interesting to have been a reporter. Then again, I could have been a comedian. Or a talk-show host. Maybe that's what I am.

Centennial celebration proclaimed a delight

From a Tournament of Roses float featuring Isaac Newton and nine time-traveling Beavers to special labels for Athenaeum wine bottles, the Caltech Centennial offered events and objects to stretch the imagination and please just about everyone.

Sunney I. Chan, professor of chemical physics and biophysical chemistry, was chosen as Centennial chairman and presided over a steering committee and eleven subcommittees. Membership totaled 92 people.

A permanent tribute to the Centennial was installed early in the year, as *Water Forms*, an original creation by artist George Baker, was dedicated on January 25 at Millikan Pond. The sculpture, designed to achieve a fluid motion, is built of stainless steel and contains six moving parts. Twenty-four feet long and three feet high, it was constructed with funds raised from the Caltech community, including trustees, faculty, and members of The

Associates.

Sixty street banners proclaiming Caltech's 100th birthday alerted the community to the event, as did three billboards in Pasadena locations. Sixty-five Centennial banners adorned the campus for up to 36 hours, but spirited souvenir hunters removed them.

Regular features about the Institute (accompanied by sidebars on student pranks) ran regularly in the Pasadena *Star-News*. But word of the Centennial had already reached a worldwide audience when the Caltech float rolled down Orange Grove Boulevard on New Year's Day, kicking off the year's events as it passed television cameras that transmitted its image to the world. Although a float builder was hired to construct the elaborate structure, 45 engineering students participated in its creation, a Caltech committee supervised, and more than 250 volunteers from Caltech, JPL, and the Pasadena community attached over 200,000 flowers to it.

Even President George Bush participated in the Centennial, coming to campus to speak to 9,000 visitors on commencement morning. Commencement was held on the athletic field to accommodate the crowd. And 2,000 alumni and their families returned to campus for the Caltech Centennial Seminar Day and reunion weekend. Members of every class attended a reunion dinner at the Ritz-Carlton Huntington Hotel. A Centennial dinner at the Athenaeum drew capacity attendance, and there were many disappointed individuals on a waiting list.

"Pasadena Salutes Caltech," a free afternoon concert during the fall, attracted 900 visitors to the Court of Man to hear music by the Pasadena Pops. Campus tours, JPL exhibits, hot dogs, and cold drinks added to the festivities.

The Pasadena Symphony provided yet another tribute, saluting Caltech in its opening concert with a special performance of *The Planets*, an orchestral suite by Gustav Holst. A pre-symphony lecture featured Richard J. Terrile, a JPL astronomer, who gave a modern perspective on the planets.

The Caltech Jazz Band and Chamber Music Ensemble presented their customary events—but added a Centennial flavor. A chamber-music concert focused on musical events of 1891, and another featured music composed by distinguished scientists. Still another program offered a historical look at jazz.

Plaques and dedications were a part of the celebration. A plaque was installed at the Green Hotel, first home of Throop University, commemorating the establishment of the institution later renamed Caltech. A plaque commemorating Caltech's Centennial was placed at the summit of Caltech Peak, and five giant Sequoias in Nelder Grove were dedicated.

Undergraduates from more than 200 colleges and universities throughout the country shared their work at a

three-day conference, EUREKA (Excellence in Undergraduate Research). And Caltech faculty members and graduate students reached out into the public schools, giving lectures on volcanism.

Symposiums presented by the divisions drew scientific attention. "Just the right amount, and well timed," commented one observer. JPL and Caltech joined to present a two-day symposium on space science, "Caltech and the Universe." Four Caltech presidents—past and present—attended. A four-day symposium, "Visions of a Sustainable World," was the culminating scientific event, focusing on the earth's population, environment, and resources.

A campus party on November 1 drew 1,000 to celebrate Caltech's birthday. Food, music, and prizes were on the agenda.

The Centennial celebration has concluded, but tokens of it will be around well into the future. Memorabilia commemorating the event—including mugs, lapel pins, pens, key chains, sweat shirts, and T-shirts—were especially popular and were reordered many times. Jean-Paul Revel took pins to be given as gifts on a trip to China. Others found their way to Italy and Russia, and foreign students took pins as they returned home.

Greensteins endow astronomical research fund

Jesse L. Greenstein, the Lee A. DuBridge Professor of Astrophysics, Emeritus, and Mrs. Greenstein are endowing the Jesse L. and Naomi K. Greenstein Fund for Astronomy Research at the Institute. The Greensteins are contributing a portion of their home to a charitable trust at Caltech from which they will receive an income for life. After their deaths, the money will endow the astronomy research fund.

"We've been fortunate in having a long relationship with Caltech astronomy," said Greenstein, "and we want it to continue to be preeminent. It seems more rewarding to direct our contribution toward this goal while we are still here and can receive the enjoyment of knowing that Caltech's astronomy program will benefit and grow in the future."

The Institute is pleased to announce that a first major addition of \$100,000 to the Greenstein Fund has already been received from William T. Golden, a friend of Greenstein for 70 years. Golden, an investment banker who holds numerous professional and civic posts, is a nonscientific member of many astronomy science advisory boards and is given credit for suggesting the President's Science Advisory Commission.

There went the sun— Alumni view eclipse at Big Bear Solar Observatory

By Betsy Woodford



On July 11, the Alumni Association sponsored a trip to Big Bear Lake, California, where 50 alumni and friends gathered to view "The Eclipse of the Century," so called because its viewing zone, extending from Hawaii to Mexico, enabled more people to watch this eclipse than any other in history. But these alumni had a unique viewing point—Caltech's Big Bear Solar Observatory—one of the world's premier solar astronomical facilities.

Like a magician's white dove sitting on the edge of a top hat, Caltech's Big Bear Solar Observatory has an enchanting beauty. Its brilliant white, domed building is situated in the dark waters of Big Bear Lake, and the contrast between the sleek, efficient symbol of scientific inquiry and the surrounding pine forest is startling.

But aesthetics have little to do with the location—Big Bear is well known for its cloudless skies and the clarity of its air, and thus was an obvious choice when the observatory was built in 1969. Its location on a man-made island in the lake may seem odd to the casual observer, but it is based on a

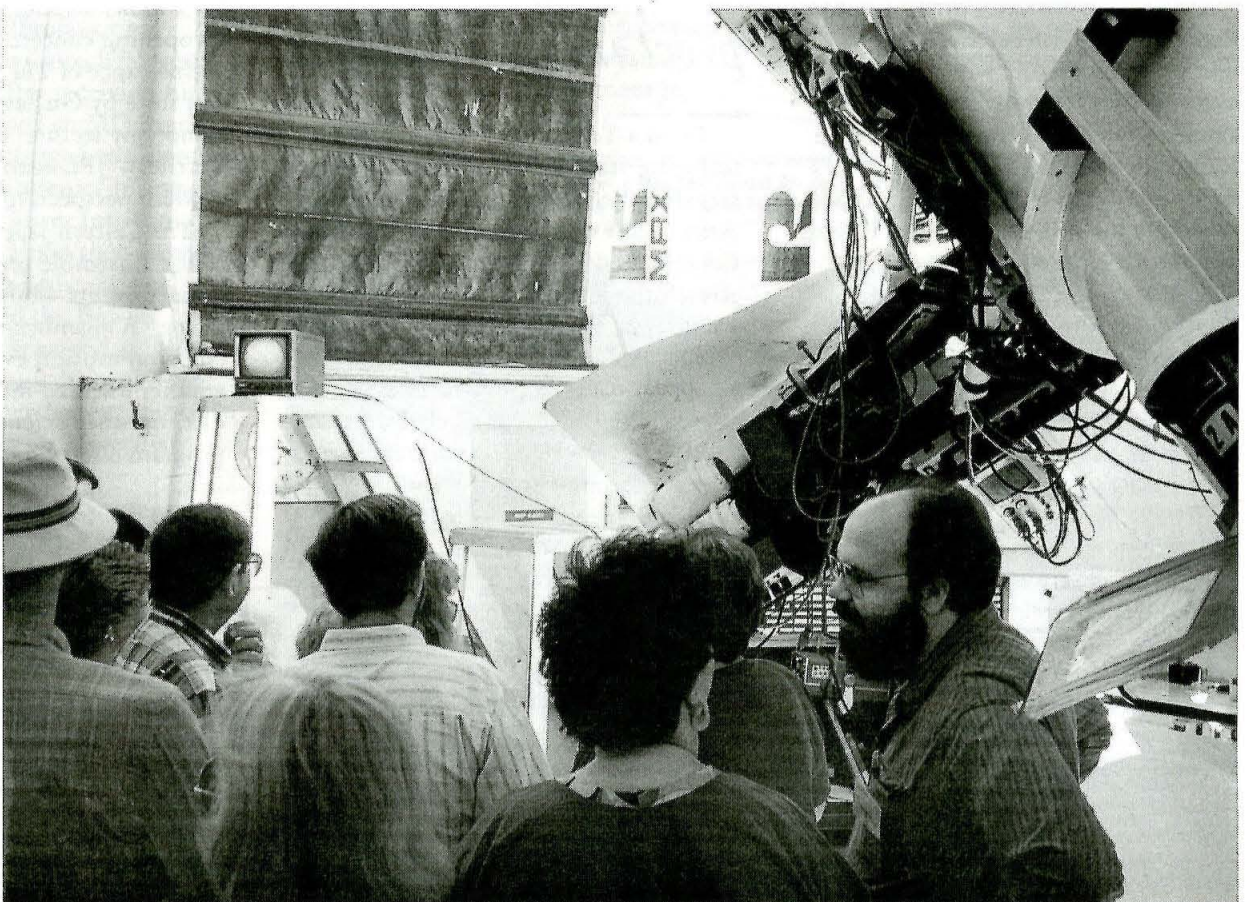
scientific necessity—still air. The atmosphere over water does not have the heat-driven convection currents that are present over land, or the wind turbulence caused by landforms. "What limits us in solar astronomy," says chief observer Bill Marquette, "is not the size of the telescope but the amount of atmospheric disturbance."

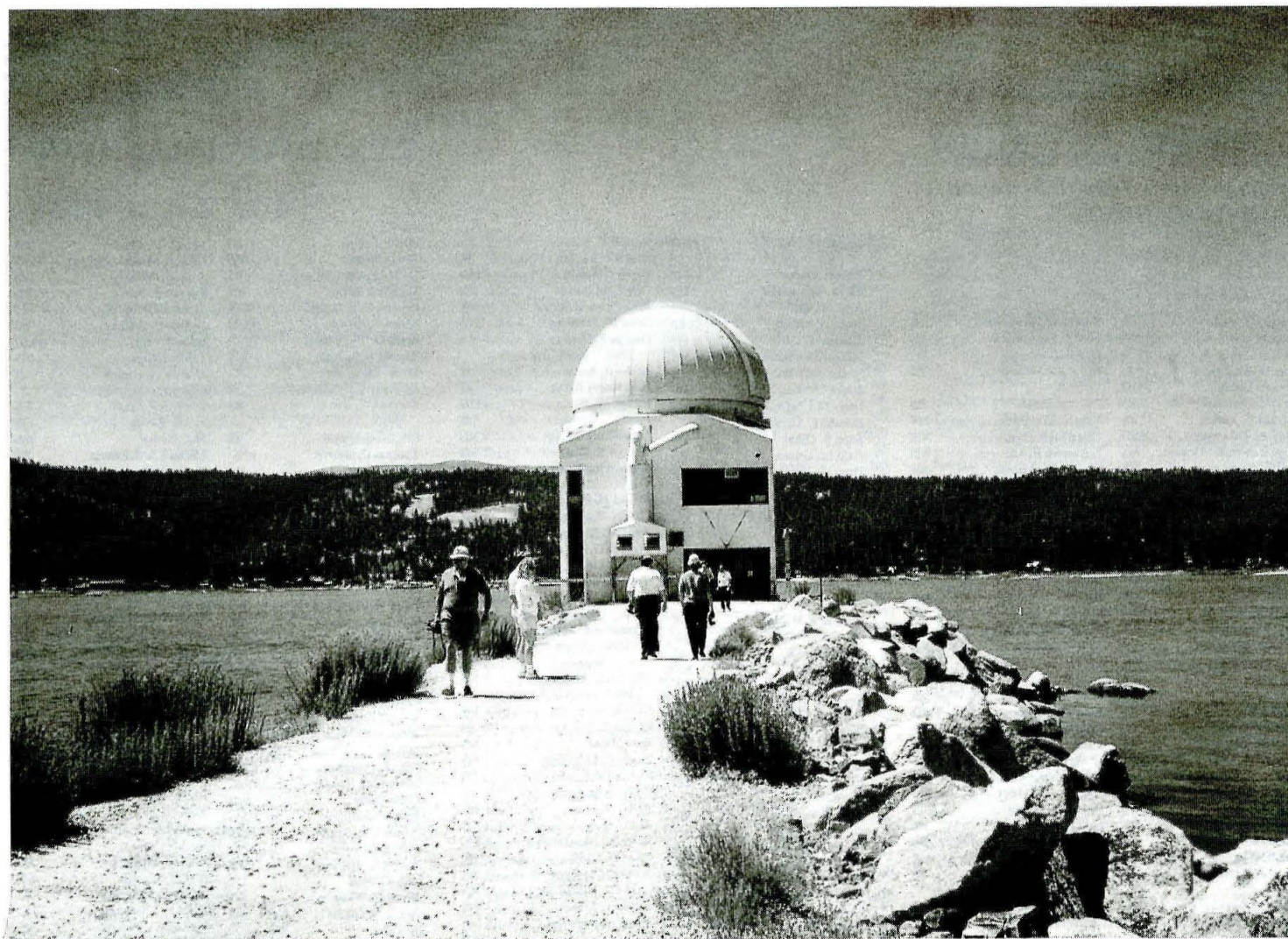
The observatory is, says Marquette, "like a submarine on end." The first two floors house computer labs and offices that do seem like ship's quarters—small and efficient, with a view of the water outside. On the third floor is the observation deck, home of the telescopes, which is covered by a 30-foot-diameter dome. The whole dome moves on a rail, and is connected to a motorized, photoelectric-cell system that follows the sun's path, even on cloudy days.

The observatory's original instrument consisted of four telescopes in one 42-inch-diameter pipe-like casing. The instruments were replaced with better ones in 1973, but the casing still stands outside the observatory's onshore offices—a sculpturesque testimonial to

Above, the sight that alumni came to see—an eclipse over 72 percent of the sun's surface. This photo, taken with the 26-inch reflector telescope at Big Bear Solar Observatory, shows many of the sun's surface structures.

Right, waiting for the eclipse to begin, alumni and their spouses crowd onto the observation floor to view a black-and-white television monitor showing the telescope's image of the sun.





Alumni walk down the causeway to the observatory, which sits in the waters of Big Bear Lake to take advantage of the calm air over the water. The drop in the water level due to California's five-year-old drought has not affected the observatory's operations.

solar astronomy and a reminder of the sentimentality of astronomers who could not part with it.

Big Bear's present instruments consist of three separate white-painted telescopes mounted on a single base amid a jumble of wires and cooling tubes. The largest telescope is a 26-inch reflector built with NASA funding to conduct solar observations in conjunction with those done by the astronauts on Skylab 3. (Hal Zirin, current director of the observatory, was a principal investigator for Skylab.) The 26-inch takes detailed pictures of the sun and has enabled observers to obtain spectacular images of solar flares and sunspots. There are also two smaller, refractor telescopes—a 6-inch that monitors the whole sun, and a 10-inch that observes a small portion of the sun with high magnification.

The telescopes view the sun through filters that transmit different wavelengths of light and thus reveal different layers in the sun. The 26-inch and the 10-inch are each equipped with three filters and detectors so it is possible to record three sets of data from each instrument. "We often run several experiments at once," says observer Randy Fear.

Data are recorded on 35-mm film or video tape, or recorded digitally for later processing. In order to develop the large volume of film, there is a processing lab in the observatory's cedar-shingled onshore complex. Says film technician Jeff Nenow, "During the summer, the peak viewing season, we use 3,000 feet of film per week—the equivalent of 1,000 rolls of 24 exposures." Adds Marquette, "There are approximately 300 days of clear weather per year in Big Bear, and we observe every day, including Christmas."

But July 11 was a very special observing day, and the visiting alumni

were excited to be able to take part. They drove from all over southern California and arrived about an hour before the eclipse's start at 10:15 a.m. As they pulled into the observatory's onshore compound, the alumni and their spouses were greeted by BBSO staff members Melinda Hope and Kathleen Cronk, and their four-legged associates—watchdogs Sunshine and Solar Maximum (Max to his friends), and Aurora, the calico cat.

While half of the alumni group walked down the causeway to the observatory, the others filed into the lodge to hear about the work being done at BBSO from solar astronomer Sara Martin, who gave up observing the eclipse in order to explain the structure of the sun to the group. "At BBSO we commonly look at prominences, active regions, and sunspots," she explained, while showing spectacular slides of these features. "Prominences are huge structures in the sun's atmosphere that occur between magnetic fields of opposite polarities. They sometimes erupt concurrently with solar flares. We are currently viewing many erupting prominences since we're near the sun's maximum solar cycle, but unfortunately none of the prominences on the sun appear ready to erupt during the eclipse."

Martin explained that as a result of their years of study of solar flares, the staff is able to predict times of high solar-flare activity. "We issue a warning called 'Bearalert,' which is sent via computer e-mail to scientists throughout the world and gives detailed descriptions of the type of solar-flare activity, and the location and time.

"We also regularly photograph sunspots," continued Martin as the alumni waited for the eclipse to begin. "Sunspots, the strongest magnetic fields in an active region, can change noticeably in a 24-hour period. Our time-lapse

photographs show not only changes in the sunspots themselves, but also the changes in the magnetic field of the surrounding active region."

In addition, the instruments at BBSO are used for observing weak magnetic fields in the sun's polar regions and for measuring the oscillations in the sun's surface, which can be used to make interpretations of the sun's internal structure.

As Martin finished her lecture, all eyes turned to the small black-and-white TV monitors that showed with remarkable detail the swirling surface of the sun. At 10:15 a.m. first contact occurred, and the moon began to pass in front of the sun—evidenced by the sun's perfect circle being flattened ever so slightly on one side. Over in the observatory the other half of the alumni group witnessed the same TV-monitor picture and saw the observatory staff begin some exacting measurements.

"One of the most important observations we made during the eclipse," says Marquette, "was to measure the size of some of the smaller structures on the sun. While we can often observe these small features, the turbulence of the earth's atmosphere prevents us from measuring their size. During an eclipse we know how fast the moon moves across the sun, and we time how long it takes to cover and uncover a small feature. Later, calculations will be done to find out the size of these features."

Alumni were not satisfied to use only high-tech machines to view the eclipse. As the event progressed, many low-tech observations were also made through pinhole viewers, welder's masks, and circles made with fingers. In fact, even low-tech devices soon became unnecessary as the floor of the observatory was filled with miniature images of the eclipse, from light that passed through the viewing slit in the

dome and from there through tiny spaces between the pieces of the equipment.

As viewed from Big Bear, the moon covered 72 percent of the sun's surface. The light dimmed enough to resemble a cloudy morning but what people noticed the most was the drop in temperature. "Wow, it's really gotten chilly," acknowledged one participant.

After two hours and thirty-four minutes the eclipse was over. The alumni enjoyed a box lunch under the pine trees covering the lodge's patio. Then, reluctant to put an end to the day, they lingered a little longer before heading down the mountain.

It wasn't until later in the afternoon that the observers finished their work. "All of the observations went very well," said Marquette. "As the data are analyzed we expect to learn a great deal."

With Sunshine and Max trailing him as he heads up the causeway, back to the onshore offices, Marquette reflects on his profession, at the end of an important day for solar astronomy, "I sometimes wake up in the middle of the night and wonder what the sun is doing and wonder if anyone in the world is photographing it. To be in astronomy now, at Caltech, is very exciting."

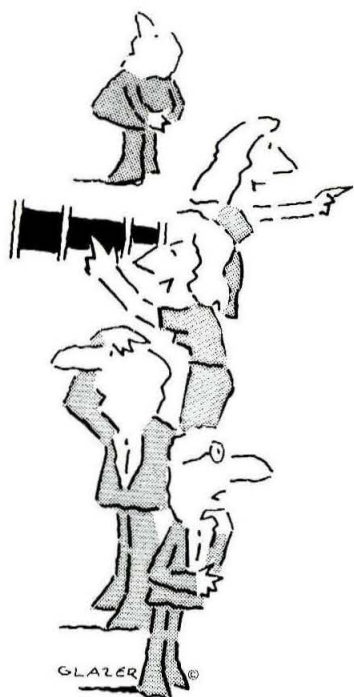
Help us find these lost alumni

Caltech has no record of the addresses of these alumni. If you know the current locations of any of them, please relay the information to Gloria Vacio, Information Services, Mail Code 105-40, Pasadena, CA 91125, or call 818/356-2173.

1918	Blaine R. Nelson	BS	Raymond L. Olson	BS	Thomas R. Slodowski	BS	Jeanne M. Weiler	PHD	Kornit R. Kubitz	BS	Albert T. Ng	BS	Amelia M. Maxted	MS				
Edison Hoge	BS	George I. Reimers	BS	John L. Orr	MS	Fred P. Storrer	MS	1962	John M. Lehman	BS	David Pollard	MS	Luis M. Medina-Vaillard	PHD				
1922	Frederick G. Robinson	BS	Loyd M. Satterfield	ENG	David S. Twining	BS	Nazeer Ahmed	MS	Leroy C. Lin	PHD	D. W. Rivers	BS	Arthur I. Metz	MS				
Blake Beatty	BS	C. B. Stadium	BS	Robert W. Shackford	ENG	Richard D. Welsh	BS	Clement C. Audet	MS	Sedigh Salim	MS	Donald E. Miser	MS	Lawrence I. Mortin	BS			
Art. J. Garfield	BS	Clyde T. Standridge	MS	Alexander Smith	PHD	1954	James T. Chang	PHD	Jean-Pierre G. Morel	MS	Satish C. Sharda	PHD	James H. Mullany	BS				
1923	Robert L. Weaver	MS	Francis D. Sullivan	BS	Otto Cardinale	BS	Edward T. Cline	BS	George K. Tucker	BS	Arlan D. Steinolfson	MS	John C. Neu	PHD				
C. D. Adams	BS	Colman Zola	MS	Raymond B. Tasker	BS	John T. Coughlin	MS	Brian M. Schaefer	MS	1969	Donald J. Sullivan	MS	Tor E. Ostbo	MS				
Robert J. Hammond	BS	1942	Mehmet P. Bebe	ENG	Russell A. Thompson	ENG	Larry D. Fitzgerald	MS	Jean-Henry Barth	MS	W. S. Thompson	BS	Siranush Papazian	MS				
1924	Orhan M. Enne	ENG	Arthur F. Vieweg	BS	George R. Vanden Heuvel	MS	Donald C. Garwood	PHD	Joseph W. Blum	PHD	Frederick D. Williams	BS	Stephen P. Pope	BS				
Mitchell C. Lukens	BS	Frank L. Given	BS	Pao K. Wan	MS	Irvin G. Henry	MS	James P. Cerne	MS	1975	Eric M. Benjamin	BS	Jack Powell	MS				
Willard H. Tracy	BS	Chong-Hu Go	MS	Victor H. Martinez	MS	Richard R. Hodges	BS	George K. Chan	MS	Thomas C. Brown	PHD	Michael A. Schwartz	BS	Kenji Shintani	BS			
1925	Paul E. Noll	BS	Charles B. Metz	PHD	Yin-Ching Au	BS	Herberto Jimenez	MS	Shuan-Ping Chao	MS	Erik J. Brune	BS	Tom P. Sterk	MS				
Willfred G. Thompson	BS	Enver M. Muradoglu	ENG	Russell Rhyne	BS	James A. Bunce	MS	Eugene A. Kaiser	BS	Ted W. Dillingham	BS	James C. Conwell	MS	Chen Sun	EX			
Conrad J. Waller	BS	Albert G. Wilson	MS	Robert S. Worthington	MS	1943	Burgess F. Collins	BS	James E. Guinane	MS	Michael H. Ikwuake	MS	Peter J. Drivas	PHD	Wayne J. Thompson	PHD		
1926	Hung Y. Chang	BS	Wayne H. Brown	BS	James M. Brown	EX	James R. Dale	MS	Charles D. Edwards	MS	Ted L. Crosthwaite	MS	Alexander C. Egwuatu	BS	George Triantafyllou	MS		
Riley L. Gilbert	EX	Robert S. Worthington	MS	1943	James M. Brown	EX	Charles D. Edwards	MS	Patrick N. Glover	BS	Benjamin A. Daleon	MS	Klaus H. Engelhardt	BS	Yau K. Tsui	MS		
Fray Hardwick	BS	James M. Brown	EX	Wayne H. Brown	BS	Ted L. Crosthwaite	MS	Benjamin A. Daleon	MS	Warren V. Eaton	MS	Richard M. Holcombe	EX	Manuel R. Florez	MS	Nikolaos P. Vasilakos	MS	
John R. Howell	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Edward G. King	MS	Robert H. Koch	MS	Ari Glezer	MS	David S. Wong	BS	
1927	Frank F. Peterson	BS	Ted L. Crosthwaite	MS	Benjamin A. Daleon	MS	Warren V. Eaton	MS	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Ralph R. Hayward	BS	Ella H. Wong	BS
1928	Francis C. Martin	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Sylvan A. Jacques	MS	King-Wah W. Yeung	BS
John D. Elder	PHD	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Ravi Jain	MS	Jeffrey C. Yuen	MS	
Reymond J. Kircher	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Jonathan D. Katz	MS	Barton Zwiebach	MS	
Kam H. Lau	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Diane J. Kent	MS	Mark C. Anderson	MS	
Julius Nelson	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Vincent K. Leung	MS	Elizabeth P. Blankenhorn	PHD	
True W. Robinson	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Robert W. Lim	BS	Genevieve M. Blik	BS	
Willem Uytendhoeven	PHD	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Brian T. Luke	BS	Douglas A. Breisky	BS	
1930	Donald K. Allison	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	William C. Moss	BS	Richard J. Carlson	BS
Rollin P. Eckis	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Michael L. Norman	BS	Boyd J. Carter	PHD	
William Kelley	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	John P. Pelegano	MS	Ping Y. Chiu	BS	
Frank N. Moyers	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Michael D. Rourke	MS	Bo H. Cho	BS	
Jack D. Pritchett	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Omer Savas	MS	Kenneth S. Coles	BS	
1931	Jack H. Amann	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Barry Schneidman	MS	Steven W. Cordray	PHD
Abraham J. Grafman	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Fredrick H. Seguin	PHD	Fred J. Crimi	BS	
Marvin W. Hall	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Jeffrey B. Smith	BS	Mark B. Cronshaw	MS	
James B. Taylor	EX	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Robert E. Sullivan	BS	Brian G. Easton	MS	
William T. West	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Eric N. Vella	BS	Steven T. Eckmann	BS	
T. R. White	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Bruce D. Westermo	MS	Brent L. Ellerbrook	PHD	
Carl K. Yoshioka	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Eric D. Williams	BS	Kenneth P. Fecteau	MS	
1932	F. B. Phleger	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Iraj Aalam	MS	Carl R. Gilray	BS
Richard A. Searle	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Abnet V. Arslan	MS	Frederick S. Grennan	BS	
1933	Thomas C. Burk	EX	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Richard M. Atwater	MS	Alvin J. Hill	PHD
Luis E. Kennitzer	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Samir E. Barudi	MS	Sai Yuen B. Ho	MS	
Arnold M. Kuethe	PHD	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Russell A. Bell	BS	Artie Hodges	BS	
William A. Larsen	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Charles R. Byler	BS	Stephen C. Jackson	BS	
Edwin B. Michal	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Martin F. Cohen	MS	Deanna K. Johnson	MS	
Winston H. Rice	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Michael C. Coln	MS	David L. Keller	MS	
Maple D. Shappell	PHD	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Michael L. Cooper	MS	Ahmad F. Khorrami	MS	
Warren H. Smith	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	James W. Deutsch	PHD	Robert R. Krcunavsek	MS	
William E. Stone	EX	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	George M. Fuller	BS	Aleksander Kupiszewski	BS	
Richard R. Whitaker	EX	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Lewis K. Hashimoto	BS	Albert Y. Lam	BS	
Alexander Wolf	PHD	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Robert H. Higley	BS	Thomas K. Lee	PHD	
1934	Jack M. Desmond	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Andrew J. Jankevics	BS	Brian T. Lew	BS
Duncan L. Hooper	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Barbara F. Keenan	MS	Paul Linares	MS	
Jack P. Judson	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Thomas J. Lawler	EX	Mark G. McClurg	BS	
Edward E. Simmons	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Keith D. Neerman	PHD	Mark T. Nussmeier	PHD	
Francis G. Tracy	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Chiu-Yuen J. Ng	BS	Patty P. Pang	BS	
1935	Leon S. Becker	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Douglas G. Petrie	BS	Panayiotis N. Papanicolaou	MS
Edward A. Bertram	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Robert H. Reiner	BS	Michael B. Porter	BS	
Fun-Chang Huang	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Stephen Robsky	EX	Theodore W. Post	BS	
Russel L. Maycock	EX	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Steven R. Roe	BS	John M. Pursch	BS	
Dagoberto Rivas	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Mark G. Rowan	BS	Mark Ragins	BS	
1936	W. B. Beckley	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Alan B. Saul	BS	Michael Rubinstein	BS
Calvin M. Bolster	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Subhash Sharma	BS	Augusto Sagnotti	MS	
Paul H. Hammond	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Hubert H. Shen	BS	Mavis Shure	PHD	
Thomas R. Burnight	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Alan J. Shusterman	PHD	Eric J. Siskind	PHD	
Ju-Yung Cheng	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Don J. Slankard	BS	Dean G. Sturtevant	BS	
Anthony Easton	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Carl D. Stephan	BS	Jehrl A. Swedan	MS	
James A. Hurst	EX	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Steven M. Sweeney	BS	James L. Taylor	PHD	
Paul F. Jones	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Steven K. Wake	BS	Steven G. Trabert	BS	
Thomas N. Shaw	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Gerald A. Wedekind	BS	David R. Van Alstine	PHD	
Ellis W. Shuler	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Mustafa A. Abushagur	MS	James C. Walseth	BS	
Meyer J. Test	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Adi R. Adiwoso	MS	Tak-Yiu Wong	MS	
Clark H. Wiget	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Kwok-Shing K. Au-Yeung	MS	Jean-Luc R. Aschard	MS	
1938	Kamal Djanab	PHD	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Jeffrey R. Barnes	MS	Pamela R. Auburn	MS
Duane W. Farnham	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Andrew Bewsher	MS	N. W. Barcus	MS	
Hymen D. Goodman	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Mark S. Bickford	BS	Michael S. Becker	MS	
Arthur G. Gross	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Duane K. Boman	BS	Robert J. Bensoussan	MS	
Arnulfo G. Gutierrez	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	John L. Chambers	PHD	Donna H. Berry	MS	
Frank C. Lowe	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Philemon C. Chan	MS	Roland L. Bouchard	MS	
William Rhett	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Pei-Chuang Chen	MS	Donald J. Brotenmarkle	BS	
Chi-Cheng Tsao	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Pierre Choubert	PHD	Johann L. Codona	BS	
Hai-Heng Wang	MS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Bruce G. Herring	BS	David M. Cole	PHD	
James W. Watson	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch	MS	Wayne H. Brown	BS	Bart Jackson	BS	Brian R. Davis	PHD	
1939	Richard H. Bishop	BS	James M. Brown	EX	Wayne H. Brown	BS	Frank H. Kelley	EX	Richard M. Holcombe	EX	Robert H. Koch							

Lost touch with your classmates and they with you?

Caltech alumni will soon be receiving an important questionnaire in the mail providing the opportunity to be accurately listed in the new Caltech Alumni Association directory. Harris Publishing Co., Inc., will process the



information and produce the final product, due out the fall of 1992.

Please be sure to return your directory questionnaire before the deadline shown on the form!

What happens if you don't return your questionnaire? We will print the information in our database, but it is possible that we don't have your most current information. Don't miss out on your chance to rekindle friendships—watch for your questionnaire and return it promptly! For even faster service, call Harris Publishing toll free at 800/326-5955 to update your listing.

Patricia F. Scott	MS	Michael R. Walsh	BS
David C. Shafer	BS	Laura H. Weason	BS
Kwoktai Shum	BS	George W. Williams	BS
Charles S. Slater	MS	1982	
Joseph S. Stephens	MS	Stewart W. Baillie	MS
Eric J. Swanson	MS	John R. Bennett	BS
James K. Wang	BS	Marc J. Berman	BS
Robert W. Weaver	BS	Scott A. Biller	PHD
1981		Robert E. Blair	PHD
Rajapillai V. Ahilan	MS	Bennett H. Bonham	BS
Erdal Arkan	BS	Loudon L. Campbell	BS
G. Aston-Jones	PHD	Kwokming J. Cheng	MS
John R. Bell	PHD	Steven A. Cohen	PHD
Philippe G. Boita	MS	Pascal O. Correc	MS
Bret S. Burns	BS	Kathryn L. Doughty	BS
Thomas D. Burton	MS	Ilknur Erbas	MS
Carla J. Casewit	PHD	Graeme F. Fowler	PHD
Constantine Chazapis	MS	Joseph A. Garcia	BS
Adelaide D'Ambrosio	MS	Steven H. Green	PHD
Vanevic C. Daniel	MS	Gothard C. Grey	MS
Antonio De Candia	MS	Rajan Gupta	PHD
Kathryn L. DeWitt	MS	Karl W. Heuer	BS
Honore R. Drew	PHD	Ralph E. Howard	PHD
Singaravelu Elangovan	MS	Nak-Hui Hwang	MS
Steven L. Gay	MS	Randal D. Koster	BS
Natalie S. Gluck	BS	Leonardo A. Laroco	BS
Marci L. Gray	BS	Catherine H. Leblanche	MS
Brian Herndier	PHD	Gerasimos K. Lyberatos	MS
Daniel J. Jacob	MS	Douglas Y. Mackenzie	BS
Michael P. Karyacalis	MS	Philippe Marie	MS
Richard P. Keller	MS	Linda B. McAllister	BS
Robert P. Kreh	PHD	John P. McNally	BS
Hin-Wing Kul	BS	Wen J. Meng	BS
Luen-Hin Kwok	MS	Milan Mijic	MS
Louis Lamarche	MS	David P. Millar	PHD
Christopher Lamendola	MS	Fai H. Mok	BS
Tuan A. Le	MS	David A. Myers	MS
Derek S. Lillie	BS	Byron L. O'Steen	PHD
Anoosh V. Manohar	BS	Hisup Park	BS
James P. McDermott	BS	Michael L. Pearson	BS
Afshin Nassiri	MS	Pamela J. Phillips	BS
Beyllyn B. Newman	EX	Forrest C. Quinn	BS
David B. Reiss	PHD	Mohit Randeria	MS
Leonid I. Rudin	MS	Russell O. Redman	PHD
Raghvendra Sahai	MS	Philip A. Sackinger	BS
Byron B. Siu	MS	Edward Schepps	MS
Paul N. Spathis	BS		
Maritza I. Stapanian	PHD		
Frederick R. Vachas	BS		

Kenneth R. Sieck	BS	Siew K. Chua	MS
Terrance P. Smith	PHD	Young H. Chung	BS
Maurisa Sommerfield	BS	Mark Crawshaw	PHD
Michael E. Stibila	MS	Edward L. Cuellar	BS
Glen H. Swindle	BS	Margaret M. Farrell	BS
Saleh A. Tanveer	MS	Sheldon I. Green	MS
Paul D. Thomas	BS	Betty J. Hannoun	MS
Anuchit Tianuchit	BS	Ting-Lin Kao	BS
Liem T. Tran	BS	Ivo Klemes	PHD
Russell E. Walker	MS	Greg A. Kopp	BS
Xian-Li Yeh	BS	Byung S. Kwak	MS
1983		Kikis M. Kyriacou	MS
Khaled A. Abdel-Ghaffar	MS	David E. Levy	PHD
Nancy N. Becker	PHD	Blake H. Lewis	BS
Tadhg P. Begley	PHD	William M. Pegram	MS
Robert E. Betzig	BS	Jeanne-Marie St. Jacques	BS
Steven M. Block	PHD	Cynthia C. Walker	MS
Alejandro A. Borbolla	MS	John B. Wall	BS
David P. Brady	MS	Michael J. Walsh	EX
Clark D. Brooks	BS	Johann C. Weber	MS
William M. Bruno	MS	Andrew J. Weir	MS
Kathleen M. Carey	MS	Jesse Wen	BS
Karl R. Clausing	BS	Christopher Yo	BS
Jeremiah F. Connolly	PHD	Christine H. Yu	BS
Walter A. Coole	BS	Thomas C. Zielow	PHD
Yongbum P. Cuevas	MS	1986	
James M. Cummings	BS	Douglas D. Axe	MS
Barry D. Davidson	MS	Mihir Bellare	BS
Marc M. De Villepin	MS	Douglas J. Bennett	MS
Andrew M. Duncan	BS	Lynda C. Brinson	MS
James E. Flowers	MS	Wei Chen	MS
Chi H. Fong	BS	Piranart Chokwattana	MS
James M. Gerard	MS	David H. Chow	MS
Ghavam Ghavarnishahidi	MS	Sung H. Chun	MS
Thomas M. Hagstrom	PHD	Uma D. Dasika	MS
Tze K. Ip	BS	Denise L. Draper	BS
Hamid Johari	BS	Jeff D. Gelles	PHD
John Kao	MS	Stephen L. Gipson	PHD
Young S. Kim	BS	Thomas G. Green	MS
Baruch D. Kupperman	PHD	Brian F. Hatfield	PHD
Anthony Magaldi	ENG	Marc E. Herant	BS
Maclean B. Marvit	BS	Chi F. Ho	PHD
Frank A. Meyer	BS	Watches S. Hoknayan	MS
Jean-Michel Missirian	MS	Justin T. Ip	MS
Roman Movshovich	BS	Mark A. Johnson	PHD
David J. Mumki	BS	Julie A. Kern	MS
Thelma Y. Nunez-McNally	BS	Stephen D. Lee	MS
Wendy A. Olson	MS	Kerry I. Litvin	MS
Steven W. Otto	PHD	Michael J. McDowell	BS
Richard L. Paquette	BS	Arie M. Michelsolm	MS
Jonathan E. Parker	BS	Milagros Montalvo	BS
Vipul Periwai	BS	James J. More	MS
Alexios P. Polychronakos	MS	Thomas J. Nadeau	MS
Zinovy B. Reichstein	BS	Tak-Kwong Ng	MS
David C. Sams	MS	Yannis Nikoleris	BS
Balachandran Sathiapalan	PHD	Kevin C. Power	MS
Paul D. Siders	PHD	Todd C. Pulvino	MS
Risto L. Sjogren	BS	Irene L. Replegie	BS
Srinivas Sridhar	PHD	Michael A. Rider	MS
Aditya Srinivasan	BS	Steve S. Roy	BS
Kenneth J. Stern	MS	Ricardo S. Sanchez Pena	MS
Steven Y. Tam	MS	Donald W. Schwendeman	PHD
Gregory P. Trollsien	MS	Steve S. Shin	BS
Curtis A. Trimble	BS	Hong Sima	MS
Walter S. Tsuha	MS	John R. Stille	PHD
Thiti Vejpas	BS	Dale R. Warren	PHD
Korawit Wacharasinth	MS	Yiu-Fai I. Wong	BS
Timothy L. Williams	BS	Michael T. Yamada	BS
Brian D. Wilson	MS	Chang D. Yoo	BS
Sung J. Yoo	BS	1987	
Jeffrey W. Yu	BS	Asif Ahmed	MS
1984		Jaywant H. Arakeri	PHD
Stephen C. Anco	MS	Bryan R. Botsch	MS
Clinton L. Ballard	BS	Michael C. Burl	BS
Mary A. Barsony	MS	Yie-Hwa Chang	PHD
Gregorio Beitman	MS	David S. Fasbena	MS
Paul S. Bloch	MS	Andrew D. Gaynor	MS
Anne-Marie Brest	MS	Peyton S. Gibner	MS
Carol J. Bryan	BS	D. M. Goedecke	EX
Hong-Man Chan	BS	Arie W. Grossman	MS
Pang-Chieh Chen	BS	Kurt W. Haas	MS
Mark S. Chitjian	BS	David A. Imel	MS
Haris Christodoulou	MS	Lap Y. Lee	MS
Yam K. Chu	MS	Graeme Lowe	PHD
Jose E. Disini	BS	John J. Ngai	PHD
Michael M. Doty	BS	Khanh B. Nguyen	BS
Reese Faucette	MS	Ching-Long Ni	PHD
Benjamin Frisch	MS	Ivan M. Onyszchuk	MS
David A. Goldberg	PHD	Valerie Patrick	MS
Stuart Gondrici	BS	Michael W. Spencer	MS
Koichi Gotoh	MS	Hung-Tao Sun	BS
Peter J. Griev	BS	Ichiro Takeuchi	BS
Roeh Guerin	MS	Jean C. Tang	BS
Orkum Hasekioglu	MS	Jean Thounin	MS
Jeffrey M. Hicks	BS	John J. Vajo	PHD
Elliot B. Hohri	BS	Hei S. Wong	MS
Chih-Chieh Hu	MS	Tinju Yen	MS
Kenneth Hui	BS	1988	
Karim F. Karagulla	BS	Julian L. Anthony	MS
Francoise J. Lemouel	MS	Ashok Bansal	BS
John M. Mahony	BS	Wilson Bruniller	PHD
Alan Y. Mak	BS	Malcolm N. Butler	MS
Gail A. Manning	BS	Thomas H. Buttgenbach	MS
Moses Mares	BS	Manshun Chan	MS
Craig N. Minor	BS	Chun Chang	MS
Bruno C. Nadd	MS	Michael R. Douglas	PHD
Tarik Naheiri	BS	Richard L. Dubs	PHD
Phu T. Nguyen	BS	Nadeem Ghani	BS
Shouleh Nikzad	MS	Clemens H. Glaffig	PHD
Nonkululeko Nyembezi	MS	Chang S. Hahn	PHD
Jeffrey P. Rhinesmith	MS	Eric M. Hanczyc	MS
Helio T. Rodrigues	MS	Reed T. Henry	MS
Michael P. Schatz	PHD	Phyllis H. Ho-Liu	PHD
Steven G. Schlipf	BS	Jonathan N. Hurley	PHD
Kurt E. Seel	MS	Barton D. Huxtable	BS
Steven M. Stahl	BS	Kenneth A. Kable	PHD
Howard D. Stone	MS	Alexander Kamb	PHD
Barry A. Swartz	PHD	Gary H. Kruppa	PHD
Daniel A. Tazartes	MS	Corinne P. Labaune	MS
Brian S. Tipton	BS	Patrick A. Legros	MS
Wilman Tsai	BS	Andrew D. Lewis	MS
Nadeem Tufail	BS	Michael R. Lewis	MS
Robert B. Vogelaar	MS	Michael Loewenberg	PHD
Peter D. Washabaugh	MS	Lindsay K. McKinley	MS
Kriengkrai Wisanrakkit	BS	Stephen G. Miller	PHD
1985		Rusty S. Miskovich	BS
Manuel Acevedo-Ruiz	BS	Michael P. Mitternann	BS
Denise Ball	MS	Raymond B. Moberly	BS
Sean M. Callahan	MS	Srihari Murthy	MS
Roberto A. Carnassa	MS	Jean-Laurent Rosenthal	PHD
Ariel Caticha	PHD	Minh Q. Tran	MS
Kerning Chen	MS	Yacon Tsien	MS
Gary T. Chow	BS	Yuqian Wong	MS

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Annual Fund chairmen chosen as 800 volunteers launch drive for support

The goal of the Annual Fund is the development of a broad base of alumni donors who will make annual contributions to the Institute. As a result of the interest and involvement of these Institute advocates, Caltech enjoys an impressive donor participation rate as well as greater financial support each year.

Each year over 800 alumni volunteer for the Annual Fund. The alumni body is divided into five distinct campaigns, each with a separate volunteer organization.

The Chairman of the entire Annual Fund for the fourth year is George Stanley Holditch BS 1948. The key volunteer for the Special Gifts I Campaign, which solicits gifts of \$5,000 - \$25,000 is Joseph Ben Earl BS 1944.

The Special Gifts II Campaign which solicits gifts of between \$1,000 and \$4,999 is headed again this year by Gordon McClure BS 1947. The volunteers working with Gordon are: Albert P. Albrecht BS 1942, Paul H. Allen, Jr., BS 1942, Dwight H. Bennett BS 1940, Frank C. Bumb, Jr. BS 1951, MS 1952, Donald J. Collins PHD 1969, James H. Crabtree BS 1965, James A. Davies BS 1935, MS 1936, Roger C. Davison BS 1965, MS 1966, Elliott A. Green BS 1942, Robert T. Herzog BS 1956, MS 1963, ENG 1964, Danny F. Huebner MS 1957, ENG 1958, Theodore G. Johnson BS 1957, Stuart A. Krieger BS 1940, Neville S. Long BS 1944, MS 1948, Wayne T. McMurray BS 1945, Harry J. Moore, Jr. BS 1948, Fred W. Morris BS 1944, Richard L. Ridgway BS 1937, Alfred Schaff, Jr. BS 1941, Richard W. Seed BS 1944, Lionel S. Senhouse, Jr. PHD 1964, Paul W. Tuinenga BS 1977, MS 1978, Jephtha A. Wade, Jr. BS 1947, John C. Warren BS 1944, David R. Witwer MS 1975, James W. Workman BS 1957, MS 1958.

The Reunion Campaign is directed at all alumni who are celebrating their 10th, 25th, 30th, 35th, 40th, 45th, and 50th reunion. Kirk Dawson BS 1961, MS 1962 is the volunteer coordinator for this campaign. Dwain B. Bowen BS 1942, MS 1946 serves as the Class of 1942 Reunion Chair. The 1946 Class Chair is Herbert N. Royden III BS 1947.

Keith L. Winsor BS 1952 is the Class of 1952 Reunion Chair, his committee members are: Wilbur J. Barmore BS 1952, Norman Bulman PHD 1952, Malcolm G. Davis, Jr. BS 1952, Ray F. Destabelle BS 1952, MS 1953, Raymond L. Heacock BS 1952, MS 1953, Robert A. Laff BS 1952, David A. Lee BS 1952, Robert M. Phillips BS 1952, William J. Rihn BS 1952.

The 1957 Reunion Class Chair is Larry G. Whitlow BS 1957, his committee members are: Richard Alvarez BS 1957, Edwin X. Berry BS 1957, John F. Brewer, Jr. MS 1957, Gary N. Dietrich BS 1957, Michael B. Duke BS 1957, MS 1961, PHD 1963, Joe E. Lingerfelt BS 1957, MS 1958, Charles L. Malone BS 1957, MS 1958, Reuben B. Moulton BS 1957, John R. Thomas BS 1957, James G. Welsh BS 1957, James W. Workman BS 1957, MS 1958, Leon W. Zelby BS 1957.

David Kauffman BS 1962, MS 1963 is the Class of 1962 Reunion Chair, his committee members are: Reginald W. Clemens BS 1962, John R. Golden BS 1962, Harrison B. Hall BS 1962, Arthur F. McGarr BS 1962, MS 1963, Peter L. Metcalf BS 1962, Albert C. Whittlesey BS 1962, Robert S. Williams BS 1962.

The 1967 Reunion Class Chair is Daniel E. Erickson BS 1967, PHD 1974, his committee members are: Robert W. Berry BS 1967, Douglas M. Chabries MS 1967, James A. Cutts MS 1967, PHD 1971, Cary N. Davids PHD 1967, Robert B. Eddington ENG 1967, James E. Fishbein BS 1967, Ted T. Fujimoto BS 1967, Kimberly R. Gleason BS 1967, David A. Hammond BS 1967, Michael G. Hauser PHD 1967, Arnold H. Henderson ENG 1967, Terrill W. Hendrickson BS 1967, Gray Jennings BS 1967, Gordon O. Johnson MS 1967, PHD 1972, Richard A. Landy BS 1967, George Lauer PHD 1967, James M. McDonald BS 1967, Martin Y. Oiyi BS 1967, MS 1968, Edward J. Patula MS 1967, PHD 1970, Arlin R. Peters BS 1967, Donald E. Schmidt Jr. PHD 1967, James M. Seybold MS 1967, George F. Sharman III BS 1967, Martin L. Smith BS 1967, MS 1968, Steven R. Tyler BS 1967, Wade J. Wnuk MS 1967, David C. Wooten PHD 1967.

The Young Alumni Campaign, now in its fourth year, is led by Gary R. Tanigawa BS 1983. The campaign solicits all alumni who earned a bachelor's degree within the last nine years. The Blacker House Chair is Ari Fuad BS 1982. The Dabney House Chair is Ami L. Choksi BS 1990; her Class Chair is Mark D. Rintoul III BS 1989. The Ruddock House Chair is Mark R. Vagins BS 1987; his Class Chairs are: Ri-Chee Chou BS 1983, Glyn H. Anderson BS 1984, Michele C. Costa BS 1985, Jamaludin Mohd.Yusof BS 1988, Jay P. Ebersohl BS 1989, Kathleen E. Kraemer BS 1990, The Lloyd House Chair is Carol A. Mullenax BS 1989; her Class Chairs are: Walter G. Chong BS 1989, Alan F. Golightly BS 1990, Jack L. Prater BS 1991, The Page House Chair is Sean F. Moriarty BS 1985; his Class Chairs are: Scott H. Bloom BS 1983, Ki C. Wong BS 1990. The Ricketts House Chair is Eric Sinn BS 1983; his Class Chairs are: Daniela M. Bonafede-Chhabra BS 1984, Sven A. Wolf BS 1985, Janice F. Sakai BS 1986, Kouroos Ghandehari BS 1988,

Nicole P. Vogt BS 1988, Alexandre B. Sugiyama BS 1991. The Fleming House Chair is David F. Geraghty BS 1991; his Class Chairs are: Philip H. Albert BS 1983, John D. Sahr BS 1984, Stefan Feuerabendt BS 1985, Karl R. Clauser BS 1986, Edward J. Zanelli BS 1987, John D. Woolverton BS 1989, Kent B. Nordstrom BS 1990, William J. Swanson BS 1991.

Finally, all remaining alumni are contacted through the Regional Campaign. This campaign is geographically based with 13 national regions consisting of approximately 10 areas each. In addition, there is one international region. Ben Burke BS 1961, MS 1962 is serving as the Chair of this campaign for the fourth year.

The Regional Chair for Region 1 - Pasadena and Vicinity - is David B. Ritchie BS 1980. His Area Chairs are: Vladimir Dvornychenko BS 1963, Robert M. Lehman BS 1931, James J. Kosmicki MS 1971, 1973, Craig T. Elliott BS 1958, Vatche Vorperian PHD 1984, Albert C. Whittlesey BS 1962, Allen E. Wolfe BS 1944, Loucas N. Christodoulides MS 1984, Maurice L. Whitaker EX 1955, William C. Woods BS 1949.

Region 2 - South Coast Counties - is chaired by Michael S. Stefanko BS 1970. His Area Chairs are: Calvin E. Kempton BS 1946, Malcolm C. Morrison BS 1964, PHD 1969, Sanford S. Sweet BS 1951, A. E. Thompson BS 1934, Jerry F. Aldrich MS 1947, Denver C. Gore, Jr. MS 1952, David B. McCarroll BS 1966, Donald Stewart, Jr. BS 1947, Michael J. Kaiserman BS 1970, Frank A. Fleck BS 1942.

Western Los Angeles, Region 3, is led by Reinaldo V. Gutierrez BS 1954. His Area Chairs are: Miles A. Nesman BS 1955, Mitchell H. Seidman BS 1958, MS 1959, Robert L. Ditchey ENG 1973, Leo J. Milan BS 1936, John N. Gross BS 1983.

The Regional Chair for Region 4 - Central Coast Counties - is Lothrop (Bud) Mittenhal BS 1948. His Area Chairs are: Joseph R. Bookee BS 1951, Steven M. Menkus BS 1971, G. Richard Morgan BS 1949, Gordon E. Glattenberg BS 1958, Steven L. Heisler BS 1970, MS 1971, PHD 1976, Patrick J. Fazio, Jr. BS 1953, Tad E. Reynales BS 1972, Donald W. Moore BS 1950, Daniel Markoff BS 1950.

Region 5 - San Francisco - is chaired for the first year by Robert W. De Grasse BS 1951. DeGrasse's Area Chairs are: Robert L. Shacklett PHD 1956, Donald A. Darms BS 1953, William P. Cox BS 1950, See C. Young BS 1975, Alan M. Breakstone BS 1972, Arthur F. McGarr BS 1962, MS 1963, Frederick Martin BS 1955, William R. King, Jr BS 1947, Raymond F. McNeil MS 1943.

The Regional Chair for Region 6 - East Bay and Northern California - is David B. Sams MS 1980, PHD 1986. His Area Chairs are: Michael P. Chandler BS 1978, Raymond K. Chow BS 1976, David C. Oakley BS 1950, MS 1952, PHD 1955, Tracy V. Petersen BS 1986, Clinton L. West BS 1957.

Region 7 - Southwestern Sun Belt - is led by Clay T. Smith BS 1938, MS 1940, PHD 1943. Smith's Area Chairs are: Delano A. Brouillette BS 1955, MS 1956, Warren P. Waters BS 1949, Eric J. Korevaar BS 1981, Dwight H. Bennett BS 1940, Ulrich Merten BS 1951, C. Croxall LeGrand BS 1940, Donald W. Chapin MS 1949, Robert M. Isaac MS 1978, PHD 1981, Thomas C. Stockebrand BS 1953, Warren S. Baldrige MS 1970, PHD 1979.

Region 8 - The Northwest - is chaired by John J. Deniston BS 1947. His Area Chairs are: Melvin N. Lever BS 1939, MS 1940, Robert R. Bennett BS 1945, MS 1947, PHD 1949, Frank A. Woodward ENG 1952, Rex B. Peters BS 1956, MS 1963, ENG 1969, Alan K. Forsythe BS 1958, MS 1959, Robert E. Breidenthal, Jr. MS 1974, PHD 1979, Ronald W. Gatterdam BS 1961, John L. Honsaker BS 1955, PHD 1965, Ernest G. Janzen BS 1961, Richard W. Forester MS 1971, PHD 1975, Alex G. Drapes BS 1949, Carol L. Watkins BS 1975, David A. Lind MS 1943, PHD 1948, Clyde S. Zaidins BS 1961, MS 1963, PHD 1967, Frank H. Shelton BS 1949, MS 1950, PHD 1953.

The South, Region 9, is led by Henry (Arch) Corriher, Jr. MS 1950. Corriher's Area Chairs are: Kristian E. Meisling MS 1978, PHD 1984, Richard C. Montgomery BS 1959, Albert Schweizer PHD 1974, Donald R. Street MS 1966, ENG 1966, Elizabeth M. Yelverton BS 1976, Samuel A. Bradley MS 1969, William V. Wright BS 1951, PHD 1955.

The Regional Chair for Region 10 - The Midwest - is Edwin B. Seidman BS 1955. His Area Chairs are: Gregg F. Wright BS 1969, Arthur E. Gooding BS 1977, Edward H. Simon PHD 1960, Steven J. Goldner BS 1964, MS 1965, Donald R. Petersen PHD 1955.

Region 11 - Washington, D.C., and Virginia - is chaired for the first year by Robert L. Von Gerichten USN (Ret) ENG 1954. His Area Chairs are: Bruce G. Montgomery BS 1974, John K. Inman BS 1950, Tse-Fou Zien PHD 1967, Robert H. Korkegi MS 1950, PHD 1954, Frank Ridolphi BS 1962, MS 1963, David L. Turner BS 1971, Edward B. Fomalont PHD 1967, William M. Hardam PHD 1965.

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ALUMNI

CHAPTER ACTIVITIES

Washington, D. C., chapter hears report on early science education

Many scientists and engineers have recently become aware of the urgent need for improving precollege science education. They realize that good primary-school education is necessary if the U.S. is to become scientifically literate, and if substantial numbers of students are to enter the scientific and engineering professions.

Alumni in the Washington, D.C., area heard a report on innovative programs in these areas, as Jerry Pine, Caltech professor of physics and co-founder of Project SEED (Science for Early Educational Development) described this program, and Douglas Lapp, director of the National Science Resources Center, spoke on the work he directs.

The alumni met at the Tivoli Restaurant, in Rosslyn, Virginia.

Boston chapter members tour Haystack Observatory

The Haystack Observatory, in Westford, Massachusetts, boasts one of the East Coast's largest radio telescopes—a 120-foot-diameter giant housed in a weatherproof dome. Although virtually unknown to residents of New England, the observatory is now familiar to members of the Boston chapter, who participated in a special tour on November 14. Before the tour, staff briefed the visitors on research in astronomy and geodesy, and how the telescope and its electronics are being refurbished to collect observations at wavelengths down to 3 mm.

David Kauffman's goal:
Increasing alumni involvement

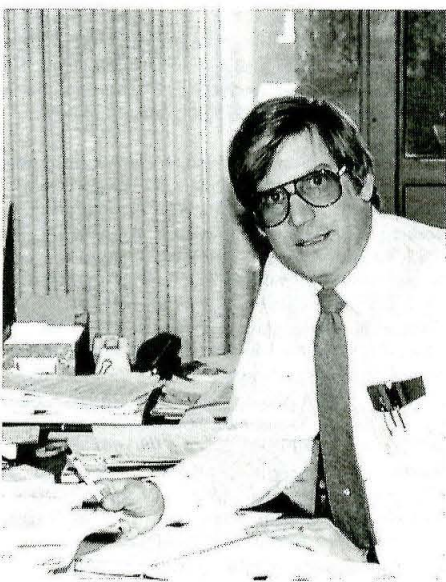
Involving alumni of all ages in chapter activities—from those newly graduated to those retired—is one of the goals of David Kauffman (BS '62, MS '63), who became the second president of the New Mexico alumni chapter early in 1990. The chapter has been in existence for about three years, and helping it continue the process of becoming firmly established is a priority with its president.

There are more than 200 alumni in the state, and the chapter reaches out to all of them. Meetings are held two or three times a year—some of them in Santa Fe, some in Albuquerque. Two SURF (Summer Undergraduate Research Fellowships) students spoke at the most recent meeting.

The chapter fulfills two primary goals, Kauffman believes—to provide a means for alumni to come together and learn news of Caltech, and simply to give graduates the opportunity to

"trade stories and have a good time."

A faculty member at the University of New Mexico for 14 years, Kauffman is now associate dean at the College of Engineering. He previously worked for Shell Oil Company, and was an officer



David Kauffman

in the Air Force. His research specialty is chemical plant design and safety.

One of Kauffman's favorite activities is singing with the New Mexico Symphony Orchestra Chorus. For years, he played the clarinet with small orchestras, but gave it up because "you have to stay in shape, and there wasn't enough time to practice." He also likes to ski. The Kauffmans have one adult daughter who lives in Albuquerque.

Active for several years with the Annual Fund, Kauffman is chairman this year for the class of 1962. Continuing involvement with the Institute is a commitment he has made—and he plans to keep the connection strong.

Parker MacCready (MS '86, right) gives Wayne Roberts (BS '45, MS '48) and James M. Evans (BS '67) a closer look at the "Pogo Foil," a human-powered hydrofoil boat with flapping wings. MacCready gave a demonstration of the "Pogo Foil" at the Alumni Association's Seattle chapter meeting.



Alumni President Stupian reports on changes in Caltech admissions process

Caltech's undergraduate admissions process has gone through some changes over the past few years. Since undergraduate education is quite likely a topic of particular interest to alumni, I would like to outline the mechanics of assembling freshman classes in the 1990s. I especially want to describe the role played by the Alumni Association in undergraduate admissions.

Last year, about 1800 prospective freshmen applied to Caltech. Five hundred applicants were admitted. Of these, 227 accepted and now constitute the class of 1995. For those who keep a tally, the average SAT scores for the class are 650 verbal and 750 mathematical. As one might suspect would be true of any university's selection procedure, applications fall into three categories. The "this kid walks on water" and the "below C level" groups can be handled with reasonable dispatch. Applications in the middle group generate the greatest amount of work.

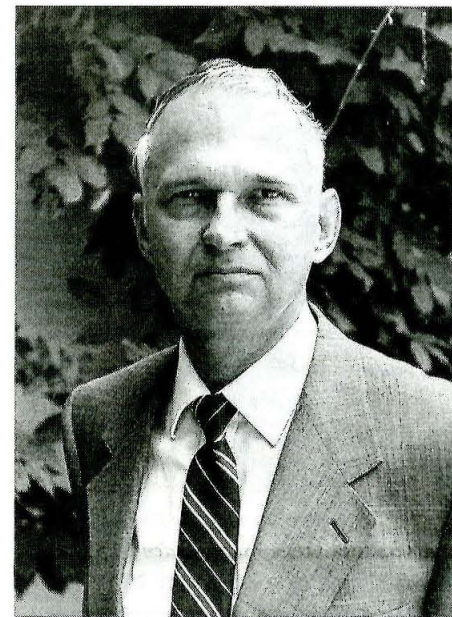
Most of you will recall that an interview with a faculty member was once a unique aspect of an application to Caltech. Caltech faculty stopped interviewing applicants several years ago; this decision was reached because of constraints on the available time of the faculty and because of the difficulty inherent in arranging interviews with applicants drawn not only from all parts of the United States, but from many other countries as well.

Interviewing only those applicants who enjoyed reasonable geographic accessibility was deemed not to be equitable, and the process was discontinued. Some personal contact is provided by receptions held in the spring for admitted applicants in various cities. In addition, admitted students are invited to the campus for a grand tour, so that they may obtain a better picture of Caltech before they have to indicate their final acceptance. Additional personal contact may be provided by alumni.

Excellent freshmen constitute a commodity not overly abundant. A nationally ranked university like Caltech would like to receive a large number of viable applications in order to get the best possible freshman class—while providing some general room for maneuvering. As unlikely as it may seem, there are many students who either have not heard of Caltech, or who are hazy about the Institute's virtues. At present, alumni admissions representatives concentrate on providing high school students with information about Caltech. Alumni volunteers become acquainted with faculty at high schools in their areas, and act to promote student interest in the Institute.

Six regional directors and 19 area coordinators manage the efforts of the 185 (at last count) admissions representatives. The regional and area boundaries were drawn up after a detailed analysis, in the best traditions of Caltech, of the geographical distribution of applications for admission as freshmen; this effort was carried out by

Ed Lambert. This year, Ed chairs the Alumni Association's Undergraduate Admissions Support Committee, which serves as a link between alumni volunteers and the admissions office. More volunteers are always welcome! In addition to admissions representatives, area coordinators are still needed for Phoenix, Long Island, Philadelphia, Princeton—mid-Jersey, San Jose, Seattle, San Francisco, Portland, Sacramento, Detroit, Pittsburgh, Minneapolis/St. Paul, Raleigh-Durham, Dallas, Austin, and Miami.



Gary Stupian

Anyone wanting to help should call Karen Carlson at the Alumni House (818/356-6593).

Finally, but most important, I want to take this opportunity to welcome Dr. Carole Snow as Caltech's new director of undergraduate admissions.

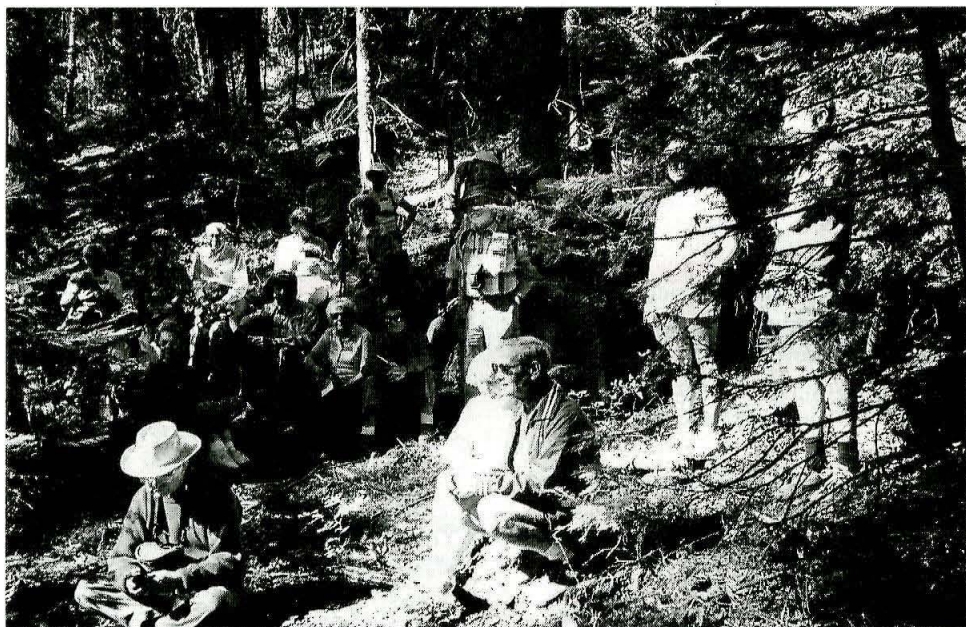
Your comments are always welcome. You can contact us at: Caltech Alumni Association, mail code 1-97, Pasadena, California 91125, 818/356-6592. You can also send your remarks to me via electronic mail at STUPIAN@JULIET.CALTECH.EDU or GSTUPIAN@CALTECH.BITNET.

Student house history project launched

Prompted by student interest and encouragement, the Caltech Alumni Association would like to compile the history and legends of the student houses, including the Throop Club. Many students, as well as alumni, are fascinated by the stories that alumni recollect. They are curious about the origin of traditions and the evolution of the houses. Perhaps you could help solve some of the mysteries.

The houses have changed over the years—dress meals are a rarity these days! However, Caltech ingenuity has been constant, and alumni often see a

Continued on page 11



Alumni join in dedicating Nelder Grove

By Ralph Miles, BS '55, MS '60, PhD '63

"We have an appointment with five giant sequoias up at the top, about 500 feet above us. They've been waiting there more than 2,000 years for this occasion, so that they can get proper recognition. Today's our day."

With these words, on the morning of September 30, 1991, Ted Combs (BS '27), initiated the dedication of Caltech's 20 acres in Nelder Grove as the Caltech Centennial Grove. As part of the ceremony, Caltech's five mature giant sequoia trees (*Sequoiadendron giganteum*), ranging in diameter from 9 feet to 22 feet, were named in honor of five men who played essential roles in the creation and development of Caltech.

Nelder Grove is located a few miles south of Yosemite National Park in the Sierra National Forest. It encompasses 1,540 acres containing more than 100 mature giant sequoias. Caltech's land lies along the southwestern edge just off the Shadow of the Giants National Recreational Trail. John Nelder, a California gold miner, moved into the grove in 1875 and homesteaded there until his death in 1889. John Muir passed through the area in 1875, and later wrote that Nelder was a "fine, kind man, who in going into the woods has at last gone home."

After Nelder's death, the land was sold to a lumber company, and eventually came into the possession of Arthur H. Fleming, a major financial contributor to the Institute. Fleming, who later donated his entire estate to Caltech (except for an annuity), also contrib-

uted 160 acres of Nelder Grove. Caltech still owns 20 of these acres.

Ted Combs continued the dedication by giving a brief history of the grove. Combs was responsible for proposing the dedication as a Centennial activity.

After Combs's speech, most of those attending committed themselves to a 15-minute, arduous scramble over forest litter and up the steep hillside to the site of the plaque. There, Le Val Lund (BS '47), speaking for Caltech and the Alumni Association, dedicated the trees. Martha Smith, great-granddaughter of Amos Throop, lifted the cloth covering the plaque. Designed by Combs, it sits on top of a three-foot-high wooden post, with arrows pointing to each of the five trees.

The five men honored in the naming are Amos G. Throop, founder of Throop University; Robert A. Millikan, administrative head of the Institute for many years; Arthur A. Noyes and George Ellery Hale, both founders of the modern Caltech; and Arthur H. Fleming.

Forty members of the Caltech community, including alumni, their guests, and Caltech staff, participated in the dedication and naming as one activity in a four-day trip organized by the Alumni Association. To preserve the Caltech land, no sign will be placed on the trail, and there will be no path to the plaque. Those wishing to visit it may contact the Alumni Association for directions.



Volunteers sought for reunion weekend

Mark your calendar for the 1992 reunion weekend, Thursday, May 14, through Saturday, May 16. Eight classes will gather in Pasadena, not only to greet classmates and relive their college days, but also to participate on May 16 in Seminar Day activities.

The Alumni Association is delighted to offer a weekend which promises to be both fun- and event-filled for the eight reuniting classes. The Association staff is available to handle most of the arrangements, but needs your help! The success of the weekend depends on the collective cooperation of many people, and on the input of the reunion committees as they seek to recreate the uniqueness of each class:

Please check the list of reunion classes below, and give Patsy Gougeon, seminar/reunion coordinator, a call at 818/356-8366 if you would like to make your reunion the most memorable in the history of the class.

60th—Class of 1932; Robert Foss, chairman.

50th—Class of 1942, Thursday, May 14; John McClain, Jr., chairman.

45th—Class of 1947, Friday, May 15; John L. Mason, chairman.

40th—Class of 1952, Friday, May 15; Robert C. Perpall, chairman.

35th—Class of 1957, Saturday, May 16; Charles H. Anderson, chairman.

30th—Class of 1962, Saturday, May 16; chairman needed.

25th—Class of 1967, Friday, May 15; chairman needed.

10th—Class of 1982, Saturday, May 16; chairman needed.

History project

Continued from page 10

little of themselves in current students. A compilation of events and vignettes from life in the houses should be interesting reading for both alumni and students. After gathering enough historical data to present a complete picture of life in the student houses, the Alumni Association plans to publish the results.

The Alumni Association is looking for assistance with this project. Anyone who is interested should write to the address below, or call with the following information: name; address, phone number, class year, student house, and whether they would like to be an organizer, editor, or contributor.

Write to Student Houses History Project, Caltech Alumni Association, Mail Code 1-97, Pasadena, CA 91125, or call 818/356-6592.

Suzanne Granger (fourth from left), associate curator of the Los Angeles Arboreta and Botanical Gardens, describes Native American use of local plants for food. Her audience consists of participants in the Alumni Association travel/study program to the Owens Valley: Barton Wood (MS '47), August Segelhorst (BS '38), Virginia Robinson, whose husband is Charles F. Robinson (MS '38, PhD '49), and Richard Cowley (BS '58, MS '59).

ALUMNI ACTIVITIES

December 10, 1991, *TriState Chapter dinner/meeting*. Judith R. Goodstein, faculty associate in history and registrar, guest speaker.

December 12, 1991, *Phoenix Chapter dinner/meeting*. Judith G. Cohen, professor of astronomy, guest speaker.

January 1, 1992, *Rose Parade event*. Breakfast and lunch at the Athenaeum. Reserved seating at Hill and Colorado for the 103rd Tournament of Roses Parade.

January 29, 1992, *San Francisco Chapter dinner/meeting*. Terry Cole, office of technical divisions, JPL, guest speaker.

March 29–April 15, 1992, *Galapagos travel/study program*, with William P. Schaefer, senior research associate, chemistry.

May 14, 1992, *class of 1942, 50th reunion dinner*, the Athenaeum.

May 15, 1992, *Half Century Club reception and luncheon*, the Athenaeum.

May 15, 1992, *class of 1947, 45th reunion dinner*, the Athenaeum.

May 15, 1992, *class of 1952, 40th reunion dinner*, the Athenaeum.

May 15, 1992, *class of 1967, 25th reunion dinner*, the Athenaeum.

May 16, 1992, *55th annual Alumni Seminar Day and dinner*, the Caltech campus.

May 16, 1992, *class of 1957, 35th reunion dinner*, the Athenaeum.

May 16, 1992, *class of 1962, 30th reunion dinner*, the Athenaeum.

May 16, 1992, *class of 1982, 10th reunion dinner*, the Athenaeum.

June 18, 1992, *Alumni Association annual meeting and honorary alumni dinner*, the Athenaeum.

June 21–28, 1992, *Yellowstone travel/study program*, with Robert P. Sharp, Robert P. Sharp Professor of Geology, Emeritus, and Leon T. Silver, W. M. Keck Foundation Professor for Resource Geology.

July 13–21, *Iceland travel/study program*, with Robert P. Sharp, Robert P. Sharp Professor of Geology, Emeritus.

August 1992, *Asbland/Crater Lake travel/study program*, with Jenijoy La Belle, professor of literature, and Charles Bacon, United States Geological Survey.

Unless otherwise indicated, for information please contact Arlana Bostrom for chapter events, at 818/356-8363; Patsy Gougeon for Seminar Day/reunions, at 818/356-8366; and Helen Shafran for travel/study programs, at 818/356-8364.

Kanamori

Continued from page 1

difficult time," he says. "The war years did a lot to build strength and character."

Near the end of elementary school, Kanamori began to develop an interest in science. As the war drew to a conclusion, it became easy to find small unassembled electric devices on the street—debris from abandoned or burned-out factories. Kanamori enjoyed picking them up and assembling them, and an interest in creating small mechanical things and designing electronic devices had its beginnings. Good science teachers in junior high and high school further stimulated his interest in the subject, while mountain climbing and camping stimulated his interest in nature.

In college, a professor suggested that he combine his interests in science and nature, and his skill in assembling scientific devices, by studying geophysics. Living in a seismically active region further piqued his interest in the field, and he followed his professor's advice, studying geophysics at the University of Tokyo, where he earned his BS, MS, and PhD degrees.

During these years he met Charles Richter, Caltech's pioneering seismologist, who was at the university as a Fulbright Scholar. Kanamori frequently attended his lectures. He also met Hewitt Dix, Caltech professor of geophysics, who was spending a year at the University of Tokyo as a visiting professor.

"I liked his way of approaching problems," says Kanamori. "He was determined to figure out the answer, even if the problem did not seem too important at first sight."

The encounter with Dix was a critical one for Kanamori, because the Caltech professor returned to the United States and made arrangements for the Japanese geophysicist to come to the Institute as a postdoctoral fellow. Kanamori arrived in 1965 with his bride of a year, Keiko, who had attended high school in England and spoke fluent English.

Kanamori was immediately captivated by the flexible, open atmosphere at Caltech. "I loved the smallness and the informality," he says. "That year was the highlight of my life. But," he adds, with an infectious laugh, "I'm not sure how happy Caltech was with me. I liked traveling very much, and my wife and I drove more than 25,000 miles that year. I don't feel I was very productive. I was too busy traveling to write papers."

Kanamori was struck by the enormous contrast in wealth between the United States and Japan—and also by the enormous class differences that he perceived in the US. He recalls that even then, in this wealthy country, he saw people living on the streets.

After completing his assignment at Caltech, Kanamori returned for two years to Japan's Earthquake Research Institute as associate professor. Then, in 1969, he spent a year at the Massachusetts Institute of Technology as visiting associate professor. After two more years at the Earthquake Research Institute, he received an invitation to come to Caltech as professor of geophysics.

"This was a big surprise," he says dryly, "because of the guilt I carried about all the traveling during my postdoc days. I wondered whether Caltech had gotten the names mixed up."

"I still remember how much I enjoyed my first year as a professor here," he says. "In terms of a scientific and research environment, there is no comparison to a university in Tokyo. Here, innovative science is much more accepted. In Japan, you're expected to do what other people do, to conform in your social and professional life, and in the way you dress. All this conformity makes me very uncomfortable, and it isn't good for science. Here, these matters are far more flexible. You're free to be an individual."

Kanamori felt so comfortable in the United States that he experienced only a few twinges of homesickness. "For more than ten years after moving here, I never missed Japanese food," he says. "Now, I'm going back to Japanese cuisine. The only place in the United States where I feel a little out of place is in a sushi bar. There are so few Japanese there."

The seismologist returns to Japan for a few days every couple of years, but emphasizes that "when I come back here, I'm home."

"I don't know Japan very well," he adds. "I've only explored the parts near Tokyo. After I retire, I want to spend more time there, traveling and visiting the regions I've never seen."

But retirement is a long way in the future for Kanamori. There is far too much fascinating research to do. Currently, his research centers on the causes of earthquakes, and he recently collaborated on a major seismological study demonstrating that moderately strong earthquakes are not always caused by faulting, but may also result from slides or explosions in sediments on the sea floor. He is also interested in tsunamis and volcanoes, as well as the structure of the earth's crust and mantle.

In 1989, Kanamori became involved in a space-age seismic puzzle concerning the space shuttle *Columbia*—just the kind of mysterious occurrence that he enjoys. He and his colleagues examined the record from a special high-fidelity seismometer—the initial segment of the TERRAscope to be installed at Caltech. They noticed that the instrument recorded a long-period ground motion 12.5 seconds before the sonic booms marking the shuttle landing were registered. They concluded that the sonic booms pushed almost simultaneously against the 400 high-rise buildings in downtown Los Ange-

les and the Wilshire District, and that the high rises, in turn, pushed against the relatively soft sediment of the Los Angeles Basin. This push, they agreed, produced the ground motion recorded in Pasadena.

So, as one commentator put it, the sonic boom shook the buildings, which shook the soil which caused the wave that shook the seismograph.

"I was so interested in the problem that I continued working on it until I figured it out," Kanamori says, thereby defining a prominent trait.

The TERRAscope, Kanamori's new "candy store," consists of an array of some 10 broadband, high-dynamic-range, digital seismometers placed around southern California, linked by realtime telemetry, and serviced by high-speed computers. It is funded by the Whittier Foundation and now also by the ARCO Foundation. The TERRAscope's seismometers have a dynamic range about 10,000 times broader than ordinary seismometers, so that they are able to record large and small earthquakes on the same scale. The array, one-third of which is in position, has been termed "a versatile geophysical observatory."

For several years, Kanamori was the only scientist in his household. Then Mrs. Kanamori decided to earn her PhD and enrolled at the Institute, where she studied chemistry with John D. Roberts as her faculty adviser. After working as a postdoc at Caltech for two years she went on to a research position at UCLA, and the family moved to a home in the San Fernando Valley to be closer to her work—as well as to their son's preparatory school. Kanamori rose early to drive into the Institute before rush hour traffic, and learned that he liked the quiet morning hours for getting things done. Today, Mrs. Kanamori is working at the Huntington Medical Research Institutes, and the family is back at home near the campus, but Kanamori has kept to his early ways. The Kanamoris are the parents of two sons, one a graduate student at Stanford, and the other a sophomore at Caltech.

Observers have noted that the seismologist not infrequently seems to be somewhat unaware of information transmitted by television or newspaper, so absorbed is he in his research. He also claims few hobbies. "My work is my hobby," he says. "I don't need any others."

To what does Kanamori attribute his success as a seismologist? "To be successful in this field," he says, "besides being good in physics and math, one must be very inquisitive and have a strong interest in nature. Personally, I don't have much ambition, and I don't want to be famous. I'm just happy to be in this profession. Seismology is exciting."

And so Kanamori continues coming up with novel problems and novel solutions, explaining things that have never been explained before. After all, enthusiasm, shrewd insight, and a determination to understand are more effective than ambition any day.

Native Americans study on campus

They came from Alaska, from New York, from the Southwest—31 young Native Americans representing more than 20 tribes, eager to learn more about science and mathematics. All of them 11th graders, they spent four weeks on the Caltech campus, living in Page House and becoming deeply involved in classes in mathematics, computer science, and physics. When it was time to go and the students met with their faculty at a banquet, the climate was emotional as friends said good-bye and marked the conclusion of one of the most stimulating periods of their lives.

The young men and women were participants in an annual program of the American Indian Science and Engineering Society, which has student chapters across the country. The society sponsors summer classes at a different university each year. Those chosen for the program (on the basis of grades and recommendations of teachers) begin their course of study in the eighth grade, and continue each summer through the eleventh grade. A teaching staff accompanied the group to the Institute—among them, college-level Native American students from other universities who acted as tutors. In addition to formal studies, the participants took field trips to off-campus sites such as TRW and JPL. IBM loaned computers for the summer.

This was the first year that the program had met on the Caltech campus, and every effort was made to give participants a realistic insight into the environment at a major research university, according to Eduardo Grado, director of student affirmative action programs and secondary school relations, who made arrangements.

"Some of the participants had problems with the material, because they came from weak high schools," said Grado. "Not all of them were A students. But they were highly motivated, and willing to work hard."

"Native Americans have been the forgotten people of this country. We have greater difficulty recruiting from this ethnic group than from any other. It seemed especially appropriate to me that we had this program here during our Centennial year. I was really glad that we could be of help to these students."

Grado said Native Americans in Los Angeles turned out to welcome the young people, making presentations to them and inviting them to powwows. "The Native American community was very proud to have these students here, and grateful to Caltech for its support," he remarked.

Engineering and science students capable of succeeding at top educational institutions in the country are being produced through this program, Grado believes. "We may recruit one

or two of them," he says, "and I hope we'll see some of them here for graduate work or as faculty members some day."

"Your vision is not limited by what your eyes can see, but by what your mind can imagine," said Hawaiian astronaut Ellison Onizuka, who was killed in the *Challenger* explosion. For the 31 Native Americans who studied on the Caltech campus this summer, vision has been expanded to new limits.

Centennial Challenge boosts alumni campaign participation

Only three quarters of a year have passed since the late Hugh Colvin (BS '36) issued his \$3 million Centennial Challenge to his fellow alumni, but already \$714,276.86 of the funds have been used in matching alumni contributions. "We suspect that, after a year into the challenge, more than \$1 million will have gone into matching gifts," a spokesman for the fund said.

Colvin issued this challenge early in the campaign: Make a new gift to the Institute, or increase the amount of a usual gift, and he matches the increased portion of the contribution at a two-to-one ratio. Alumni who received their BS degrees within the last nine years have their gifts matched at a three-to-one ratio.

During the last quarter, these contributions have been made and these amounts matched in the various campaign sections: Special Gift I Campaign: \$15,606.25 qualified for matching and \$31,212.50 matched; Special Gift II Campaign: \$24,393.51 qualified and \$48,787.02 matched; Regional Campaign: \$17,570.66 qualified and \$35,141.32 matched; Reunion Campaign: \$10,725.00 qualified and \$21,450.00 matched; Young Alumni Campaign: \$5,430.00 qualified and \$16,290.00 matched. Grand totals for the categories: \$73,725.42 qualified and \$152,880.84 matched.

Colvin's overall aim in establishing the challenge was to enhance alumni participation in The Campaign for Caltech, and to encourage contributions of unrestricted funds to the Institute. The challenge will run through the end of 1993.

Colvin, who served as president of The Associates in 1988-89, made a number of gifts to the Institute. In 1988 he provided seed money of \$50,000 to establish five SURF (Summer Undergraduate Research Fellowship) endowments named for distinguished members of the faculty. Last year he received Caltech's Distinguished Alumnus Award.

Alumni asked to support summer job program for students

ASPIRE (A Summer Position in Research or Engineering) is a program designed to provide Caltech undergraduates with preprofessional summer work experiences. Although many employers participate in ASPIRE, a large number of them are Caltech alumni. Alumni provide many of the most challenging and rewarding positions for students and frequently offer exciting salaries. In addition, students and alumni benefit from the opportunity to interact with undergraduates and to develop relationships with them.

Last year, more than 50 percent of Caltech's returning students sought summer jobs through ASPIRE, and half of the available positions were



A Summer Position in Research or Engineering

offered by alumni. Students were employed throughout the United States in business, industrial research facilities, and universities.

But many listings specified that only juniors and seniors should apply. The Career Development Center, in planning for next summer, is particularly interested in job listings for freshmen and sophomores.

As Caltech graduates know, these students frequently have taken advanced courses in high school, have completed one or two years of rigorous coursework in mathematics, physics, and chemistry at Caltech, and have a great deal to offer to an employer.

The Alumni Association will soon be contacting alumni, encouraging them to participate in ASPIRE. However, it is not necessary to wait to hear from the Alumni Association before contacting the Career Development Center concerning openings. "It's never too early to start looking," students are advised.

Alumni with summer job opportunities for students are urged to contact the Career Development Center's Rosana Madrid Gatti, career counselor and coordinator of the ASPIRE program, to begin discussing summer needs.

The address and phone number are: Career Development Center, 8-31, California Institute of Technology, Pasadena, CA 91125, 818/356-6361.

ALUMNI ASSOCIATION FINANCIAL STATEMENTS

ALUMNI ASSOCIATION
CALIFORNIA INSTITUTE OF TECHNOLOGY
Pasadena, California

BALANCE SHEET
June 30, 1991

ASSETS	
Cash on Hand and in Bank.....	\$ 37,991
Investments:	
C.I.T. Consolidated Portfolio.....	1,326,953
Money Market Funds	169,229
Receivables	9,363
Inventory	25,926
Deferred Program Expense	17,600
Postage Deposit and Other Assets	3,164
Computer and Other Equipment	19,030
Accumulated Depreciation	(7,074)
TOTAL ASSETS	\$ 1,602,182

LIABILITIES, RESERVES AND SURPLUS	
Accounts Payable.....	\$ 54,975
Deferred Income:	
Investment Income from C.I.T.	
Consolidated Portfolio	54,000
Program Income	5,562
Life Membership Reserve	1,330,848
Reserve for Directory	40,000
Reserve for Publications	8,231
Reserve for Electronic Database	4,000
Investment in Equipment	11,956
Surplus	92,610
TOTAL LIABILITIES, RESERVES AND SURPLUS	\$ 1,602,182

STATEMENT OF INCOME, EXPENSES AND SURPLUS For the Year Ended June 30, 1991

INCOME	
Dues of Annual Members.....	\$ 85,945
Investment Income	
C.I.T. Consolidated Portfolio	81,699
Money Market Funds	10,869
Net Income of Seminar Day	2,737
Net Income of Alumni Programs	1,721
Sale of Legends	5,365
Other	206
TOTAL INCOME	\$ 188,542

EXPENSES	
Publications.....	\$ 23,095
Net Expenses of Class Reunions	17,493
Net Expenses of Chapter Programs	18,989
Student/Faculty/Alumni Relations	24,620
Undergraduate Admissions Support	3,191
Administration	65,961
Membership	9,378
Directory	25,000
TOTAL EXPENSES.....	\$ 187,727
INCOME IN EXCESS OF EXPENSES.....	\$ 815
Surplus, June 30, 1990.....	91,795
Surplus, June 30, 1991.....	\$ 92,610

INDEPENDENT AUDITOR'S REPORT

Board of Directors
Alumni Association
California Institute of Technology

I have audited the accompanying balance sheet of the Alumni Association, California Institute of Technology as of June 30, 1991 and the related statement of income, expenses and surplus for the year then ended. These financial statements are the responsibility of the Association's Board of Directors. My responsibility is to express an opinion on these statements based on my audit.

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

In my opinion, the financial statements referred to above present fairly in all material respects, the financial position of the Alumni Association as of June 30, 1991 and the results of its operations for the year then ended in conformity with generally accepted accounting principles.

Calvin A. Ames
Certified Public Accountant

October 17, 1991

Lost Alumni *Continued from page 9*

Bradley B. Woods	MS	Hong Jiao	MS	Fei Zhuang	ENG	Majid Saghaei	MS
Dongping Yin	MS	David Y. Jung	BS	Miriam H. Zietlow	PHD	Michael P. Salisbury	BS
Ren-Feng Yuan	PHD	Katherine J. Kanjes	PHD	1990		Martin J. Savage	PHD
1989		Floyd L. Klavetter	PHD	Roberto Battisti	PHD	Karen M. Siegrist	BS
Talal T. Balaa	MS	Paul U. Lee	BS	Gabriel F. Bobadilla	MS	Phaikun Tan	PHD
Jerome D. Banks	BS	Lun-Tseng Lu	PHD	Martin J. Brenner	MS	Xi Wang	MS
Matthew A. Breiden	BS	Takeshi Sasaki	MS	Herbert J. Burrows	BS	Christopher Webb	PHD
Thomas K. Brown	MS	Amish J. Shah	BS	Huy T. Cao	BS	Mark Weitzman	MS
Rex W. Burington	MS	Craig M. Shakerji	MS	Sonali Chakrabarti	MS	Huafeng Wen	MS
David W. Burnett	MS	Jacqueline V. Shanks	PHD	Fen Chen	MS	Patricia K. Wiese	BS
Carlo Carraro	MS	Seung Koo Shin	PHD	Olivier R. Espinosa	PHD	Shi-long Yang	MS
Somchart Chantasirawan	BS	Steven G. Sogo	MS	Enrique Geffroy aguilar	PHD	1991	
Kay-Yut Chen	BS	Spiridon V. Spirou	BS	Jonathan J. Hamkins	BS	William E. Fulcher	MS
Douglas A. Collins	MS	H. H. Thorp	PHD	Patricia D. Jungers	PHD	Benjamin S. Holland	BS
David V. Dearden	PHD	Mark S. Trimmer	PHD	Chaitan S. Khosla	PHD	Nikhil R. Joshi	BS
Samir Diab	BS	Michael A. Udell	MS	Victoria Lane	BS	Zhenhuan Liu	MS
Ricardo H. Diaz	MS	Kevin E. Underhill	BS	Po King Li	BS	Sanjeev K. Rao	MS
Jeffrey J. Flint	BS	Johann C. Van Der Walt	MS	Mark T. Ma	BS	Linda Salzhauser	MS
Mary Ann M. Fuhr	MS	Nancy S. Vogelae	PHD	Raymond G. Mayer	MS	Michael P. Strathmann	PHD
David A. Gerken	MS	Thomas E. Wahl	BS	Colleen McDermott	MS	Alexander Vakakis	PHD
Takahiro Hamada	MS	Denise L. Worthen	MS	John Murphy	MS		
Tracy M. Handel	PHD	Sin-Nim S. Yip	MS	Adam J. Perse	BS		
Brian T. Hayes	BS	Yanong Zhu	PHD				

PERSONALS

1922
RALSTON E. BEAR has just celebrated his 90th birthday, following 28 years of retirement and much traveling here and abroad. He had spent 41 years with General Electric, starting in Schenectady and retiring from management in the company's Los Angeles office, and he has been happily married for 68 years to Dorris Condon of Pasadena. "After some 50 years in Pasadena and 12 years in Oceanside," he writes, "we moved in 1989 to Redwood Terrace Retirement Community in Escondido. Here we enjoy an active life among wonderful people, and I can truthfully say that there is not much wrong with us that being 40 again wouldn't fix." Their daughter, Marcia Fowler, lives in Hesperia, California, and she has a son living in Forest Grove, Oregon.

1935
ADRIAN H. GORDON, MS '36, of Belair, South Australia, having just turned 79, writes, "I retain my affiliation to the Flinders Institute of Atmospheric and Marine Science (FIAMS) of The Flinders University of South Australia. Incidentally, the Vice-Chancellor of our University, John Lovering, is also an alumnus of Caltech [PhD '56]. This past year I have had four peer refereed papers accepted for publication in scientific journals, on global warming. My wife Kay will be 81 on 10/10/91 and she is involved with programming artistic audio-visual sequences which she shows to various community groups. Our son Martin owns and operates a small film production house in Adelaide. He recently produced his first mini feature film which was shown on television in Australia."

1937
JOHN S. RINEHART, MS, of Santa Fe, New Mexico, has been presented the John A. Ulrich meritorious achievement award, by the American Defense Preparedness Association.

1940
JEROME KOHL, of Raleigh, North Carolina, has returned from three weeks in the People's Republic of China as a consultant to the Chinese National Environmental Protection Agency, regarding waste minimization. He has made a presentation to the World Bank on the results of his trip, and is preparing a final report on "Implementing Waste Reduction for Chinese Township and Village Enterprises." As a photographer, he will be participating with his sculptress daughter, Joyce, in two joint shows. The first will open February 2, 1992, in the Rotunda Gallery of Meredith College, in Raleigh. The second will open May 24, at the Fayetteville Gallery of Art, Fayetteville, North Carolina. He teaches photography at the Sertoma Art Center in Raleigh.

1941
REUBEN P. SNODGRASS, MS '42, is at 71 an international competitor in the sport of iceboating, according to NAOMI KASHIWABARA, BS '49. In 1962, Snodgrass was the North American champion in the DN iceboat class, and, in 1990, while competing as one of three Americans, he finished ninth in a field of 23 during an international meet at Novosibirsk, Siberia. Snodgrass and his wife, Virginia, have lived on Lake Ronkonkoma in Long Island, New York, since 1948, and they are the parents of three daughters and a son, Dale, a Navy pilot and former Top Gun who participated in air strikes against Libya and Iraq.

1946
GERALD S. HUESTIS, MS, ENG '47, of Hartsville, Pennsylvania, retired as chief executive officer of Navmar Applied Sciences Corp. in September 1991. He remains with the company as chairman of the board.

DONALD R. LINDSAY, EX, of Bakersfield, California, has been elected president of the board of the Bakersfield Symphony Orchestra, for two years. His wife, Paula, is president of the Symphony Associates, the chief fund-raising organization.

1948
ROBERT J. HEPPE, of Fairfax, Virginia, won Computer Science Corp.'s award for technical excellence, the company's highest award, in May 1991. He retired in June 1991, after 39 years, and writes that he is "now a consultant in computer simulation of (mostly) satellite systems, (mostly) classified."

HARVEY K. HOLM, of Santa Cruz, California, retired in April 1990 as executive vice president of Cal-Air, Inc., "after 22 years and a 65-mile-daily commute," he writes. "I am now happily renovating, at my own pace, a 108-year-old Victorian house with a 2-minute daily commute." He and his wife, Barbara, have been married 44 years, and they have three children and two grandchildren.

1952
RICHARD E. WALLACE, ENG, of Bellevue, Washington, retired in October 1990, after 35 years with Boeing. His last position was as chief engineer for computer-aided design applications; he was a specialist in airplane design synthesis and configuration optimization, and his career spanned 48 years. He is now helping restore airplanes for an air museum.

1953
WILLIAM G. BLODGETT, of Friday Harbor, Washington, has retired after 37 years as an electronics engineer, including 15 years at Caltech and 11 years at TRW. Now living on San Juan Island in Upper Puget Sound, he is pursuing the hobbies of boating, welding, and carpentry.

1959
RAY M. BOWEN, MS, has been named provost and vice president for academic affairs by Oklahoma State University. At the time of his appointment, Bowen was deputy assistant director for engineering at the National Science Foundation in Washington, D.C., and professor of engineering mechanics and mechanical engineering at the University of Kentucky.

DONALD D. CLAYTON, MS, PhD '62, professor of physics and astronomy at Clemson University, was awarded the Leonard Medal of the Meteoritical Society at its July 1991 annual meeting, in Monterey, California.

1961
JAMES M. KALLIS, MS, of Los Angeles, was appointed chairman of the corporate reliability and maintainability committee of Hughes Aircraft Company, effective July 8. A Hughes employee since 1972, Kallis is a chief scientist in the electro-optical and data systems group. He was the editor of *Managing for Reliability and Maintainability* from 1983 until his appointment as committee chairman. He is also a corecipient of the Institute of Environmental Sciences Maurice Simpson Technical Editors Award for 1990, for the technical article "Stress Screening of Electronic Modules," published in the March/April 1990 issue of the *Journal of the IES*. The article was selected for its excellence in the field of product reliability.

1962
LAUREN MERRITT, MS '63, of Sunnyvale, California, writes that, after nine patents, three trade-journal articles, and innumerable engineering memos, "I've put together a collection of the poetry I've written over the last 20 years. It's indeed satisfying to be able to review how my personal space has changed."

1963
DAVID L. BARKER, of Foster City, California, has been appointed vice president for scientific development at Molecular Dynamics, in Sunnyvale; the company specializes in innovative optical imaging for molecular biology.

WAYNE C. HUBER has moved from the University of Florida to Oregon State University, where he is the new department head of civil engineering. He lives in Corvallis, Oregon.

WENDELL W. MENDELL and his wife, Pamela, announce the birth of a son, John Henjesand Mendell. They live in League City, Texas.

RICHARD E. PETERSON on July 15 became chairman of the department of geosciences at Texas Tech University, where he is a professor of atmospheric science; his particular interest is high-wind events, such as tornadoes, hurricanes, and dust storms. Travel with his wife, Becky, "along with the study of languages are my chief outside interests," he writes. "Our son David is beginning graduate study at UC Berkeley in linguistics, our daughter Kristin is a junior art history major at Washington University and our daughter Karin is a high school junior. They all share our love for travel."

1964
MARK LEVINSON, PhD, of Edmonds, Washington, retired from his position at the University of Maine in 1990. He had been the Arthur O. Willey Professor of Mechanical Engineering and the founding director of the Technology and Society Project there. He will be a visiting professor of aeronautics and astronautics at the University of Washington during the 1991/92 academic year, where he will introduce a new course, "Topics in Aeronautical History."

1965
SHENG-RONG LIN, MS, of Pacific Palisades, California, has received the President's Achievement Award for engineering, one of The Aerospace Corporation's highest honors. He is director of the company's structural technology department, and received the award for his work in the thermostructural analysis of solid rocket motors.

1967
BRUCE S. HUDSON, MS '69, professor of chemistry at the University of Oregon, has returned from his second trip to Moscow, where he took part in a series of Academy of Sciences seminars as well as other discussions and consultations regarding the application of advanced technology to small business ventures. Much private-sector infrastructure development is in progress, including electronic mail, accounting, and other services. "Some of the available technology," he writes, "appears . . . worthy of development for export to the west. As this trip covered the period 15 August through 4 September, many rolls of film were shot in Red Square and at the Russian Parliament Building (the 'White House'). Two scientific colleagues who were on my seminar schedule were involved in the defense of the White House. Many strange (and scary) stories were recounted; many good friends were made. Another trip is in the planning stage."

1971
CLIFFORD M. WILL, PhD, has been appointed chairman of the physics department at Washington University, in St. Louis.

1972
PHOEBE K. DEA, PhD, professor of chemistry at California State University, Los Angeles, has been named California Professor of the Year by the Council for the Advancement and Support of Education, in Washington, D.C. The honor cites the large number of her undergraduate students who have gone on to graduate programs in science or health fields, and her efforts to encourage women and minorities to enter those professions. She has also this past year received the systemwide Outstanding Professor Award from the Trustees of the California State University.

PAUL S. ZYGIELBAUM, MS '73, received his MBA from Golden Gate University in 1987, and is currently a production section manager in the Microwave Technology Division of Hewlett-Packard. He has just completed two years as president of his synagogue, and is serving on the board of directors of the local United Way and as a member of the Sonoma County Human Services Commission. He enjoys playing golf and the piano. His wife, Michelle, is a registered nurse and works in the intensive-care nursery of the county hospital. She serves on the board of directors of the Sonoma County Diabetes Society as well, and has been active in the synagogue. Their 15-year-old son, Sam, has just entered high school, their 12-year-old daughter, Beth, has just entered junior high school, and their 10-year-old son, Josh, is in the fifth grade. Sam spent a week at Space Camp in Alabama last winter, where he acted as pilot in a simulated space-shuttle mission. In the last few years, the Zygielbaums have developed close ties with exchange students from Japan and Spain who have stayed with them. Paul and Michelle fulfilled a lifetime dream by visiting French Polynesia in 1987.

1974
JAMES M. STANA, MS, currently manager of mechanical design engineering for the LANTIRN program at Martin Marietta, has provoked a great deal of interest in a booklet he has developed. Through a paper-bridge contest, the booklet introduces gifted elementary-school students to the fundamentals of design and strength of materials. If any alumni would like more information about this teaching resource, Stana would be happy to reply if they include a self-addressed, stamped envelope. His address is 9043 Notchwood Court, Orlando FL 32825.

1977
MICHAEL WILSON, of Burlington, Vermont, is an associate professor of mathematics at the University of Vermont. He and his wife, Lori, have three sons: Philip, eleven; Tim, eight; and Tom, five.

1979
FRANCE ANNE CORDOVA, PhD, of State College, Pennsylvania, has been appointed by President Bush to serve a three-year term on the President's Committee on the National Medal of Science. She has also been appointed to the National Science Foundation's Advisory Committee for the Astronomical Sciences. Cordova is a professor in and the head of the Department of Astronomy and Astrophysics in the Eberly College of Science.

WILLIAM E. STUMPH, PhD, a professor in San Diego State University's chemistry department, married Diane K. Huber on May 26, in Houston, Texas. He met Huber while on sabbatical leave at Baylor College of Medicine. She has a Masters of Accountancy from the University of Tennessee and is controller for American Mobile Nurses, Inc. The couple particularly enjoys country-and-western and ballroom dancing. They live in San Diego, California.

OBITUARIES

1980
FRANK L. BERNSTEIN and his wife, Jane, had their first child, Hannah Frances, this past March. They have been married three years and live in Washington, D.C., where he is a patent attorney and a partner in the intellectual property law firm of Sughrue, Mion, Zinn, Macpeak & Seas. He specializes in electrical and mechanical engineering technologies.

JONATHAN A. ZINGMAN left physics several years ago and now works in image compression. He writes that he “recently acquired a new house in Oakland, CA, a new job in Berkeley at TCSI, and a new baby, Shira Ilana.”

1981
ERIK W. GUNDERSON has completed his residency training in ob/gyn at Washington University, St. Louis, and will be joining the clinical faculty at Kern Medical Center, in Bakersfield, California.

1983
SANDRA T. LOH, the performance artist, is planning her next exploit for the coming spring: a participatory traffic jam. The jam—to be called *Sigalert*—will be held on an abandoned LA freeway. In part a tribute to other staged disasters—such as the earthquake ride at Universal Studios—and in part “classical Aristotelian” drama, *Sigalert* will cost participating motorists \$20 for admission. The jam will last 20 minutes, and will end with everything from a five-car pileup to explosions and “toxic” spills.

1984
ELIZABETH A. (NEWMAN) ROBINSON writes that she and her husband, Jim, “are proud to announce the birth of their first child, Ellen Dorothy, on April 21, 1991. Jim is working as an engineer for NASA’s Lewis Research Center in Cleveland. I’m staying home as a full-time mom to Ellen.” The couple live in Richmond Heights, Ohio.

1987
MARKUS MEISTER, PhD, of Cambridge, Massachusetts, is an assistant professor in Harvard University’s department of cellular and developmental biology. He was appointed in July.

1988
IMRAN HAMEED, of Karachi, Pakistan, who previously was with Citibank operations in Pakistan, has moved to a marketing position in the corporate bank of American Express.

RAJARAM RAMESH, MS, PhD ’92, has joined the GE Research and Development Center as an electrical engineer. He and his wife, Tripura S.S. Yegnanarayanan, live in Schenectady, New York. Ramesh has completed his PhD work and will officially receive the degree in June.

BRUCE G. VALERIUS, MS, was commissioned as a second lieutenant in the U.S. Air Force on June 5 and is training as a navigator at Mather Air Force Base in Sacramento, California.

1924
WARREN B. LEAVITT, of Long Beach, California, on February 1.

SIDNEY WEINBAUM, PhD ’33, of Santa Monica, California, on September 1, after a brief illness. A portion of Dr. Weinbaum’s oral history will appear in the fall issue of *Engineering & Science* magazine.

1928
EDWIN M. MCMILLAN, MS ’29, of El Cerrito, California, on September 7. As a codiscoverer of plutonium and neptunium, he won the Nobel Prize in 1951; in 1963 he and a Soviet theorist shared an Atoms for Peace Award for a major expansion in the capacity and sophistication of particle accelerators; and, last year, he received the National Medal of Science. During World War II, McMillan worked on radar, sonar, and the atom bomb, and he headed the Lawrence Berkeley Laboratory for 15 years. He is survived by his wife, Elsie; by a daughter, Anne Chaikin; by two sons, David and Steven; and three grandchildren.

ALFRED C. NESTLE, of Pasadena, Texas, on October 27, 1990.

1930
EDWARD M. THORNDIKE, PhD, of Montrose, New York, on August 23. After receiving his degree, he remained at Caltech for a time as a postdoc, then went to Brooklyn Polytechnic Institute. He joined the physics department at Queens College of the City University of New York in 1938, where he remained until he retired in 1970. He was chairman of the department for much of his career. He was also involved in oceanographic research at Columbia University Lamont Geological Observatory from 1950 to 1980. He is survived by a son, Edward.

1931
RAYMOND A. PETERSON, PhD ’35, of Altadena, California, on September 15. A pioneer in seismic surveying, he and the late JOSHUA L. SOSKE (PhD ’35) formed the Geophysical Engineering Corporation. He later served as vice president and director of research at United Geophysical Corporation, until retiring in 1973. He is survived by his wife, Pauline; his two daughters, Dianne Glasson and Linda Tebben; his son, Lowell; and four grandchildren.

1932
THOMAS F. ANDERSON, PhD ’36, of Philadelphia, Pennsylvania, on August 11. A biophysical chemist and geneticist, he was a senior member emeritus of Fox Chase Cancer Center’s scientific staff, which he had joined in 1958, and he had been a member of the National Academy of Sciences since 1964. Internationally known for his research in the fields of virology and bacteriology and for his development of techniques using the electron microscope, Anderson was president of the International Federation of Electron Microscope Societies from 1959 to 1963. He had earlier served as president of the Electron Microscope Society of America, which honored him with its Distinguished Service Award in 1978. He was an honorary member of the French and German electron-microscope societies. Among the first to apply electron microscopy to the study of viruses, he concentrated on bacteriophages, the viruses that infect bacteria; one of his innovations was the “critical point” method of drying specimens for the electron microscope. He is survived by his wife, Wilma; their daughter, Jessie Dale Anderson; their son, Thomas F., Jr.; and three grandchildren.

WINSTON M. GOTTSCHALK, MS, of Wolfeboro, New Hampshire, on June 8. He is survived by his wife and daughter.

1934
EDGAR L. KANOUSE, MS, of Los Angeles, on August 16. He spent all his 35-year engineering career with the Los Angeles Department of Water and Power, and was general manager and chief engineer from 1967 to 1972. In addition, he served on several state and national power boards, including the Colorado River Board. He is survived by his wife, Betty, and two sons, David and Kent.

1939
NOEL W. HENDRY, MS, of Vancouver, British Columbia, on November 28, 1989.

1943
ARTHUR D. BELMONT, MS, of Minneapolis, Minnesota, on May 12. He is survived by his wife.

1946
ROBERT E. TUCKER, of Camp Connell, California, on September 29. He had retired after 34 years with US Steel. He is survived by his wife, Doris; two daughters, Roxanna Wendt and Robin King; a son, Ronald; his mother, Bessie; a brother, Ted; a sister, Dorothy Shelton; six grandchildren; and one great-grandchild.

1947
ROBERT E. CLEMENTS, ENG, of Jacksonville, Florida, on August 16, 1989. A decorated World War II naval aviator with two Distinguished Flying Crosses and three Air Medals, as well as a tally of five kills of Japanese aircraft, Clements remained in the Navy after receiving his Caltech degree. He worked in a variety of engineering and administrative slots, the last being at the Jacksonville, Florida, naval air station. He retired in 1968 with the rank of captain. He is survived by his wife, Eleanore, and two daughters.

WARREN G. KOERNER, MS, ENG ’48, of Manhattan Beach, California, on May 6. He is survived by a cousin, John Sheidel, Jr.

1950
HERBERT A. FORRESTER, of Port Townsend, Washington, on February 11.

1951
AARON J. SERIFF, PhD, of Houston, Texas, on May 23. His doctoral research involved a successful search for previously undiscovered subatomic particles, using cloud-chamber technology. After graduating, he joined Shell Development Co.’s research center in Houston, where he performed basic research in exploration seismology. He retired from Shell as a senior research associate in 1990. He also taught at Rice University for several years as an adjunct professor and served in 1973–1975 as editor of *Geophysics*, the journal of the Society of Exploration Geophysicists, which named him an honorary member. He was also an honorary member of the Geophysical Society of Houston, as well as a member of the American Physics Society, the American Geophysical Union, the American Association for the Advancement of Science, and Sigma Xi. He is survived by his daughters, Jan and Suzanne; a son-in-law, Robert Cullick; a grandson, Matthew Seriff-Cullick; a sister, Ida Belle Frank; and two brothers, Nathan and Jack.

1952
MARTIN L. SANDELL, of Glendora, California, on October 27, of a heart attack. He worked as an electrical engineer for Aerojet-Electrosystems for 20 years and was a member of the Institute of Electrical Engineers. He served in the VASA Order of America, Senior Citizens

of Glendora, Arcadia Men’s Bridge Club, and Pasadena Folk Dance Co-op. He is survived by his wife, Lyvia; sons, Tony and Greg (Elena); and a sister, Jean Hallock.

1958
EDWARD L. KREHBIEL, of El Cajon, California, on July 1. After graduating from Caltech, Krehbiel went on to receive a PhD in genetics from the University of Minnesota, in 1965. He served as a professor of business law and statistics at Grossmont College, which culminated a 26-year career at that institution. He was a life member of the Caltech Alumni Association and at one point fund-raising chairman for San Diego County. He was a member of the Elks Club and the California Bar Association, and a past president of the Heartland Chapter of the American Cancer Society. He is survived by his wife, Rosemary; a daughter, NANCY (BS ’83); a son, JOHN (BS ’84); and a daughter-in-law, CINSY (BS ’85).

Hugh Colvin dies on November 10

Hugh F. Colvin (BS ’36) died November 10 at Huntington Memorial Hospital. He was 74. He is survived by three daughters and a son, and by eight grandchildren. A memorial service will be held at 2 p.m. on December 8 in the Athenaeum.

Colvin served on the board of directors of the Caltech Alumni Association and was editor of *Engineering & Science* magazine in the early 1940s. He was president of The Caltech Associates in 1988, and was also a member of the President’s Circle. For many years he was a member of the SURF board of directors, and was active in establishing SURF fellowships. A recipient of Caltech’s Distinguished Alumnus Award, last winter he issued the \$3 million Centennial Challenge, based on matching gifts made by alumni, with the goal of increasing alumni participation in The Campaign for Caltech.

Annual Fund chairmen chosen

Continued from page 9

The Regional Chair for Region 12 - the Mid-Atlantic - is E. Ted Grinthal PHD 1969. Grinthal’s Area Chairs are: Donald H. Voet BS 1960, John L. Hokanson MS 1958, Francis E. Fairman III MS 1948, Alfred B. Brown, Jr. MS 1947, PHD 1950, Ricardo A. Bloch MS 1969, PHD 1976, Carl A. Price BS 1949, Bernard L. Mitchell MS 1956, Lim H. Cheung BS 1975, Frank R. Johnson BS 1969, John R. Golden BS 1962, Donald B. Potter PHD 1954. Region 13 - New England - is led by William F. Tivol BS 1962 for the first year. Tivol’s Area Chairs are: Robert M. Mattheyses BS 1968, MS 1969, Bernard M. Malofsky BS 1959, Bruno Harris BS 1952, Richard H. Homewood MS 1951, Jonathan A. French MS 1964, PHD 1970, Allan B. Elkowitz BS 1970, Paul A. Sand BS 1973, Donald L. Strange PHD 1972. The International Region has one Area Chair, Thomas Vrebalovich BS 1948, MS 1949, PHD 1954, serving Spain.

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In this issue



Hiroo Kanamori finds new excitement every day in his research role as director of Caltech's Seismology Laboratory.

Page 1



Gordon McClure asks volunteers in his Special Gifts II campaign to "give something back" to donors.

Page 2

Harry Gray, the Arnold O. Beckman Professor of Chemistry, talks about the creative process and how much fun it is to be a scientist.

Page 3

Big Bear Solar Observatory provided a unique viewing site for 50 alumni and friends who traveled there to watch the "eclipse of the century."

Page 6