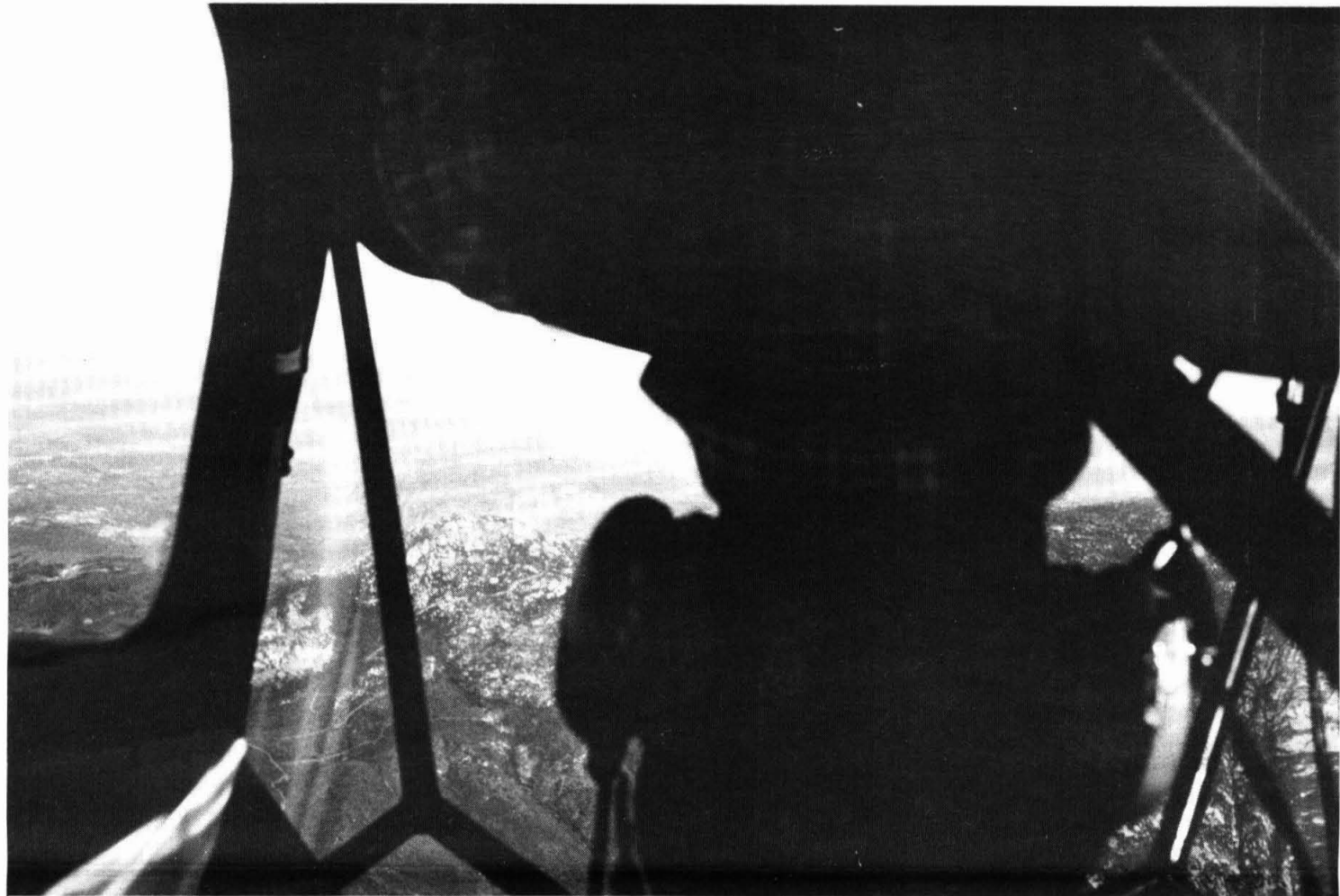


Caltech News

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Professor Chuck
Seitz practices
his aerobatics.



No fear of flying here

By Winifred Veronda

*Several
Caltech
professors
enjoy soaring
above it all
in their
private
planes. In
this issue,
they describe
the
fascination.*

Jack Beauchamp likes to fly his Cessna 172 along the beaches of Baja, soar over the Sea of Cortez and watch the whales for a while, then land in a little airport and eat a lobster burrito in a restaurant frequented by local fishermen.

British Columbia is William Dreyer's favorite flying destination. He enjoys landing his Cessna P210 on small airstrips surrounded by forests, fiords, mountains, and glaciers, unpacking his backpack and canoe, and savoring the beauty of the remote, unspoiled wilderness around him.

Fred Culick and his son (then 15) made 48 takeoffs and landings in 48 states back in 1978 on an odyssey that celebrated the history of flying. Their stops included St. Louis to look at Lindbergh memorabilia; Kittyhawk, South Carolina; Washington, D.C., to visit the country's oldest commercially operating airport; Little Falls, Minnesota, where Lindbergh was born; and Dayton, Ohio, where the Wright Brothers did their research. Altogether, they flew 8,400 miles.

Chuck Seitz prefers aerobatics, which involves precision maneuvers executed in a special plane. He can be found flying out of Fallbrook almost every weekend. "As a dancer I'm clumsy," he says, "but

strap me into a Pitts Special and I can soar as gracefully as a gymnast."

Beauchamp, Dreyer, Culick, and Seitz are four members of the Caltech faculty who find adventure as private pilots. They are joined by Hans Hornung, who learned to fly in Germany, and Rod Goodman, who started his training in earnest about a year and a half ago after several attempts in England, where "the weather is so bad that you spend most of your time on the ground, waiting for the clouds to go away." All of them are ardent spokesmen for their chosen sport. Says Dreyer, "Flying is nothing but fun."

Beauchamp, professor of chemistry, began flying three years ago. "I started taking lessons and fell in love with the experience," he says. "I've flown 70,000 miles. That's three times around the world."

Beauchamp occasionally flies his Cessna to professional meetings. One such expedition was to the University of British Columbia.

"I had my choice of flying there commercially in four or five hours, or spending a day and a half getting there in a small plane," he says. "Going the latter way was a lot more fun. I spent a night in Cottage Grove, Oregon with my tent on the grass, and watched a

fly-in of antique planes at the airstrip where I landed. Then I flew into Friday Harbor in the San Juan Islands and bicycled around the island, before flying on into Vancouver. On my way home, I stayed at Shelter Cove which is on the Oregon border, camping on cliffs overlooking the cove and eating breakfast at 5 a.m. in a little restaurant with the local fisherman. I was relaxed when I got to the meeting—and when I got home."

The Beauchamps have had a mechanic modify the frames of two mountain bikes so that they fold up and fit in the back of the airplane. They like to fly to Furnace Creek Camp in Death Valley and ride their bikes there. Of the return trip, Beauchamp says, "There's nothing more enjoyable than being snug in the cockpit and looking down at all the traffic fighting to get home on the freeway."

Beauchamp also enjoys the convenience of flying when he visits his mother in Needles, California. To drive there takes five hours, he points out, but to fly only requires an hour and 45 minutes.

"I use the plane a lot more than I thought I would," he says. "We found so many places to go and things to do. Continued on page 4

FRIENDS

Ahmed Zewail named Linus Pauling Professor

Ahmed Zewail has been named the first Linus Pauling Professor of Chemical Physics at Caltech. Zewail has pioneered the development of ultra-fast laser techniques for recording the behavior of molecules during chemical reactions. He is using these methods to record atoms in the act of breaking and forming molecular bonds—activity that occurs within extremely brief intervals of time known as femtoseconds. (One femtosecond is one millionth of a billionth of a second.) Zewail's work has enabled scientists for the first time to witness the instant of a molecule's creation and has been compared to observing the "big bang" of the universe.

Caltech established the Linus Pauling Professorship to honor the career and achievements of the two-time Nobel Laureate, who is generally acknowledged to be the greatest chemist of the twentieth century. Pauling was awarded the Nobel Prize in Chemistry in 1954 for his research on the nature of the chemical bond, and its application to the elucidation of the structure of complex substances.

Pauling earned his PhD at Caltech in 1925, and in 1926 he became a research associate. He was appointed assistant professor in 1927, associate professor in 1929, and professor in 1931. From 1936 to 1958 Pauling served as chairman of Caltech's Division of Chemistry and Chemical Engineering. He held the title of research associate from 1964 to 1971, and in 1971 he was named professor emeritus.

Zewail was born and educated in Egypt, where he received his BSc in 1967 and MS in 1969, both from Alexandria University. He earned his PhD in 1974 from the University of Pennsylvania and spent two years as an IBM Research Fellow at the University of California, Berkeley, before joining Caltech in 1976 as an assistant professor of chemical physics. He was appointed associate professor in 1978 and professor in 1982.

Zewail has received many awards and honors. Some of these include the King Faisal International Prize, one of the major international awards for achievement in the sciences; election to the National Academy of Sciences; both Sloan and Guggenheim Foundation Fellowships; the Camille and Henry Dreyfus Teacher-Scholar Award; and the American Chemical Society Buck-Whitney Medal.



Joanna (Mrs. Downie) Muir, president of The Associates, with Provost Paul Jennings and Missy Jennings at the new member dinner. Professor Jennings welcomed new members and spoke about Caltech activities in the absence of President Thomas E. Everhart, who was ill that evening.



Two generations of Associates: New members Tony Clifford (left) and Lynn Clifford (right), who were sponsored by Tony Clifford's parents, Henry and Lucetta Clifford (center).

Parsons Foundation \$1 million grant funds fellowships

Caltech has received a \$1 million grant from the Ralph M. Parsons Foundation of Los Angeles to establish the Ralph M. Parsons Foundation Fellowships in Caltech's Division of Chemistry and Chemical Engineering. The fellowships will support graduate students doing research in bioorganic and bioinorganic chemistry. The awards will be merit-based and will honor the accomplishments and potential of especially talented graduate students during their final years of study for the PhD degree.

The Ralph M. Parsons Foundation was established in 1971 by the late Ralph M. Parsons, founder of the international engineering and construction firm that bears his name. The foundation's areas of interest include higher education in engineering, science, and technology; social impact projects; and cultural and civic programs.

Luce Fund pro- vides graduate fellowships for Caltech women

The Clare Boothe Luce Fund has provided Caltech with a \$144,000 grant to support three two-year Clare Boothe Luce Graduate Fellowships for female graduate students. The grants, which will support students beginning graduate studies at Caltech in the fall, will be used by women pursuing PhD degrees in the Divisions of Physics, Mathematics and Astronomy; Chemical and Chemical Engineering; Engineering and Applied Science; or Geological and Planetary Sciences.

The Clare Boothe Luce Fund is administered by the Henry Luce Foundation, which was established in 1936 by Mrs. Luce's husband, Henry R. Luce, the late co-founder and editor-in-chief of *Time* magazine. Under the terms of Mrs. Luce's will, the Fund was created "to encourage women to enter, study, graduate, and teach" in certain scientific and technological fields in which they are underrepresented.

Anderson: first McMillan Professor

Don L. Anderson, professor of geophysics at Caltech, has been named the first Eleanor and John R. McMillan Professor. The professorship in Caltech's Division of Geological and Planetary Sciences was endowed by Institute alumnus John R. McMillan.

After becoming a research fellow at Caltech in 1962, Anderson joined the faculty the following year. Previously he had worked at Chevron Oil Company and the Geophysics Research Directorate at the Air Force Cambridge Research Center. A graduate of Rensselaer Polytechnic Institute, he earned his advanced degrees in geophysics and mathematics at Caltech.

Anderson served for 22 years as director of Caltech's Seismological Laboratory before stepping down last year. He is currently president of the 25,000-member American Geophysical Union and is a Fellow in the Geological Society of America, the American Academy of Arts and Sciences, the American Association for the Advancement of Science, the National Academy of Sciences, the Royal Astronomical Society, and the Seismological Society of America. He is also an honorary foreign fellow in the European Union of Geosciences.

Among his many awards, Anderson received the Gold Medal of the Royal Astronomical Society in 1988, the Arthur L. Day Medal from the Geological Society of America in 1987, the NASA Distinguished Scientific Achievement Award in 1977, and the Apollo Achievement Award from NASA in 1969.

Anderson holds editorial positions with four academic journals and last year published a critically acclaimed book on geophysics and geochemistry, *Theory of the Earth*.

The professorship was established primarily to honor the memory of Mrs. Eleanor McMillan, who died in 1988. The McMillans joined The Associates in 1957. Subsequently they became contributing life members and joined the President's Circle.

McMillan, who earned his BS degree in mechanical engineering from Caltech in 1931 and was awarded the Caltech Distinguished Alumni Award in 1980, served as president of The Associates from 1968 to 1970. He worked in management positions at various oil companies and was chairman and director of Reserve Oil and Gas Company until its acquisition by Getty Oil Company in 1980.

Robert Grubbs named first Atkins Professor

Robert Grubbs, professor of chemistry at Caltech, has been named the Institute's first Victor and Elizabeth Atkins Professor of Chemistry. The Atkins Chair has been established through a gift by Caltech trustee Victor Atkins, president of the San Francisco-based Atkins Company, and his wife, Elizabeth Tanner Atkins.

discipline on the Caltech campus.

Grubbs earned his BS and MS degrees from the University of Florida and his PhD degree from Columbia University. He has been a member of Caltech's faculty since 1978.

His work is in the field of synthetic polymers—a class of materials that includes plastics and many other widely used synthetic substances. Research by Grubbs has led to the creation of plastic-like substances that can conduct electricity and materials that perform other novel functions. In 1989, he was elected a member of the National Academy of Sciences.

Grubbs's other honors include the 1988 American Chemical Society Award in Organometallic Chemistry, the 1989 ACS Arthur C. Cope Scholar Award, fellowships from the Sloan and Alexander von Humboldt Foundations, and the Dreyfus Teacher-Scholar Award for outstanding teaching and research.

Victor and Elizabeth Atkins are contributing life members of The Associates and members of the President's Circle. Atkins, who was elected to Caltech's board of trustees in 1978, is also a long-time member of Caltech's Chemistry and Chemical Engineering Visiting Committee and currently serves as its chairman.

Baldeschwieler receives cancer research grant

The American Cancer Society has awarded a grant of \$160,000 to Caltech Professor of Chemistry John Baldeschwieler to carry out research into "Liposome-Mediated Tumoricidal Activation of Monocytes." The project is aimed at developing techniques to stimulate and monitor the anti-cancer activity of monocytes and macrophages—white blood cells with strong anti-tumor properties that are produced in the immune system.

Grant supports humanities fellowships

The Fletcher Jones Foundation of Los Angeles has given a grant of \$250,000 to Caltech to support the Institute's program for Postdoctoral Fellows in the Humanities.

The grant is a contribution to the \$1.5 million endowment fund that is being established by Caltech to support the postdoctoral appointments in perpetuity. Under the program, started 10 years ago to strengthen undergraduate education in the humanities, postdoctoral fellows are appointed each year to augment the teaching staff. Fellows are chosen via a nationwide search and are chosen partly on the basis of the compatibility of their research interests with those of Caltech's own humanities faculty. Appointments are for two years.

The Fletcher Jones Foundation was founded in 1969, and is named for the co-founder and CEO of Computer Sciences Corporation of El Segundo. Jones died in 1972. Since 1969 the foundation has made substantial grants to private colleges and universities, primarily in California. At Caltech, the Fletcher Jones Foundation has established a professorship and a student loan fund, and has provided support for the construction of the campus computer network.

NSF support for video project exceeds \$1 million

Caltech has received \$1,060,778 from the National Science Foundation (NSF) to support *Project MATHEMATICS!*, a nationwide effort that is producing a series of computer-animated videotapes for high school classrooms. More than 4,000 schools are using the first module, "The Theorem of Pythagoras."

A new NSF grant of \$684,325 for the year 1990 augments an earlier award of \$376,453 for the six-month period from July to December, 1989. *Project MATHEMATICS!* had earlier received funding from the Association of Computing Machinery Special Interest Group on Computer Graphics (ACM/SIGGRAPH—\$170,000), the Educational Foundation of America (\$50,000), and a \$50,000 equipment grant from the Hewlett-Packard Company.

Each *Project MATHEMATICS!* module consists of a videotape, 15 to 20 minutes in length, and a workbook

to guide students through the video, elaborating on the important ideas. The videotapes make extensive use of computer animation with color, motion, and three-dimensional images to demonstrate concepts in ways that are difficult or impossible to do in a textbook or at the chalkboard. The animations, blended with live action and stills, provide historical perspective and connections to real-world problems. Together with narration, music, and special effects, the video is intended to motivate students, enhance their intuition, and stimulate their imagination.

The project is headed by Tom M. Apostol, Caltech professor of mathematics and an internationally known author of mathematics textbooks. Codirector of the project is James F. Blinn, one of the world's leading computer animators, who is well known for his Voyager planetary flyby simulations. Blinn and Apostol worked together previously as members of the academic team that produced *The Mechanical Universe*, the award-winning physics course for television also developed at Caltech.

Project MATHEMATICS! is seen as a continuing effort in which four to six segments will be produced each year. Two modules, one on the Theorem of Pythagoras and another on the number pi, have already been finished. A third, on the concept of similarity, is currently in production. Apostol expects to complete four additional modules during the coming year.

To ensure that *Project MATHEMATICS!* will reach as many classrooms as possible, the departments of education in all 50 states have been invited to join a consortium whose members will reproduce and distribute the videotapes and written materials to public schools at cost. This consortium will also take part in the teacher training program. To date 32 states have joined the consortium, including California, New York, and Texas, the states with the largest potential audiences.

The nation's largest professional organizations of mathematics teachers—the Mathematical Association of America and the National Council of Teachers of Mathematics—have endorsed the project. Both organizations are represented on the project's National Advisory Board, and are helping to distribute *Project MATHEMATICS!* materials on a nonprofit basis to those who are not members of the consortium. The NASA Teacher Resource Center Network is also distributing both the tapes and the workbooks.

Two other organizations, the Intel Corporation and Science Screen Report, are also assisting in the distribution of videotapes. A \$40,000 grant from Intel enabled Caltech to distribute copies of "The Theorem of Pythagoras" to 2,500 high schools in California, Oregon, Arizona, and New Mexico. And Science Screen Report will be distributing free copies of this same module to each of its 1,200 subscribing high schools.



Exciting events planned for Caltech centennial

The Caltech community is gearing up for the Institute's centennial year in 1991. Many exciting activities are being planned to commemorate this occasion. The above logo will announce a regular column in *Caltech News* to provide readers up-to-date information on a potpourri of events that will mark this special year.

Here are a few highlights of current centennial plans and activities:

The Rose Parade float is in the final design stages with float builders Ollie Wright-Young and Ross Young of Charisma Floats. (A float theme was submitted by the centennial float subcommittee, after months of research, study, consultation, elimination procedures, decision making, and a theme draft).

A mechanical engineering class (ME 100) taught by Professor Joel Burdick will be offered to students who want to work on an engineering element of the float for academic credit. The class begins in April, and about 20 students have signed up to participate. This summer, seminars will be conducted on "petal pushing" for those interested in helping to decorate the float.

Individuals who have played an important role in Institute history, and significant events will be commemorated. For example, one month might feature Beno G. Gutenberg, Charles R. Richter, and Frank P. Press for the development of the Richter Scale. During the same month, a special lecture or displays might focus on modern earthquake science.

Special musical concerts throughout the year to celebrate the centennial are under consideration. A Watson lecture on the history of Caltech has been proposed, and commissioning a piece of art to commemorate Caltech's 100th anniversary is being discussed.

Student research will be the focus of a three-day SURF-Eureka national conference to be held on the campus in March, 1991. The Institute expects 1,000 undergraduates representing more than 300 colleges and universities to share their independent research with

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Faculty pilots take to the air for business, recreation



"I started taking lessons and fell in love with the experience. I've flown 70,000 miles. That's three times around the world."

Professor Jack Beauchamp

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I flew the length of the Grand Canyon before it became illegal. We left Needles, flew the canyon, stopped in Sedona for lunch, and were back in Needles for dinner. We can fly to Yosemite in a day. And there's Lake Powell; it has three airports. We can be on the lake a few hours after we leave Los Angeles."

Beauchamp also enjoys learning about the physics of flight. "I studied it after taking up flying as a hobby," he explains.

Dreyer, professor of biology, has been flying since 1960. He had wanted to fly since he was a young boy, and he learned when he was a postdoctoral fellow in the Washington, D.C. area. Dreyer flew down to Baja before there were roads, and he enjoys flying to archaeological sites in the western United States. But his favorite destinations are those remote regions in British Columbia.

Dreyer often uses his plane when he is flying to scientific collaborations or consulting appointments, often travelling with his wife, Janet Roman, also a scientist at Caltech. "It's simpler and easier for us to get around this way." Dreyer keeps the plane at the Burbank Airport.

In his flying, Dreyer soars at an altitude not approached by the majority of pilots. "I fly at 15,000 feet," he says. "Commercial airplanes fly much higher, smaller ones much lower. Maybe this open space is an allegory for my tastes in scientific research. I like to work where research isn't too competitive and crowded—to move beyond the

current mob scene, even if the place where I end up is lonely."

All in all, Dreyer thinks flying is a wonderful way to get around. "Except for the cost," he says, "Don't most people who watch an eagle take off and soar, wish they could do the same?"

Chuck Seitz, professor of computer science, has been flying since 1981. For him, the primary joy in flying comes from an extraordinary source—painting pictures in the sky as he executes complex maneuvers in a plane specially crafted for this precise activity.

The first plane that Seitz owned was a Bellanca Decathlon, an acrobatic plane crafted to be flown in air shows, with its third wheel under its tail instead of its nose. To illustrate the type of flying this plane is constructed to do, Seitz displays a photograph, taken from the rear, with him in the cockpit and the horizon upside down.

"These planes aren't for taking people on rides," Seitz remarks. "Being a passenger in one of them isn't a lot of fun. You really feel out of control."

After one has started doing acrobatic flying, the next step is to enter competitions, Seitz continues. "The competitions are scored much like gymnastics, and the emphasis is on precision." He explains that this type of flying is done only over unpopulated areas. He often flies in acrobatic meets over the Borrego Springs area, south of Palm Springs.

Seitz sold his first plane and has bought a wrecked Pitts Special that he is having rebuilt by a friend. The end result will have new wings, fuselage,

and engine.

For traveling, Seitz rents a plane, enjoying the fact that he can arrive in a destination in a quarter of the time it would take him to drive there. "Flying cross-country is very relaxing," he says. "Once you get outside of the Los Angeles basin, it's very rare to see another plane."

"The Southwest is very beautiful to study from above the ground. The contrasts are wonderful. From a small plane you get a view that you don't get from a car or a commercial airplane. For example, flying from Las Vegas to San Diego, you can see people skiing at Big Bear. You can see houses, boats on the lakes, a construction company grading, and the precision of its work contrasted with the irregular terrain around it."

All in all, says Seitz, "If you've got itchy feet, flying is a good way to satisfy the itch. Much of what I do at Caltech involves long-term projects—projects that may extend over a decade. When I fly aerobatics, many of my maneuvers end up with my plane pointed straight at the ground. It's refreshing to have some experiences where it matters a great deal what I do during the next several seconds."

Rod Goodman, associate professor of electrical engineering, began his training as a pilot about a year and a half ago. "You can get your license in about 60 hours," he explains. "It depends on how often you fly. I'm not that interested in getting my license in a hurry, so I don't fly every week."

"I used to live in England, and I

started flying there several times, but the weather was so bad that I spent most of my time sitting on the ground. So I had a few abortive starts, but I never continued with my instruction. Besides, lessons there are much more expensive than in the United States."

Goodman says he was attracted to flying as an individual sport. "I wanted to learn another skill," he says, "and I like sports that involve machines. Of those sports, flying is the most demanding."

Goodman says he doesn't plan to buy a plane after getting a license. "If you buy a plane, then you have a big investment in it," he says. "If you can afford to use it a lot, that's fine, but I doubt that I could use one economically. I don't plan to use a plane in my work. I'll use one the way I would take a boat for a sail over to Catalina."

Hans Hornung, the Clarence L. Johnson Professor of Aeronautics, and director of GALTIT, learned to fly in Germany in 1983. It is rumored that he checked out the flying potentials in southern California when Caltech was interviewing him for a job. At the present, he is flying on a U.S. license based on his possession of a German license. He finds better flying weather and lower flying costs in the United States—costs that are lower by a factor of two or three.

"It's more dangerous to fly in Germany because the weather is so unreliable that you can never plan more than two or three hours ahead," he says. "There's also a lot more restricted air

space. I was flying near East Germany, and I had to make a flight plan each time I flew out of the airport."

Horning flew "for fun" during the winter of 1987-88, sampling the area from Rancho California to Big Bear to Palm Springs, and up to Apple Valley, but has not flown recently. He doesn't plan to buy a plane. "Owning one is not really practical for me," he says.

Fred Culick, professor of mechanical engineering and jet propulsion, was a charter member of the Caltech Flying Club in 1966. "I think there were six of us," he says. "There was a program called the Bates Foundation at Harvey Mudd—an endowed flying program that provided scholarships for Harvey Mudd students. The foundation agreed to provide us with a training program during the summer, using our airplane but their syllabus."

Caltech people had recently purchased their own plane. It cost \$10 an hour to fly in those days, and \$5 for an instructor. Now, an instructor charges about \$25, Culick notes. The plane itself cost \$7,500, and the students took out a mortgage to pay for it.

"It cost me \$800 to get a license, with more than 60 hours of flying," says Culick. "It was a good program."

A little later, Culick bought a half interest in a Cessna 182, and owned his half until the partner moved away and sold the plane. After that, Culick entered into partnership with two men who owned a Cessna 205. This relationship continued until the plane was destroyed three years later in a monsoon in Mexico. To replace it, they bought a six-passenger Cessna 206, and Culick retained his share until 1985, when he broke his leg playing ice hockey and could no longer pull the plane around on the ground. Since then his flying has been curtailed, but now he's interested in another partnership and ready to get into the air again.

Culick believes partnership in plane ownership is "the way to go. The last partnership worked out very well for me," he says. "The plane was virtually always available, so I practically owned it for 20 years. There's a rough rule of thumb that if you fly more than 300 hours a year it's better to own than to rent, so if you have two partners who fly more than 100 hours a year, you come out in good pretty shape."

He says he's been interested in planes for as long as he can remember. "That interest is what led me to my career. From the time I was four or five I was obsessed with planes. There was never any doubt in my mind that I would study aeronautics. I would have flown earlier but I didn't have the money or the opportunity."

The aeronautical engineer says that what he enjoys most about flying is "moving about in three dimensions," and he adds that "I think flying is the very best way to see the country." Besides that, "It's also been fun to develop the necessary skills to fly. There's a discipline in having to make careful decisions that's satisfying during long cross-country trips."

Besides conventional flying, Culick has done some soaring—"which I like very much"—and some aerobatics. But he notes that "if you're going to do aerobatics you have to invest a lot of time in maintaining your skills, and I find that difficult."

Besides his 48-state trip with his son, Culick has had many good flying trips with his family—Mrs. Culick, two daughters and his son. The entire family flew to the East Coast in 1972, 1976, and 1981.

The Caltech faculty pilots agree that, when maintenance is handled with care and attention, flying is as safe as driving. But there's disagreement over the advantages of owning one's own plane and maintaining it, or renting and having the plane maintained by a reliable mechanic.

"When you rent there are safety hazards," says Beauchamp. "If you own your own plane, you can maintain it the way you want. The instrumentation on my plane is more reliable than that on most 747s. I feel very safe when I fly." Beauchamp quickly got his instrument rating, which means he's qualified to fly by instruments alone.

Dreyer believes that "flying is 10 times safer per mile than driving if you're close to commercial pilot skills." He also has his instrument rating, and says that "you should fly as often as possible to keep up your competence."

Seitz feels that, for safety, flying in a private plane is about on a par with driving an automobile—providing the pilot checks his craft carefully. "More than half of the engine-out accidents are due to running out of fuel," he says. "There's a saying among private pilots: 'In God we trust. We check everything else.'"

Seitz started his instrument training through the Caltech flying club almost as soon as he earned his private license, and received his instrument rating five months later.

Goodman is a member of a club that flies out of Burbank Airport. "If I'm going to fly, I want to know that the plane is safe," he says. "The mechanics in the club perform excellent maintenance and the planes are used every day. People squawk loudly about any defects."

Goodman believes flying is "safe if you make it safe. You make it safe by becoming a good pilot—a pilot who knows exactly what his own limitations are, who is aware of the weather, and who is conscious of people out there who are not good pilots and don't use standard procedures."

Hornung agrees that "except for really unusual traffic situations, the danger element in flying resides with the pilot. When someone is killed flying a private plane, it was probably the person's own fault."

Culick likes the idea of owning his own plane, because then "I know how it's maintained and flown!" Culick has never gotten an instrument rating because "I've always been willing to stay on the ground when the weather was bad. I've only been canceled a few

times because of the weather. I wouldn't get an instrument rating unless I was ready to practice several hours a month flying on instruments, and I've not wanted to commit to that." However, he adds, "I've done a lot of instrument flying with an instructor, so I can certainly fly on instruments if I need to."

All the pilots agree that the Los Angeles basin provides a tough test of flying skills. "If you learn to fly here, you've learned to cope with complex air space," says Beauchamp. "Anything else is a piece of cake."

From remote valleys in British Columbia to the beaches of Baja to Needles on a family visit to a consulting job in Phoenix to aerobatics over the desert—these six faculty members are enjoying the pleasures of a demanding sport that takes them away from the routines of daily schedules. They're enthusiastic advocates for flying as a prime part of life.

Exciting events planned for Caltech centennial

Continued from page 3

members of the Caltech community. Research topics will be in science, engineering, the humanities, music, dance, and art. Some students will give oral presentations and others will present exhibits and answer questions about them.

The Alumni Association will host an all-class reunion, scheduled for the weekend of May 17-20, 1991. The centennial weekend will feature a variety of activities to welcome alumni back to campus, including class receptions and dinners, Seminar Day, campus tours, lab tours, the Glee Clubs' annual home concert, and other special events.

Centennial memorabilia are being developed, some of which should be ready for purchase in time for Seminar Day 1990.

Harry Gray receives AIC honor

Harry Gray, the Arnold O. Beckman Professor of Chemistry and director of Caltech's Beckman Institute, has been selected to receive the 1990 Gold Medal of the American Institute of Chemists. Gray will be presented the medal on May 19, when he will speak on "A 2020 Vision of Chemistry."

President Everhart honored

President Thomas E. Everhart has been awarded an honorary Doctor of Law degree by Illinois Wesleyan University. The degree was conferred at Illinois Wesleyan's Founders' Day Convocation in February. Dr. Everhart spoke at the convocation on the role of the computer as a part of modern learning.

JPL director to retire

Lew Allen, who has been Caltech vice president and director of the Jet Propulsion Laboratory since 1982, plans to retire on September 30, 1990.

The board of trustees has established a search committee for a new JPL director, which will be chaired by Caltech trustee Robert Anderson, chairman emeritus of Rockwell International Corporation. Also serving on the committee are Richard M. Ferry, president of Korn/Ferry International and a Caltech trustee; Albert D. Wheelon, retired chairman and chief executive officer of Hughes Aircraft Company and also a Caltech trustee; David W. Morrisroe, vice president for business and finance and Caltech treasurer; Arden L. Albee, professor of geology and dean of graduate studies; Fred E. C. Culick, professor of mechanical engineering and jet propulsion; and Duane F. Dipprey, assistant laboratory director at JPL.

Allen's tenure at JPL saw the successful completion of the Infrared Astronomical Satellite (IRAS) mission in 1982-83 and the Voyager 2 encounters with Uranus (1986) and Neptune (1989). And under his directorship two new missions have been launched recently—the Magellan spacecraft to Venus and the Galileo mission to Jupiter. Another significant development has been the establishment of the Center for Space Microelectronics Technology at JPL. "The last eight years at JPL have been marked by a spirit of resiliency, and the last year has been hugely successful," said Caltech President Thomas E. Everhart. "We are indebted to Lew Allen for his leadership."

Associates choose new board members

Five new members have been elected to the Board of Directors of The Associates. They are: Laurence K. Gould (BS '33), Millard W. Jacobs (BS '40), Elizabeth Loucks Samson, George F. Smith (BS '44, MS '48, PhD '52), and Hugh T. Smith.

By Winifred Veronda

Harold Hubbard (Ex '20) is probably the oldest working reporter in California, and that's a distinction he's not preparing to relinquish. As a staff member of the *Pasadena Star-News*, the 90-year-old newspaperman is having too much fun writing columns and features and traveling four weeks a year to far-off destinations to think about retiring.

Hubbard joined the *Star-News* staff at the mature age of 74, after a stint as managing editor of the short-lived *Pasadena Union*. Before that stretched a 46-year career with the *Hollywood Citizen-News*, where Hubbard was city editor and then managing editor. The paper folded in 1969, when Hubbard was 70, but he had no thoughts of retiring then. He searched the southern California area for another position, and started the job with the *Pasadena Union* on the day his unemployment insurance ran out.

The soft-spoken, rather low-key Hubbard wears a three-piece suit and looks more like a banker than a journalist. He takes pride in the fact that his blood pressure is still what it was when he was 30—120 over 70—and in walking up three flights of stairs to the city room several times a day. "He doesn't huff and puff on the stairs," said one coworker, "though I do."

Hubbard was born in Pasadena in 1899 and moved soon afterward with his family to Buena Park. He went to grammar school for a time in Long Beach but finished in a little town called Acton, on the way to Palmdale, where his father had bought a ranch. In 1913 his father sold the ranch, and the family moved to San Fernando so that Hubbard could go to high school. San Fernando boasted one of the two high schools in the San Fernando Valley in those days, the other being in Burbank. In between stretched miles of bean fields and other croplands. Hubbard's father worked as a painting contractor in San Fernando and later as the superintendent of streets.

Hubbard's mother grew up in Pasadena, in a little house on Orange Grove Boulevard, and there she heard of Throop Institute, a school that taught its students to work with their hands as well as their minds, and she liked that concept for her son's education. Although times had changed at the little campus on California Boulevard, Hubbard enrolled there in 1918, under a special Student Army Training Corps program to train officers to serve in World War I.

Hubbard slept on a cot in Throop Hall, part of which had been converted into dormitories. He remembers taking his turn serving as an orderly during the great flu epidemic of 1918, when nurses were summoned to the building to help take care of the sick. Fortunately, Hubbard recalls, all of the students survived.

The war ended earlier than the U.S. government expected—only three



California's oldest working reporter tells his story

months after Hubbard had enrolled at Tech—and with it the training corps program. Gone were the days of doing sitting-up exercises on San Pasqual, and digging trenches in front of Throop. Hubbard, who now had to make it on his own financially, moved out of Throop and into his uncle's home on Fair Oaks in Pasadena.

Millikan had just come to Throop Institute, and was beginning to make his mark. He argued that students at the institution would be future leaders of the country, and that they must have a good general education in addition to their work in science and engineering courses. Thus Hubbard took a generous number of liberal-arts courses, which served him well when he decided that what he really wanted to do was be a newspaperman.

After two years at Tech, Hubbard transferred to USC, where he took a liberal arts major. Newspaper jobs were scarce when he graduated in 1922, but in two years he landed a job as a cub reporter for the *Hollywood Citizen-News* for \$19 a week.

"That was a low salary, but not exceptionally low," says Hubbard. "You have to remember that in those days a Chevrolet 490 cost \$490, and a Model T could be had for \$365."

The *Citizen-News* took Hubbard on trial, and never told him he had a permanent job. But the paychecks kept on coming, and his salary was soon raised to \$20. In 1927, he was made city editor, and his salary was raised to a munificent \$50 a week.

"It was common thinking at the time that when a man made \$50 a week he was well enough off to marry," says Hubbard, "and I had someone picked

out. A girl in circulation named Alma had caught my eye. We were married in 1928 and celebrated our 61st anniversary last June." Hubbard eventually went on to serve as news editor and managing editor of the paper.

Hollywood was a good place to live in those days, says Hubbard, a community town full of pleasant, congenial people, a good town in which to raise two daughters. Hollywood might be the motion-picture capital of the world, but it hadn't lost its rural roots. There were Basque sheepherders in the hills above the city, and there were still laws on the books that made it illegal to drive more than 300 sheep down Prospect Drive at any one time.

Those were the days when you could encounter stars shopping in the local Broadway, when you could see Charlie Chaplin and Paulette Goddard walking down Hollywood Boulevard, hand in hand, and when the *Citizen-News* mail at Christmas time was full of cards from celebrities. They were times when Hubbard's two young daughters were invited to birthday parties for Shirley Temple on the Twentieth-Century Fox lot, when Hubbard was invited to parties on the lavish sets of Hollywood musicals, and when the Academy Awards were dinners where Will Rogers was master of ceremonies and members of the press mingled with the stars at the tables.

The movie capital was part of Hubbard's beat, and he reminisces about an interview with singer-actor Nelson Eddy. He also remembers covering a press conference at which Douglas Fairbanks, Sr. announced the formation of the Academy of Motion Pictures Arts and Sciences.

In its heyday, the *Citizen-News* had more readers in the industry than the two trade papers combined, says Hubbard. This was due in large measure to the fact that the paper ran casting news with details of when and where to go to try for parts.

Judge Harlan G. Palmer was the *Citizen-News* editor and publisher until his death in the 1950s. Hubbard recalls the time Palmer was so angered when Charlie Chaplin fathered a child out of wedlock and sent the mother out of town with a pittance that he continued to write about the incident in the paper until Chaplin capitulated and increased his child support.

Hubbard also recalls the paper's policy: When someone is in trouble, before doing a story consider whether it will do enough good for the public to outweigh the damage to the individual. Hubbard continues to follow that dictum to this day.

Hubbard clearly loved Hollywood, despite his own rather straight-laced nature. Of the stars, he says, "I had a lot of fun watching their antics."

But the fun ended in 1969, as a new era in Hubbard's life began. This one has been a lot of fun, too. Hubbard has made so many contacts in the Pasadena area that he has become a kind of one-man coordinating center for people and organizations with complementary needs. He is often asked to ferret out a local resource.

One recent occasion when he met with failure came when a casting director asked him to find a 100-year-old man with a son in his 70s, to be featured in the "It's not your father's Oldsmobile" series of television commercials. Hubbard knew a 100-year-old man who fit the bill perfectly, but the man didn't have a 70-year-old son.

As a result of Hubbard's articles and community service, he has accumulated dozens of awards, plaques, and resolutions from groups ranging from the Pasadena Arts Council to the State Senate and Assembly. Senior citizen groups in Pasadena and Altadena, as well as the *Star-News* staff, threw him surprise parties on his 90th birthday.

Hubbard has few guesses for the reason for his longevity and good health. His doctor, who can find no reason to give him medicine, simply says, "Whatever you're doing, keep it up." "So that's what I do," Hubbard says.

Of course, those month-long trips add zest to life. This year Hubbard and Alma, 85, are planning to visit Spain, Portugal, Morocco, Normandy, and Brittany. "Having something interesting to do and the excitement of looking forward to a trip gives me a good excuse to keep on living," he remarks.

Hubbard adds with emphasis that he has no plans to retire. "I want to keep on doing something that gives me a chance to use my talents and a reason to get up in the morning," he comments. "I want something rewarding to do."

There is one clue to Hubbard's long life that he hastens to mention.

"I've been very lucky," he says. "My lady takes good care of me."

62-year-old confirmed bachelor Earnest Watson surprised everyone by returning from Europe a married man.

By Laura Marcus

As Mrs. Earnest C. Watson, Jane Werner Watson has one of the best-known names associated with Caltech's history. But, in addition to the connection with her husband's professional attainments, she is also responsible for bringing Caltech one of its most famous romances.

Earnest Watson joined the Caltech faculty in 1919 as assistant professor of physics, eventually becoming such a mainstay of the Institute that the Earnest C. Watson lectures were named in his honor. Serving Caltech for over 40 years, he was for 14 years dean of the faculty, and was at one time acting president of the Institute.

In 1954, after 35 years at the Institute, Watson, 62 years old and a bachelor, took his first sabbatical and headed by cruise ship for the Arab countries of the Middle East, in pursuit of his intense interest in the history of science. By chance, joining the cruise briefly in Cairo was Miss Jane Werner, a professional writer based in New York who was on her way to Greece to do research for a children's edition of the *Iliad and Odyssey*. She and the Caltech professor met during the cruise's week-long shore trip to Baghdad, Damascus, and then-beautiful Beirut. After two weeks back on the ship, however, Jane Werner left the cruise, as planned, for her stay in Greece.

Before Jane returned to New York, she and Earnest rendezvoused briefly in London, and rather soon decided to be married before Earnest's return to the States. Since they both were Presbyterians, they chose to be married in Scotland, and were pleased that Mrs. Albert Ruddock (wife of the chairman of Caltech's Board of Trustees) could recommend a suitable village church, complete with a nearby castle for their headquarters.

News of their approaching marriage startled the unsuspecting Caltech community, which had said good-bye to a presumably confirmed bachelor, and was absolutely agog at the prospect of welcoming his bride.

Of the Watsons' arrival at Caltech, where they settled temporarily in a suite at the Athenaeum, Mrs. Horace Gilbert has said, "Everyone was very eager to meet her. And, of course, we found her



Jane and Earnest Watson at the Parthenon, Athens, in June, 1956.

A lady of romance and adventure

to be a delightful person."

Sitting in her Santa Barbara living room one spring day, Mrs. Watson recalled that first round of parties. "I had never been the center of so much attention. I decided I was not going to panic about remembering names, but I tried to remember a few from each occasion. Everyone was lovely to me, and I gradually became acquainted."

So well, in fact, that she was asked to be President of the Caltech Women's Club for 1958-59.

"Oh, that was just a token of respect for Earnest," she said. "I was not a distinguished president."

As an author, however, Jane Werner Watson has definitely had a distinguished career, with more than 200 books for children to her credit—including that fateful *Iliad and Odyssey*.

While an undergraduate at the University of Wisconsin, Jane Werner had wanted to major in psychology, but felt—in those Depression days—that a BA in English would provide a safer route to a job. Upon graduation, she taught for a year, and then started working as an editorial assistant with Whitman Publishing Company (later renamed Western) in Racine, Wisconsin.

Many years of editing and writing have followed. In addition to using her own name, Jane Werner Watson has employed the pseudonyms Annie North

Bedford, Monica Hill, Elsa Ruth Nast (her mother's maiden name was Elsa Nast, her sister's Ruth), and W. K. Janner.

Books she has written or edited include: *The Giant Golden Bible, History of the World, Geography, Dinosaurs, Whales, My First Golden Encyclopedia, Alternate Energy Sources, Conservation of Energy, and Sciences of Mankind*. Mrs. Watson credits her husband with giving her the courage to tackle subjects in science—particularly *The World of Science*, which was based directly on interviews with Caltech faculty here in the late 1950s. It was very successful, selling in the hundreds of thousands, and was translated into more than ten languages—including Serbo-Croatian. Her more than one hundred Little Golden Books range from *Birds* (still popular after more than 30 years) to *My First Book About God* and *The Marvelous Merry-Go-Round*.

"I consider myself a Renaissance woman—at a ten-year-old level—because I have done widely varied research up to that level," says the prolific author. Actually, Mrs. Watson's audience ranges from pre-schoolers through high-school students—not to mention parents and grandparents.

Upon Earnest Watson's retirement in 1959 (celebrated by Professor Kent Clark's musical comedy "The Impor-

rance of Being Earnest,") the Watsons went to India. From 1960 through 1962, Earnest served as scientific attache to the American Embassy in New Delhi. His principal assignment was to become acquainted with what was going on in science in India. He also traveled on special projects to other countries in the region.

Mrs. Watson usually accompanied her husband on his visits to the far-flung scientific laboratories in India. "I became accustomed to being the most beautiful woman in the room—because there weren't any other women present," Jane recalls.

An exception occurred when Arnold Beckman went to India and was taken by Watson to visit a laboratory in the Punjab, where both of the Watsons had been earlier. On this occasion, however, Jane did not accompany the men, and was embarrassed to learn that, in anticipation of her coming, the Indian senior scientists had invited their wives to the luncheon.

Soon after their arrival in New Delhi, Jane began studying Hindi with a young woman lawyer as tutor. The basic knowledge of the language she acquired proved to be of practical help. "On long drives I could often read road signs faster than the driver, because he was watching out for camels, bicycles, and other traffic. And if we were out in a village area, I could carry on a very simple conversation with people."

While living in India, Jane began a series of picture books for beginning readers, which were published in Delhi and translated into most of India's 15 official languages. To make them available to village children, they were priced as low in rupees as Little Golden Books had originally been in the U.S.—twenty-five cents. When the Watsons returned to the States, Jane used much of that material, with illustrations by Indian painters (with whom the Watsons had become acquainted while collecting Indian paintings) in the first of 14 books about life today in other countries.

Soon after the Watsons returned to California, Earnest began working as a consultant for the Ford Foundation, a job which took the couple back to India for several stays of two to three months. In addition, they traveled extensively to other countries, often on behalf of Jane's series on other lands. These travels continued until Watson's death in December 1970 closed that chapter.

At 74, Mrs. Watson is still an enthusiastic traveler. But when at home in Santa Barbara, she busies herself with the meetings of the several boards on which she sits, and, under the Continuing Education program, gives slide talks on various cultures. And she manages a bit of writing. In fact, she is currently negotiating with a publisher about her just completed book, *World in Danger: Too Many People*.

This article by Laura Marcus appeared in the Caltech publication. On Campus.

Evaluating a Caltech education

Members of the class of 1987 have been in the working world long enough to have gained insight into the value of their Caltech educations. For this issue of *Caltech News*, we asked five class members to give their views on what their Caltech educations have meant to them.

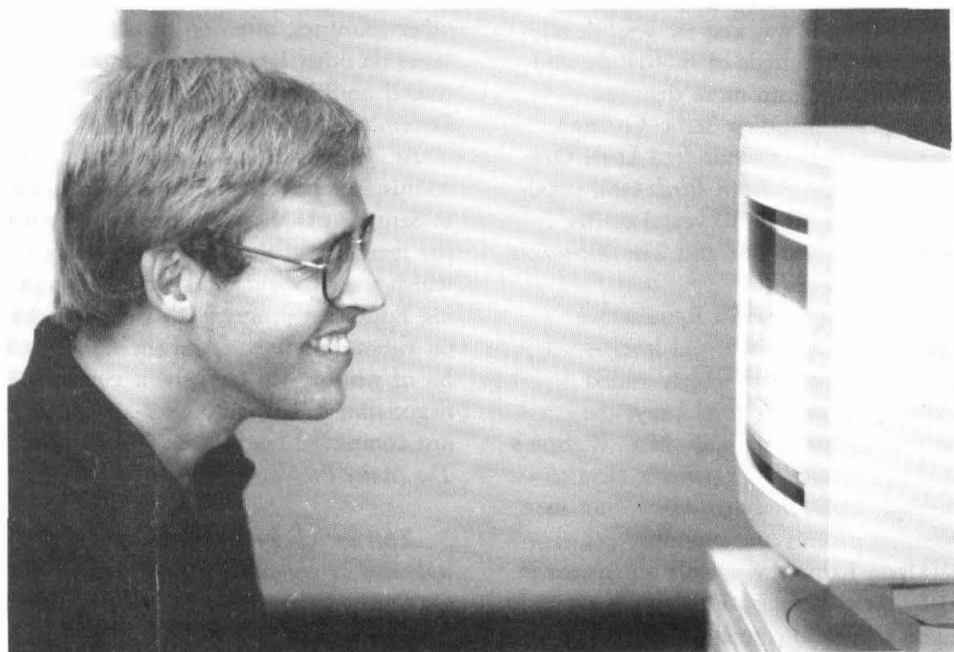
Janet Boley

Janet Boley graduated with a degree in geophysics and worked for the geology division for two years. She is now a graduate student at the University of Oregon.

I find that my Caltech education has served me well in several different ways. As might be expected, it has given me an advantage in both seeking employment and entering graduate school. However, I feel that the most important

Assessing the value of a Caltech education takes perspective. Members of the class of 1987 have that perspective.

Rob Fätland learned to say, "I don't understand."



element of my Caltech education was embodied in a simple but fundamental idea: you can (usually) solve any problem if you only try. This idea has influenced my approach to many situations, from the highly complex to the mundane. Whether I am troubleshooting computer software and hardware in the laboratory, fixing a broken oven door at home, or solving a complex problem in crystal field theory, I treat each as a challenge, and don't give up until I have exhausted all possible solutions. I consider this idea to be the most valuable lesson I learned at Caltech, and the one which has most influenced my life since I graduated.

Randy Brown

Randy Brown earned his degree in electrical engineering and worked at JPL as a hardware designer on advantaged designed and debugged high-speed digital hardware. He is now in a graduate program in electrical engineering at Stanford.

I may be the only person on this page to tell you about the valuable Caltech education I received outside the classroom. I'm not talking about grueling homework sets or research opportunities (although those are both very nice), but about clubs and varsity sports teams and student committees.

There were several activities at Caltech that taught me a lot. For example, varsity sports. While it must be very exciting to watch your school team compete on national TV, it is actually more exciting to be a *member* of the team,

even in a game no one comes to see. It's valuable for the student to learn discipline and build self-confidence (as well as a healthy body). For most student athletes (including myself), varsity experience is only possible at a smaller, nonrecruiting school.

I tell everyone how valuable my term on the Undergraduate Admissions Committee was. It was not a position to be taken lightly, because if I interviewed and did not recommend a particular applicant, that person had very little chance of being admitted. Also, I knew the students and schools I visited judged Caltech by my actions, and I learned to give a professional impression of myself and my office.

But perhaps my most valuable experience was a two-year stint as head coach of the women's water polo team, because I dealt with so many people on so many levels. I learned to objectively assess abilities and attitudes of my own friends (who became merely team members when they entered the pool). It was necessary to stop being a friend and to assert myself as an authority figure to people who were my age or older.

Not everyone at Caltech samples these experiences (or even wants to), but these and similar opportunities exist. If a student is willing to tear himself from his studies, he can learn to meet peers with confidence and authority.

Rob Fätland

Rob Fätland earned his Caltech degree in physics. He has been working at JPL in radar digital signal processing.

Undergraduate life at Caltech was for me depressingly hard work, and in retrospect, I believe that ego and the prestige of the school motivated me to stick it out through graduation despite the many factors that otherwise would have compelled me to change course and leave. Yet my time spent there was never dull, and I still hold mixed feel-

ings regarding what my Caltech education has done for me.

Rather than elaborate on the benefits (which are many), or on the negative aspects (which are also many), of such an education, I will relate a brief event. When I was a freshman I took the required chemistry class, taught at the time by a brilliant and enthusiastic and amusing professor. It was his aim to teach us in our very first term some intuitive quantum mechanics, so that we would gain some fundamental understanding of the nature of atoms and molecular bonding. Needless to say, we were at once amazed and delighted at this deluge of arcane and completely alien quantum theory which the professor espoused with expansive gestures and huge multicolored chalk diagrams. Almost the entire freshman class, about 160 of us, sat and listened in fascination to his lectures in Baxter Lecture Hall.

Unfortunately, the majority of us, including myself, also didn't understand a word. We left the lectures *feeling* as if we had understood, or as if there was something there that was just outside of our grasp. But the school had already worked its magic upon us, and we turned this embarrassed lack of comprehension back on ourselves, feeling inadequate and stupid not to be able to understand the professor's words. There was grumbling and murmuring and fervent discussion, but two days later back in the lecture hall we would all fall silent as the new lesson began to unfold.

We tried to work through various channels, talking to our TAs and doing homework problems, but the confusion persisted. As I recall, this state continued for several weeks. Then, at the beginning of one lecture, the professor asked, as was his custom, if there were any questions. Normally we were particularly silent at this point, but a girl raised her hand amid the nervous silence and said words to this effect, "Look, I've been studying this material very hard, reading the notes, and trying to do the problems, but I think that it is extremely difficult to understand, and I



Randy Brown learned a lot outside the classroom.

don't feel that I am learning anything, and I think that the material is presented in a very unclear way. I think there are a lot of people in this class who are of the same opinion, and I think you should do something about it, and I would like to know what you are going to do."

So I would like to say that at Caltech I learned to emulate her example, and try to say "I don't understand" as often as I could. It is such a difficult thing to do—I don't know how she did it then—but I feel it is also important by virtue of it being so difficult. Almost all of the time I was in school, nobody asked questions in class.

Chris Schofield

Chris Schofield earned his Caltech degree in engineering and applied science, and worked in technical sales with Exxon USA. He is studying for an MBA at the Amos Tuck School of Business Administration, Dartmouth.

Although I graduated from Caltech only two years ago, I already feel that my degree has done much for me. I feel that my education contributed considerably to both my job success and my admission to business school, and I am certain that it will continue to be a significant factor in my future successes.

My Caltech degree was in engineering and applied science, concentrating primarily on mechanical engineering, although I took a number of courses in other engineering disciplines. The flexibility of the E&AS degree was perfect for my needs because it allowed me to acquire a solid engineering degree without becoming too specialized. In my recent sales position, this foundation enabled me to quickly understand not only my company's business, but also my customers' businesses. In addition to this background knowledge, the speed at which I pick up new concepts

also comes from a valuable lesson I learned at Caltech: If I don't understand something all I need to do is pick up a book and learn it. I feel that my broad background will also allow me flexibility in choosing the company and industry I will work for when I graduate from business school.

Because my career goals are more focused on business than on engineering, I'm often asked why I attended Caltech. I wanted to get my undergraduate degree in engineering, and I decided on Caltech because of the Institute's excellent reputation. I feel that outstanding credentials, such as a degree from Caltech, are valuable because they can't be taken away. Also, regardless of the position I apply for, my educational background, and thus my résumé, stand out because of my degree. This alone can create opportunities that otherwise might not exist.

My career goals may be unusual for a Caltech graduate, but I have received as much from my Caltech education as those who are pursuing advanced degrees or engineering careers. I am also confident that my education will continue to pay off as my career progresses.

Joe Wirtley

Joe Wirtley has been working in Caltech's student affairs office, doing personal computer data-base programming. He recently left for Ohio with plans to find a job in the Cincinnati area. He earned his Caltech degree in chemical engineering.

It is difficult to describe the value of my Caltech education. Primarily, I learned how to analyze and solve problems. I learned how to feel comfortable in the conceptual realm; how to abstract the specific and how to apply the abstract to the specific. I learned to use the resources available to me—my text-

books, professors, and colleagues. Finally, I learned that, when all else fails, I can often start from "first principles" and derive a solution to a problem.

Because of this powerful set of problem-solving tools, I am confident when I face new situations. Tasks that would have seemed unsolvable before Caltech, now appear to be manageable.

Since I graduated with a BS in chemical engineering, I've been a PC data-base programmer with student affairs at Caltech. The most difficult part of designing data-base applications is creating the correct data structure. Because of my Caltech training, I am comfortable looking at office procedures and trying to create a data set that will not only produce the currently needed form letters and reports, but will provide more information and better organization. I often create new capabilities and statistics which profoundly affect office procedures.

Some less apparent aspects of my Caltech education are no less valuable to me. Caltech provided an environment where I could be serious about science and technology, yet not give up my interest in the humanities. I was able to participate in an outstanding instrumental music program. I was able to take courses in literature, philosophy, art, and anthropology. Most importantly, I was able to meet a group of people who had the same interests and abilities as I had.

In spite of the tremendous cost, in money and effort, I would do it all again.

Hypersonic tunnel to get second wind

Once the most sophisticated high-speed wind tunnel in the US, the hypersonic facility in Guggenheim Laboratory is now considered obsolete and has been removed to make way for a new lab. The old tunnel will have a new home, however, at the Chung Cheng Institute of Technology in Taiwan. Staff members from CCIT helped Caltech personnel dismantle the massive wind tunnel, which occupied part of two floors in the basement of Guggenheim.

Constructed in 1946-47 for the Army Ordnance Department, the tunnel was capable of producing airspeeds of Mach 10 (ten times faster than the speed of sound) and sustaining the blast continuously for any length of time. The hypersonic facility made it possible to test designs of rockets, planes, and missiles at far greater speeds than had been previously possible.

Dismantling the wind tunnel wasn't a breeze. A 12-foot-long reserve air tank, weighing six tons, had to be removed, along with many feet of pipe, most of it cast iron.

SPORTS

Basketball

The 1989-90 basketball program took a giant step forward by being readmitted to the varsity division of the SCIAC Conference. Consequently, Caltech fielded both varsity and junior varsity teams for the first time in recent history. A total of 16 students received extensive playing time and established a solid foundation for the future of the program.

The Beavers' practice season was extremely tough, because the team hosted several Eastern NCAA Division III powerhouses. The SCIAC Conference season proved equally demanding, and left the Beavers with a 2-20 overall record. In spite of this, the team was surprisingly competitive, and represented Caltech extremely well.

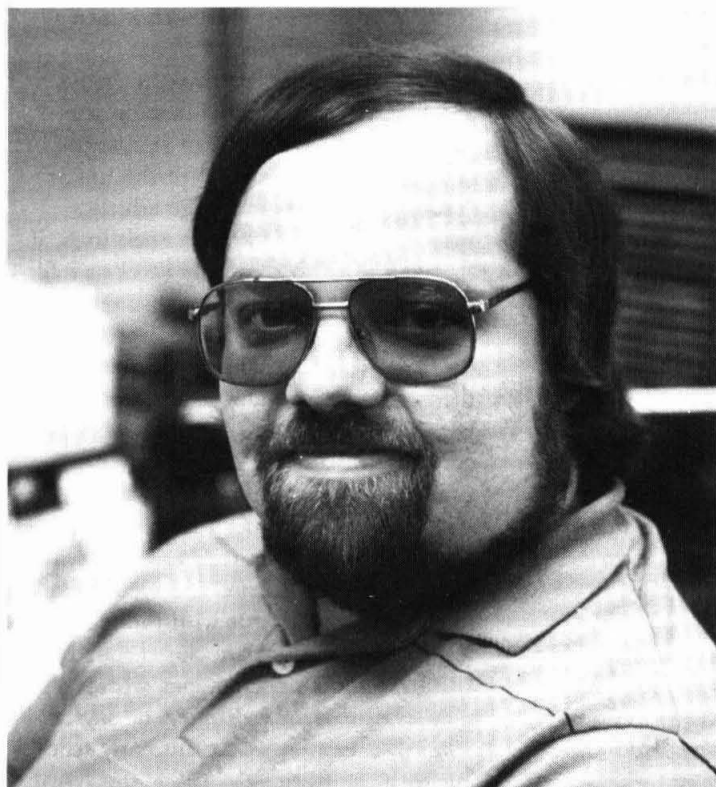
The 16 members of the 1989-90 program deserve much praise for their dedication, hard work, and strength of character. They constantly earned the respect of opposing players and coaches and established a standard of commitment that will certainly lead to greater success in the future.

Swimming

The 1990 swim team included 20 men. This large number of swimmers made the men's team highly competitive throughout the season. The record was only 2-8, but Coach Clinton Dodd explained that "we lost to Redlands, 108-109, and to U.C. Riverside, 118-124. We should have won both meets, but were missing key personnel."

At the SCIAC Conference championship, the men's team did an outstanding job. The team members set many personal records and scored numerous points. The best swim of the meet came from sophomore Barry Stipe in the 100 backstroke, with a time of 57.66. For his performance, he was named to the all-SCIAC team.

The women's team consisted of four freshmen. This number was insufficient to make the team competitive, but the four women gained a great deal of experience which will surely pay off in the future. Coach Dodd pointed out that Karen Ross placed in the sprints at the SCIAC championships, and Jessica Barnett swam well in the distance events.



Joe Wirtley learned how to analyze and solve problems.

The fencing team hopes to tackle the national championship this year.

By Winifred Veronda

Errol Flynn looked great in those fencing scenes that made him famous in the movies of the '30s and '40s. Caltech fencers are looking great, too, as they make a name for themselves in fencing competition.

The fencing team has a new coach this year, and he's hoping to take the Caltech team to the national championships of the United States Fencing Association in June in Salt Lake City. Fencing is an individual sport, Robert Randolph says, and a well-trained Caltech student can hold his own with the best.

The fencing team proved their skills when they defeated all other Division III fencing teams to secure the Pacific Coast Collegiate title sponsored by the United States Fencing Association. Other schools participating included USC, UCLA, Cal State Fullerton, UC Santa Barbara, Drew, Pomona-Pitzer, Occidental, and Claremont-Mudd-Scripps.

Randolph came to the Institute in the fall to a class of 20 students—10 of them freshmen, and only 4 of them seniors. Some had no athletic experience at all. The coach of a fencing club that has been Western United States champion for 10 consecutive years, the winner of 104 individual gold medals, and three times Pacific Coast champion, Randolph came well prepared. He brought complete plans for training the class members as fencers—mentally and emotionally as well as physically. His first task was to persuade the members that they could win.

"With your background you could go anywhere," the students told me," says Randolph. "Why would you want to come to Caltech?" It was almost as if they were thinking, "Because we're from Caltech we can't be athletes. We can't win."

"I told them, 'Fencing is a one-to-one sport. There's no reason why a single competitor from Caltech can't beat a single competitor from USC. You have more mental ability than fencers from other schools, so if anything you should have an advantage.'"

Fencing is one of the most glamorous of sports, and this is a part of its appeal. But it also appeals to Caltech students because of its chesslike quality, which matches the skills of two opponents in a contest that takes as much mental agility as it does physical strength. When the United States Olympic Committee did a study to learn what pairs of sports were most parallel in their requirements of their athletes, fencing was paired with race-car driving. This is because of the necessity in both sports to make instantaneous judgments on how to react in a competitive situation.

One of the nice things about fencing, says Randolph, is that very different



Fencing coach Robert Randolph instructs Lindee Goh, a freshman on the team.

Caltech fencers prove their skills

types of people can be successful at it. "For instance," he says, "speed is very important, but it isn't something that's required. A fencer friend of mine is 6'2" but over 300 pounds. They used to call him the dancing bear, and he was very successful as a competitor. Because he was very, very smart, he was able to analyze his opponents' weaknesses and develop a game plan that was very successful. He knew the importance of cognitive skills, and the strategies and tactics of the sport."

But the most critical criterion for success in fencing, Randolph believes, has to do with emotions, and the athlete's ability to deal with them successfully. The individual has to deal with the fear of losing, of not performing up to others' expectations—and with the fear of succeeding. Caltech students—despite their fine cognitive abilities—still have to be able to deal successfully with these fears when they go out to fence.

This kind of coping capacity comes naturally to an experienced athlete. But Randolph knew most of his potential team members would lack that experience, so he set aside 25 percent of his training time (he works with the team three hours on Tuesdays and Thursdays) for a regular workshop designed to condition the mind and to "train the athlete to be an athlete."

He gave each member of the class a personality test and compared the results with the traits required for a successful fencer. "We've looked at whether they're overaggressive or underaggressive, whether they have a low or a high desire to win, whether they're able to handle tension in an athletic competition. We've looked at whether they're oversensitive, at how much confidence they have, and at how they can change those traits for the better," says Randolph.

"We've talked about what rituals we follow to put ourselves technically, psychologically, emotionally, cognitively,

and physically into a position where we're going to compete at the height of our potential. We've talked about nutrition and diet, and had sessions on how to learn. When my group becomes more competitively mature, I may be able to cut back on the time we spend this way, but for now, I feel it's a necessity."

Sean Johnston, a fourth-year fencer and the captain of the saber team, likes fencing because of the individual competition. "It's just you and your opponent, and you're challenged every moment," he says. "Fencing's not like a sport with two teams and a ball; it's never dull." Johnston also likes the swashbuckling aspect of the sport. "It's fun to see a movie with a fencing scene and know you can do that," he says.

"It's much more interesting to fence than to put a ball through a hoop."

Johnston also appreciates the benefits he's gained from the sport. "Fencing has developed my poise and strength, changed the way I carry myself, toned my body, improved my reflexes, and given me more self-confidence," he says.

The young fencer hopes to continue competing in the sport after he leaves Caltech, by participating in events sponsored by the U.S. Fencing Association, which has its own practices, tournaments, and competitions.

Johnston feels the workshop on training to be an athlete has been "very beneficial. It's given me insights that I can carry for the rest of my life," he says.

Joe Dadek has been a member of the épée team since he was a sophomore. He likes fencing because of the strategy involved. "You have to be able to think, as well as to be well-trained physically," he remarks.

"Fencing has given me a way to relax," he continues. "It's a nice break from studies. It's also helped me build my self-confidence. The swashbuckling aspect—that's fun, too."

Dadek also plans to continue fencing after he leaves Caltech, through working out with a team or a club.

The Caltech fencer says he's learned a lot in the workshop on how to be an athlete—"how to prepare for a competition, techniques other athletes have used to achieve success, what sort of diet is good."

Mainly, says Dadek of his fencing experience, "I just do it because it's a lot of fun."

The sport of fencing has a long heritage. Coach Randolph explains that it evolved from a martial art into a sport during the time of Louis XIV of France. Two different events occurred at that time. First, musketry became much more practical, and the necessity for using a sword became less important in warfare. Second, the mask was invented, and fencing could be practiced realistically, enabling fencers to be trained as sportsmen.

About this time the foil was invented as a lightweight weapon for training in fencing with the torso as the target area. The foil today is one of three weapons used in the sport.

The second fencing weapon is the épée, which was originally created to simulate dueling experiences. It is a heavier weapon, its blade is much thicker, and the bell guard that surrounds the hand is much larger. In épée competition, the entire body is the target. Unlike contests with the foil, in which attacking blows are alternated, blows with the épée may be struck simultaneously, and two fencers may eliminate each other from a competition.

The third weapon, the saber, was developed from the cavalry sword, and the rules for its use permit the whole blade to be used in an attack, not just the point. Because it was meaningless to hit a mounted person in the leg, the target area became defined as everything above the waist. Saber movements are larger and more colorful than those of the other two weapons, and are what people recognize from the swashbuckling movies they've seen. In intercollegiate athletics, Caltech fields an épée team, a saber team, and both a men's and women's foil team.

What Randolph particularly enjoys about teaching fencing is helping students to develop a sense of self-worth and to use their potential to the fullest. "However important college athletics may or may not become in their lives, if they can learn to seek only excellence for themselves and to demand that they live up to their potential in whatever they do, and to never settle for second best, that's a very important lesson for them, whether they go into corporate work or with an academic institution," he concludes.

Randolph welcomes Caltech alumni and employees of Caltech and JPL who have fencing experience and would like to come and work out with the team. "Part of my sessions are closed, but I also have some open sessions where they're more than welcome," he says. Some JPL employees are currently fencing with the team.

ALUMNI

From the alumni president

Spring is always a busy and exciting time for the Alumni Association, and class reunions are a special part of that activity. This year five reunions for members of the classes of 1940, 1945, 1950, 1965, and 1980 will be centered around Alumni Seminar Day, and promise a festive weekend of events from May 31 to June 2. Specific information about Alumni Seminar Day, the reunion events, and registration materials



Rhonda MacDonald

have been mailed to all alumni in the United States and the foreign alumni in those classes.

To best meet the needs of alumni and the Association in planning reunions, the Reunion Committee of the Alumni Association Board is responsible for reviewing reunion policies on a regular basis. This year that task entails planning for the 1991 all-classes centennial reunion scheduled for the weekend of May 17-20, 1991. The centennial weekend will feature a variety of activities to welcome alumni back to campus, including class receptions and dinners, Seminar Day, campus tours, lab tours, the Caltech Glee Clubs' annual home concert, and other special events. More details will be published later in the year, but save that weekend on your calendar now so you won't miss the fun!

Gary Stupian (BS '61) chairs the Reunion Committee and is supported by George Barber (BS '40), David Holtz (BS '64), William Whitney (BS '51), and Don Wilkinson (BS '48).

Together, they endeavor to maximize participation in and support of class reunions and Association activities by all alumni. We are grateful for their insight and dedication in helping to see us through the centennial and future class reunion activities planning.

We appreciate feedback from alumni regarding any Association issue. Please contact us by mail or phone: Caltech Alumni Association, mail code 1-97, Pasadena, California 91125, (818) 356-6592.



Among those attending the New Mexico chapter meeting were Bill Rahe, JeanClare Seagrave (BS '76), Pauline Ho (BS '76), and Richard Buss.

Chapter news

New Mexico Alumni Association chapter formed

The inaugural meeting of the New Mexico chapter of the Alumni Association was held on January 12, at the El Dorado Hotel in Santa Fe.

Paul Jennings (MS '60, PhD '63), provost and professor of civil engineering and applied mechanics, updated 40 Caltech alumni and guests from Santa Fe, Albuquerque, and Los Alamos on faculty research, student admissions, and current events at the Institute, as well as showing a videotape of the Voyager flyby of Neptune.

Nominations were made for chapter officers and plans are underway for an election and future meetings.

Founding President Linhardt stresses roles of Orange County chapter

As president of the Orange County alumni chapter, Hans D. Linhardt is the head of a thriving new group which attracts some 50 alumni to monthly functions. The chapter was organized last June, and its members converge for dinner every second Tuesday of each month to hear a speaker from the Caltech faculty or JPL. Two social events were scheduled this year: the alumni went on a day trip to Palomar and met for a party in Linhardt's apartment to watch the Newport boat parade during the holiday season.

As founding president, Linhardt feels that the function of a chapter should be to give alumni the opportunity to know one another better and to make contacts that may be helpful in their careers. Equally important is keeping in closer touch with Caltech, and gaining insight into the most beneficial ways to support it.

Linhardt notes that there are 664 Caltech alumni in Orange County. He hopes that the alumni chapter may eventually create a Caltech "presence" in the area that can be an influence on appropriate issues. He notes the strong

presence in the county of USC and UC Irvine, and would like to see Caltech become better known and more influential, as well.

The chapter president has been in business since 1978 as a technology and marketing consultant for the cryogenic, petrochemical, and power industries. He is a native of Munich, West Germany, where he attended the Maximilians Gymnasium and the Munich Tech-



Hans D. Linhardt

nical University. At the latter institution, he received the equivalent of an MS degree in mechanical engineering.

After a short research assignment with the company, Voith GmbH, and attendance at the University of Hamburg, Linhardt was admitted to Caltech where he earned an Engineer's degree in 1960. He completed his research in mechanical engineering, working with Professor Alan Acosta on aerospace power and propulsion assignments.

After 10 years of research and development in the aerospace business, Linhardt worked for another 12 years in cryogenics and gas-processing with Airco Cryogenics, a division of Airco Inc.

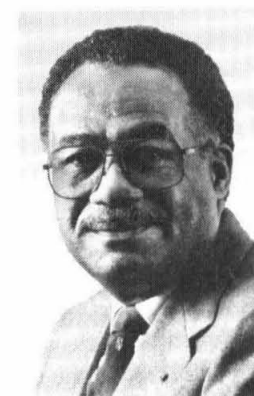
In 1970, Linhardt received his doctorate in engineering from the Aachen Technical University in Germany. His research was in two-phase flow.

The Orange County chapter president is the author of 36 publications and the holder of 14 patents. He served for five years as the director of the fluid machinery division of the Los Angeles Chapter of the ASME. He and Mrs. Linhardt live in Newport Beach, near their four sons. They both are active supporters of the performing arts and are members of The Caltech Associates.

Occidental College president to speak at Seminar Day

John Brooks Slaughter, president of Occidental College, will be the keynote speaker at the general session of the 53rd annual Seminar Day on Saturday, June 2, speaking on "Science, Technology, and Social Consciousness."

Slaughter received his PhD from UC San Diego in 1971, his MS from UCLA



John Brooks Slaughter

in 1961, and his BS from Kansas State University in 1956. He was chancellor of the University of Maryland, College Park, from 1982 to 1988; director of the National Science Foundation from 1980 to 1982; academic vice president and provost of Washington State University from 1979 to 1980; assistant director for astronomical, atmospheric, earth, and ocean sciences with the National Science Foundation from 1977 to 1979; and professor of electrical engineering with the Applied Physics Laboratory, the University of Washington from 1975 to 1977.

Among his many honors, he was elected to the National Academy of Engineering in 1982; was named U.S. Black Engineer of the Year in 1987; received a UCLA Alumni Medal of Excellence in 1989; was named Alumnus of the Year by UC San Diego in 1982; received a Distinguished Service in Engineering Award from Kansas State University in 1981; received a Distinguished Service Award from the National Science Foundation in 1979; was named UCLA Engineering Alumnus of the Year in 1978; and was elected a Fellow of the Institute of Electrical and Electronic Engineers in 1977.

He is a member of the Institute of Electrical and Electronic Engineers (IEEE), and of the Board of Directors of ARCO, Avery International Corporation, IBM, Monsanto Company, and Union Bank. He is also a member of the Board of Governors of Town Hall of California.

ALUMNI



Conversing at the San Francisco mini-Seminar Day and chapter meeting are, from left: Stephanie J. Charles (BS '73), secretary-treasurer of the San Francisco chapter; Ben G. Burke (BS '61, MS '62), regional Annual Fund campaign chair; and President Thomas E. Everhart, who spoke at dinner.

Faculty to share research news on Seminar Day

Global warming, the condition of the Antarctic ice sheet, forecasting large earthquakes . . . these are some of the topics to be sampled by alumni and their guests on Alumni Seminar Day, Saturday, June 2, when 13 faculty members and JPL scientists highlight research under way. Also featured on the program will be three SURF (Summer Undergraduate Research Fellowships) students, who will present summaries of their research projects.

Topics offered, and the faculty members presenting them, include: **Travels Along the DNA Helix**, by Jacqueline K. Barton, professor of chemistry; **An Atomic Resolution Picture of HLA: A Molecule That Helps You Get Rid of a Cold**, by Pamela J. Bjorkman, assistant professor of biology and assistant investigator, Howard Hughes Medical Institute; **Global Warming: Fact or Fiction?** Moustafa T. Chahine, chief scientist, JPL; **The "Real" California Lottery: Your Income Tax**, Jeffrey A. Dubin, associate professor of economics; **The Forgotten War: India's Armed Struggle for Independence, 1942-1945**, Peter W. Fay, professor of history.

Molecular Material Research in the Beckman Institute, Robert H. Grubbs, Victor and Elizabeth Atkins Professor of Chemistry; **New Horizons in Aerodynamics**, Hans G. Hornung, Clarence L. Johnson Professor of Aeronautics and director of the Graduate Aeronautical Laboratories; **"Current" Concerns About the Antarctic Ice Sheet**, Barclay Kamb, Barbara and Stanley R. Rawn, Jr. Professor of Geology and Geophysics; **A Novel Approach to the Design of Digital VLSI Circuits**, Alain J. Martin, professor of computer science.

Forecasting Large Earthquakes and their Effects in Southern California, Kerry E. Sieh, professor of geology; **The Voyager Encounter with Neptune**, Edward C. Stone, Jr., professor of physics and vice president for astronomical facilities; **"Heavy Light" and the Early Universe**, Alan J. Weinstein, assistant professor of physics; **Normal Growth and Development Run Amok: The Role of Oncogenes in Normal Development and in Causing Cancer**, Barbara J. Wold, associate professor of biology.

SURF students' topics include:

Characterization of Virus Transport Through Porous Media, Laura Hernandez; **How Do You Spell Relief? An Analysis of Baseball Pitching, 1876 to Present**, Ari Kaplan; and **A Novel Functional Domain in the Rev Protein of HIV**, Jennifer A. Low.

Several special programs and exhibits will be open for the enjoyment of alumni and guests. The JPL Space Exhibit will feature photographs and spacecraft models, as well as video presentations of JPL activities. Included in the exhibit will be a model of the optical imaging instrument for the Hubble Space Telescope. A JPL expert will answer questions. The Seismological Laboratory Real Time Picker, on view at Seminar Day, is a computer-automated p-wave analyzer that makes a preliminary estimate of an earthquake's epicenter. Graduate students will be present to describe the laboratory and answer questions.

Graduate students will also be on hand to answer questions about the Shock Tunnel Laboratory on the roof of Guggenheim Laboratory. This free-piston shock tunnel—the first of its kind in the United States—is capable of simulating the chemical nonequilibrium effects in flows encountered during entry into, and high speed travel within, the atmospheres of the inner planets (including Earth and Mars), and the large moons of the outer planets.

Other exhibits and special programs include the Division of Geological and Planetary Sciences' mineral and gem collection; lists of alumni attending Seminar Day; poster exhibits of student activities; the Caltech bookstore featuring a display of books by Caltech authors; an origami (paperfolding) display by Robert Lang (BS '82, PhD '86), author of *The Complete Book of Origami*, *Origami Zoo*, and *Origami Sea Life*; Dan Langdale, Caltech's director of admissions, talking informally with high school students about the academic program and student life at Caltech; and the annual home concert of the Men's and Women's Glee Clubs.

Videos, shown several times during the day, will include "The Last Days of a Genius" a 60-minute *Nova* program on the late Richard Feynman; and two episodes from the award-winning series *Project MATHEMATICS!*, "The Story of Pi" and "Similarity."

Lunch with the Caltech Brass Quintet

will be on the Olive Walk from 12:45 to 2 p.m.. Alumni may bring a picnic or reserve a box lunch. A wine and cheese reception will be hosted outside Beckman Auditorium at 5 p.m. for everyone attending Seminar Day. An informal dinner will be served from several food stations in the inner courtyard of the new Beckman Institute at 6:30 p.m.

Members of the Alumni Seminar Committee are: Leo L. Baggerly (BS '51, MS '52, PhD '56), general chairman; Franklin D. Dryden (BS '54, MS '57), past chairman; Robert C. Burket (BS Committee members—J. Milton Andres (BS '49, MS '50), Chuck Antoniak (BS '60), G. Edward Bryan (BS '54), Joseph A. Dobrowolski (BS '49), Duane D. Erway (BS '57, MS '58), Hodge C. Gaines (BS '52), Hiroshi Kamei (BS '51, MS '52), Robert S. MacAlister, Jr. (BS '47), John R. Odden (BS '74), Don M. Pinkerton (BS '57), William J. Rihn (BS '52), Raymond A. Saplis (BS '44), Kevin J. Savage (BS '69), Samuel N. Vodopia (BS '54), and Donald P. Wilkinson (BS '48). Alumni Association staff representatives are Judith M. Amis, executive director; and Kathy Harris, assistant director.

Mini-Seminar Day a Huge Success

A mini-Seminar Day and San Francisco chapter meeting, jointly sponsored by the Alumni Association and the Annual Fund, drew more than 100 alumni and guests to the San Francisco Airport Hilton on Saturday, February 3. The event, the first dual effort of its kind, featured President Thomas E. Everhart as the dinner speaker. The title of his talk was "Update on Caltech."

G. Stanley Holditch (BS '48), Annual Fund chairman, was moderator for the afternoon seminar series. The speakers included: John D. Balde-schwieler, professor of chemistry, "A New Approach to Cancer Diagnosis and

Therapy"; David L. Goodstein, vice provost and professor of physics and applied physics, "High-Temperature Superconductivity"; Melany L. Hunt, assistant professor of mechanical engineering, "Hot Topics in Thermal Engineering"; and Daniel J. Kevles, the J. O. and Juliette Koepfli Professor of the Humanities, "Purple Cows: Political Ethics and the Patenting of Genetically Engineered Animals."

Because of the success of the event, the Annual Fund and Alumni Association hope to organize similar functions for other chapters.

Bylaws Amendment

The following bylaws amendment was passed by the board of directors of the Alumni Association at its meeting on February 15, 1990.

Section 5.01—Nomination

No later than January fifteenth, the president shall appoint two nomination proposal committees whose composition and duties shall be as follows:

(1) The nomination proposal committee for directors shall consist of the immediate past-president as chairman, the president, the vice president, and the secretary, and four (4) members of the Association who are not members of the board. This committee shall propose the name of a member of the Association for each of the five (5) directors to be elected for three-year terms and an ordered pool of alternates. The names of the alternates shall only be used to fill any vacancies in the list of proposed nominees before the report of the committee is delivered to the board. Furthermore, the committee may propose one Association member and alternate from a chapter organization to be elected for a one-year term on the board of directors. This committee shall be guided by the principle that membership on the board should be allocated among various interest groups in the Association.

(2) The nomination proposal committee for officers shall consist of the immediate past president as chairman, the president, the vice president (president elect), and two (2) additional members of the board of directors. This committee shall propose the name of a member of the Association for each of the positions of president, vice-president, treasurer, and secretary.

Focus on Annual Fund volunteers

Outstanding volunteer awards to Annual Fund workers for efforts through December 31 are listed below.

Ray Cromley (BS '33), Region 11, was honored for achieving the highest donor participation rate of any regional chair outside California (for the second year in a row). Cromley's rate was 66.7 percent. Honored for the highest participation rate of any regional chair inside California was Mike Stefanko (BS '70) (Region 2) with 50 percent.

William Hardam (PhD '65) was recognized as the area chair outside California to achieve the highest donor participation rate. This was his second year for this honor. His percentage for Area 525 was 70.8 percent. James Kosmicki (MS '71, Eng '73) of Area 026, with 77.6 percent, was honored as the area chair inside California with the highest donor participation rate.

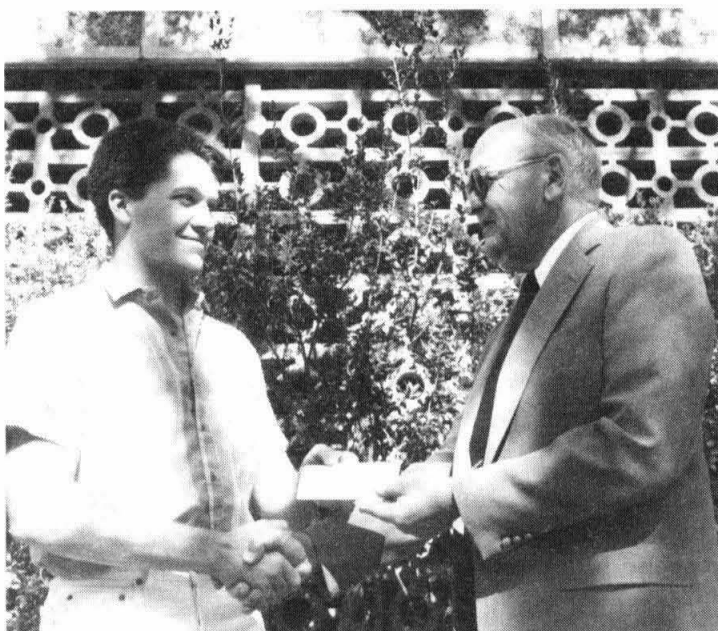
Volunteers outside California honored for achieving a 100 percent participation rate among their donors include: Victor Gilinsky (PhD '61), Louis A. Romero (BS '75, PhD '82), David B. Atkinson (BS '75), I-Lok Chang (BS '65), Daniel J. Milton (MS '56), John K. Inman (BS '50), John R. Rempel (BS '44), Brian C. Belanger (BS '63), Philip D. Harri-man (BS '59), and David P. Pope (MS '62, PhD '67).

California volunteers who achieved 100 percent participation are: Richard K. Nuno (BS '51), Ernest W. Blair (BS '49), James W. Dunham (BS '29), A. R. Zacher (BS '62), and John B. Nelson (BS '44).

Honored as the regional chairs outside of California to attain the highest percentage of their dollar goal were Robert Hall (BS '42, PhD '48) and Gary Tanigawa (BS '83), with 115.1 percent for Region 13. Bud Mittenthal (BS '48), Region 4, with 82.1 percent, was recognized for attaining the highest percent of any regional chair inside California.

The area chair outside California who attained the highest dollar-goal percentage was William Tivol (BS '62), Area 575, with 395.9 percent. Inside California, the area chair with the highest percentage was Robert Shull (MS '49). He achieved 143.3 percent.

Joe Elmers (MS '73), Area 480, was recognized as the area chair with the highest ratio of volunteers to prospects—1:4. Ray Cromley (BS '33) achieved distinction for the highest number of traditionally non-donors who made gifts by December 31.



Todd Schamberger, president of Page House, accepts a check from G. Stanley Holditch (BS '48), Annual Fund chairman. The gift was presented by Holditch, who issued a challenge to young alumni, with the promise that an award would go to the house whose alumni reached goals for dollar and donor participation. Page House alumni fulfilled the criteria.

Alumni Activities

For information about any of these programs, contact the Caltech Alumni Association, mail code 1-97, Pasadena, California, 91125, (818) 356-6592.

April 3, Tri-state chapter meeting, Princeton Club, New York City.
Speaker: President Thomas E. Everhart.

May 6, Sports Day for alumni, students, faculty, and staff on the athletic field.

May 11, Denver chapter meeting.
Speaker: President Everhart.

May 31, Class of 1940, 50th-reunion dinner, the Athenaeum.

June 1, Half Century Club reception and luncheon, the Athenaeum. The class of 1940 will be inducted into the Half Century Club. Members and guests are invited to attend.

June 1, Reception for class reunions, the president's home (for classes of 1945, 1950, 1965, and 1980).

June 1, Class reunion dinners, the Athenaeum (for classes of 1945, 1950, and 1980).

June 2, 53rd Alumni Seminar Day, Caltech campus.

June 2 Class of 1965 reunion reception and dinner, Alumni House.

June 21, Alumni Association annual meeting and honorary alumni dinner, the Athenaeum.

June 24–July 1, Yellowstone travel/study program with Robert P. Sharp, Robert P. Sharp Professor of Geology, Emeritus.

January 1, 1991, Rose Parade event, breakfast and lunch, the Athenaeum. Reserved seating, Hill and Colorado, for the 102nd Tournament of Roses.

January 22–February 6, 1991, East African Safari travel/study program with Edwin S. Munger, professor of geography, emeritus.

Alumni Board nominates new members

The Board of Directors of the Alumni Association met as a nominating committee on January 18, in accordance with section 5.01 of the bylaws. Six vacancies on the board, including a chapter representative, in addition to the positions of president, vice president, secretary, and treasurer, are to be filled.

The nominees for terms beginning at the close of the annual meeting in June 1990 are as follows:

Officers

President: E. Micheal Boughton (BS '55)
Vice president: Gary W. Stupian (BS '61)
Treasurer: Le Val Lund (BS '47)
Secretary: William M. Whitney (BS '51)

Directors

Leo L. Baggerly (BS '51, MS '52, PhD '65)—three years
Warren G. Goda (BS '86)—three years
Lisa L. Heinz (BS '78)—one year (chapter representative)
Peter V. Mason (BS '51, MS '52, PhD '62)—three years
Harry J. Moore, Jr. (BS '48)—three years
Donald P. Wilkinson (BS '48)—three years

Section 5.01 of the bylaws provides that members may make additional nominations for directors or officers by a petition signed by at least 50 regular members in good standing, providing the petition is received by the secretary no later than April 15. In accordance with section 5.02 of the bylaws, if no additional nominations are received by April 15, the secretary casts the unanimous vote of all regular members of the association for the elections of the candidates nominated by the board. Otherwise, a letter ballot is required.

Below are the biographical summaries of those nominated for director.

Leo L. Baggerly

Leo Baggerly is a senior staff engineer for TRW Inc. in San Bernardino, and lives in Claremont. Baggerly has served

for several years on the Alumni Association Seminar Day Committee and is general chairman for Alumni Seminar Day, June 2.

Warren G. Goda

A resident of Placentia, Warren Goda is a member of the technical staff of Rockwell International in Anaheim. A Gnome, he has served the Alumni Association as a member of the Student/Faculty/Alumni Relations Committee and is currently an alumni admissions representative.

Lisa L. Heinz

Lisa Heinz is a science policy analyst in the Office of Technology Assessment for the U.S. Congress. She has served on the Alumni Association Board as the chapter representative in 1989, as a Washington, D.C. area coordinator for the Undergraduate Admissions Support Committee, and as an alumni admissions representative.

Peter V. Mason

A resident of Altadena, Peter Mason is a senior member of the technical staff at JPL. He has served the Alumni Association as a member of and currently is co-chairman of the Publications Committee.

Harry Moore

Harry Moore is retired and lives in Fallbrook. He is a past chair of the Alumni Fund and currently serves the Alumni Association as the northeast regional director of the Undergraduate Admissions Support Committee.

Donald P. Wilkinson

Don Wilkinson is retired and lives in Los Angeles. He has served the Alumni Association for many years in several capacities: as president of the Alumni Association in 1985, member of the Alumni Seminar Day Committee, co-chairman of the Program Committee, and as a member of the Reunion Review and Financial Study Committees. For the Alumni Fund, he served as an area campaign volunteer and chair.

NOTE

Seminar Day is
JUNE 2
this year

(not the third week of May)

CALTECH IN THE NEWS

●In his Watson Lecture theoretical physicist Kip Thorne explained that time travel through wormholes is theoretically possible "if some future, smarter civilization could create and actually maintain it." After apologizing to his mother, who was sitting in the audience, Thorne brought up the most frequently cited paradox about time travel: a person could go back in time and conceivably kill his mother. But if that person killed his mother, he could not have been born and so could not travel back in time. For time travel to actually work, Thorne said, somehow there must be only one history that can't be changed." *Pasadena Star-News*, January 25.

●Caltech graduate student Marcus Chown (MS '84) recalled a story involving Nobelist Richard Feynman: "The BBC once screened a profile of Feynman in its 'Horizon' series. My mother, who had never shown interest in any science program, watched it from beginning to end. I had an idea. I would go to Feynman, explain that my mother had watched him on TV, and ask him to drop her a note. Then when I tried to explain why the earth is round or the sky is blue, she might be receptive. He did write my mother: 'Dear Mrs. Chown—Ignore your son's attempts to teach you physics. Physics isn't the most important thing. Love is. Best wishes, Richard Feynman.'" *Reader's Digest*, February.

●"Astronomers last week reported they may have witnessed the birth of a pair of quasars—the most intensely energetic objects in the universe. . . . The team detected an object in the constellation Pisces that appears to be a pair of quasars separated by less than 100,000 light-years. . . . The quasar twins lie so close together in space that astronomers speculate their gravity fields may be interacting and spurring formation of the intensely bright objects." The team of astronomers, headed by Georges Meylan of NASA, included scientists from the California Institute of Technology and from West Germany. *The San Diego Union*, January 15.

●"During Voyager's encounter, Neptune was revealed as a planet whose variations in winds at different latitudes are not too dissimilar from those of the other outer planets. The only surprise at the time was the revelation that the radio rotation period, reflecting the deep

interior of the planet was shorter (at just over 16 hours) than the period revealed by atmospheric features at practically every latitude." Planetary scientist Andrew Ingersoll measured the motions of cloud features within the major atmospheric spots and found that elements move at velocities from 300 to 600 meters per second towards the west with differential winds approaching the speed of sound. *Nature*, January 18.

ALUMNI

Reunion Weekend activities announced

Five classes have planned reunion activities for the weekend of May 31, June 1 and 2. Holding reunions that weekend are the classes of 1940, 1945, 1950, 1965, and 1980. All will enjoy Seminar Day activities on June 2.

The class of 1940 will begin its 50th reunion activities on Thursday, May 31, with a tour of JPL and a social hour and dinner at the Athenaeum. J. Kent Clark, professor of literature, emeritus, will be the speaker. Events of June 1 will feature continental breakfast at the Alumni House, a campus architectural tour, the Half Century Club reception and luncheon at the Athenaeum, and a social hour and buffet reception at the home of Herbert Worcester (BS '40). George Barber (BS '40) is chair for the reunion committee.

Reunion activities for the class of 1945 will commence on Friday, June 1, with a campus architectural tour. The president's home will be the setting for a hosted cocktail reception, and the reunion dinner will be at the Athenaeum. John Davis (BS '45) is reunion committee chair.

Festivities for the class of 1950 on June 1 will include a campus architectural tour, a hosted cocktail reception at the home of the president, and a reunion dinner at the Athenaeum. The reunion chair is Jay Montgomery (BS '50, MS '51).

The class of 1965 will begin its 25th reunion activities on June 1 with a campus architectural tour followed by a hosted cocktail reception at the home of the president. The reunion dinner will be at the Alumni House on June 2. Steve Garrison (BS '65, MS '66) is the reunion committee chair.

Activities for the class of 1980 will commence with a campus architectural tour. Afterward there will be a hosted cocktail reception at the home of the president and dinner at the Athenaeum. The reunion committee chair is Susan Fuhs (BS '80, MS '81).

OBITUARIES

1922

JESS C. BURKS, of Los Altos, California, on February 11. After graduation he worked for 18 years as vice president and general manager of the O.C. Field Gasoline Corporation. His last position was as executive vice president of the Ralph M. Parsons Company, from which Burks retired in 1968. He served as president of the California Natural Gasoline Association in 1937. He is survived by his wife, Louise, three children, eight grandchildren, and five great grandchildren.

1925

ALLYN BLUNT, of Laguna Niguel, California, on September 1, 1986.

1926

ARTHUR B. ANDERSON, of Leucadia, California on January 16. He is survived by his wife, Dorothea; a son, Larry, and a daughter, Diane, and their spouses; seven grandchildren; and one great grandchild. Anderson worked for Pacific Telephone and Telegraph for 38 years. He retired in 1967.

1927

REGIS S. GUBSER, on January 5, in Westminster, California. He was born January 26, 1905, in Oil City, California; he was a graduate of Loyola High School, and received his degree from Caltech in electrical engineering. He was a past vice president and engineer for California Consumer Corporation, retiring after 41 years. Gubser was a lifetime member of ASHRAE Professional Engineering Association, a past national president of RETA, an instructor in engineering at the LA Trade Technical School, and a past Boy Scout Master. He is survived by his wife, Mary; two sons, Raymond and David; two step-daughters, Ann Gubser and Eileen McAfee; seven grandchildren; and many nieces and nephews.

1928

HUSTON W. TAYLOR, of Pasadena, California, several years ago.

1931

PAUL H. CATE, MS '42, of Altadena, California, on May 9, 1989, of heart failure. He had worked for Kelco Company and for U.S. Borax; he was an honorary member of the Chemical Engineering Society. Cate was a member of the Caltech Y and the Friends of Beckman Auditorium.

1932

GLENN MYERS, JR., of San Francisco, California.

1933

DONALD F. POULSON, PhD '36, a senior research biologist and professor emeritus of biology at Yale University, on December 7, 1989, from injuries suffered on November 29 in an

automobile accident in New Haven, Connecticut. He was 79 years old. While an undergraduate at Caltech, Dr. Poulson began the first detailed analysis of embryonic development in the fruit fly and how certain genes interfered with it. He joined the Yale faculty in 1937. Dr. Poulson was a Fulbright Research Scholar twice, a Guggenheim Foundation Fellow, and the recipient of a fellowship from the Japan Society for the Promotion of Science. He is survived by his wife, Margaret Boardman; two sons, Donald and Christian; a sister, Mary P. Gibson; and three grandchildren.

1935

M. HARRISON EVANS, MS '36, passed away in Baja California in 1988.

1941

LEO C. LEVITT, PhD '57, of Washington, D.C., in November 1987, after ten years of failing health due to Parkinson's disease. After graduating from Caltech, Levitt worked at MIT's Radiation Laboratory during World War II. He subsequently studied at Princeton and Duke, and received his PhD in physics from Caltech in 1957. Thereafter, his working career included Hughes Aircraft Company, Boeing, Georgetown University, and the Harry Diamond Laboratories.

1944

YE KE (GEORGE) WU, of Shanghai, People's Republic of China, of cancer on June 29, 1987. He is survived by his wife, Grace; their three sons; and two grandchildren.

1946

MORTON M. ASTRAHAN, MS, of San Jose, California, in 1988. He is survived by his wife, Joanne.

1950

HARRY F. CLARK, JR., of Murrysville, Pennsylvania, on November 29, 1989, at the age of 67. He had just received his MS degree in nuclear engineering from Penn State University. He was retired from his position as a nuclear engineer with Westinghouse. He was a life member of the Alumni Association. Clark is survived by his wife, Dora-Dean; two sons, David and Jim; and two grandchildren.

1957

GIRAIR M. NAZARIAN, PhD, of Northridge, California, in July 1988, after a two-year struggle against bone cancer. He joined the faculty at California State University, Northridge, as an associate professor of chemistry in 1961. He was promoted to full professor in 1965, and remained at CSUN for the rest of his career. His research was in the area of macromolecular studies by ultracentrifugation, and statistical mechanical calculation.

1962

HENRY RUDERMAN, PhD, in 1989, of cancer. He is survived by his wife, Rita.

1969

JAMES T. MCFARLAND, PhD, of Whitefish Bay, Wisconsin, on January 30, of amyotrophic lateral sclerosis, commonly known as Lou Gehrig's disease. After finishing his degree and a post-doctoral stint at the University of Oregon, McFarland was a professor and former department chairman of chemistry at the University of Wisconsin—Milwaukee from September 1970 until his death. With the help of the "Words+" software system, also used by Professor Stephen Hawking, McFarland continued writing and working with graduate students until the week before his death. He is survived by his wife, Judy; son, Kevin, who is a graduate student at the University of Chicago; and daughter, Colleen, a sophomore at the College of Wooster.

PERSONALS

1933
THEODORE S. MITCHEL, of Houston, Texas, writes, "When I graduated, jobs were scarce—recruiters did not appear on campus—so I organized a 'Big Band,' using Stan Kenton as my arranger and pianist. Before we got many bookings, Shell Oil offered me a position as a draftsman, and I gave up music for a steady job. My work with Shell developed into an active role in oil-field production, which eventually took me to Casper, Wyoming; Denver; Houston (three times); New York City; and The Hague, the Netherlands. I advanced through the ranks to division engineer, chief engineer, and eventually to assistant manager, mechanical engineering, in NYC. My final assignment was being in charge of campus recruiting in the northeast.

During World War II, I spent four years as a naval officer, all in the engineering of lighter-than-air blimps, from Lakehurst, New Jersey, to Miami, Florida, leaving as a lieutenant commander.

While living in Connecticut, I assisted Caltech's director of admissions by interviewing prospective students in New York and in Connecticut.

I accepted a 'golden glove' retirement from Shell in 1971, and embarked on a life of self-employment, doing work in career counseling and engineering. Also, I was active in community affairs as president of the civic association; secretary of the water board, and later, I was instrumental in starting a computer club that now has 450 members.

Fergie, my wife of 47 years, and I are in excellent health, and we have three children, nine grandchildren, and four great-grandchildren, and are happy in Houston, Texas."

1935
ALFRED ROMER, PhD, the Henry Priest Professor of Physics, Emeritus, at St. Lawrence University, has been elected a Fellow of the American Physical Society. Romer was elected for "his contributions to the history of modern physical science and to physics education." A member of the St. Lawrence University faculty from 1947 to 1973, Romer still teaches a class in the physics department on the history of science. He received the Distinguished Service Citation from the American Association of Physics Teachers in 1964, and was the first recipient of the Giltz Award at St. Lawrence in 1987 for "performance above and beyond the expected."

1944
RUBEN F. METTLER, MS '47, PhD '49, chairman of the Caltech Board of Trustees, was awarded the 1990 Medal of Honor from the Electronic Industries Association (EIA), in March during a ceremony in Washington, D.C. The electronic industry's highest award, the EIA Medal of Honor recognized Mettler for "a long distinguished career in the industry. His professional credentials, outstanding corporate leadership and his deep personal commitment to the industry make him an outstanding choice for this prestigious award."

1948
RUPERT M. BAYLEY, suffered a stroke on January 6, and is in the rehabilitation unit at Huntington Memorial Hospital in Pasadena. He worked for 40 years for the City of Los Angeles Department of Water and Power and also taught graduate studies in electrical engineering at USC.

KEEP US INFORMED!

Keep us informed so we can keep your fellow alums informed. Send us news about you and your family, about a new job, promotion, awards—anything you'd like to see printed in the Personals section of *Caltech News*. Return this coupon and any additional materials to: *Caltech News*, Caltech Mail Stop 1-71, Pasadena, CA 91125.

Name _____

Degree(s) and Year(s) Granted _____

Address _____

Is this a new address? _____ Day phone _____ Occupation _____

News _____

1949
ALLAN M. SAUNDERS and his wife have moved their home business from San Mateo, California to Poulsbo, Washington, near Seattle. They continue to enjoy working for themselves.

GEORGE T. SKINNER, MS, ENG '51, PhD '55, writes, "I was saddened to read, in the December issue of *Caltech News*, that Wes Hershey had died. When I came to Caltech from Scotland in 1948, it was Wes who arranged for someone to pick me up at L.A. airport and take me for the night to the Pasadena YMCA. Then he arranged for me to meet Coach Anderson the next day with a view to staying with the coach and his wife, Tiny, whose hospitality I was to enjoy for almost two years. In doing so, Wes made the transition to a new school, very far from home, remarkably comfortable. I think Wes did that sort of thing for a lot of foreign students, and it made a tremendous difference for all of us. I am sure he is remembered by many for the quiet, effective help he gave so readily."

1950
DUANE H. COOPER, PhD '55, associate professor of electrical and computer engineering at the University of Illinois at Urbana-Champaign, has been elected a Fellow of the IEEE for "contributions to audio disk recording and stereo sound technology."

KAM L. WONG, of Manhattan Beach, California, retired from Hughes Aircraft Company four and a half years ago and started his own small engineering company. He is also a chief editor for a John Wiley and Sons journal. Wong received the Reliability, Test, and Evaluation Award from the Institute of Environmental Sciences in May for his pioneering work on the long-term failure characteristics of electronic equipment. Presently his company is performing a study for the U.S. Air Force. Wong plans to quit technical work in about two years to concentrate on writing his family history.

1952
RAYMOND L. HEACOCK, MS '53, of La Crescenta, California, has retired from the position of deputy assistant laboratory director for space sciences and instruments at the Jet Propulsion Laboratory after 36 years and 6 months.

1953
NICOLAS S. SZABO, of Cupertino, California, has been elected to the Cupertino City Council. He had previously served on the city's planning commission.

1956
JOHN F. KENNEDY, MS, PhD '60, of Iowa City, Iowa, received an honorary doctor of engineering degree from the University of Notre Dame. The citation states, "A Notre Dame graduate in civil engineering, Kennedy is the second person to head the University of Iowa's internationally respected Institute of Hydraulic Research. He seeks solutions to environmental problems caused by the increased use of rivers, advising power and water specialists in Germany, Saudi Arabia, India, and China. A Fellow of the National Academy of Engineering and holder of the Hunter Rouse Chair in Hydraulics at the University of Iowa, this eminent researcher merits our praise for his crucial contributions to the quality of life on this planet."

1960
RAYMOND PITTMAN, MS, of Creve Coeur, Missouri, was recently promoted to general manager of built environment technologies division of McDonnell Douglas System Integration Company.

1962
JOHN R. GOLDEN, of Pittsford, New York, has recently joined Rensselaer Learning Systems, Rochester, New York as vice president, operations. The company conducts technical and management education. Before that, as an Eastman Kodak manager, he directed the creation of a software engineering curriculum for the National Technological University. He is western New York area chair for the Alumni Fund.

CARLOS W. MORENO, MS, founder and president of Ultramax Corporation, Cincinnati, Ohio, has been elected a Fellow of the American Society for Quality Control. He was cited for the development of new concepts, for teaching and training both college and ASQC section courses, for important presentations to conferences, and for his years of dedicated leadership at the section and division levels of ASQC.

1966
LINCOLN S. HOLLISTER, PhD, will be given the past president's medal from the Mineralogical Association of Canada at their annual meeting in Vancouver in May.

1967
THOMAS J. BUCKHOLTZ has joined President Bush's administration as commissioner, information resources management service, General Services Administration. In this position he is in charge of the federal telecommunications system and sets policy governing executive branch computing and telecommunications. He and his wife have moved to Washington, D.C.

1970
WILLIAM G. BRADLEY, JR., has been named director of magnetic resonance imaging and radiology research at Long Beach Memorial Medical Center. He has spent the past eight years as director of MRI at Huntington Memorial Hospital in Pasadena, California. Last August, Bradley received the Gold Medal from the Society of Magnetic Resonance in Medicine. He is past president of the Society of Magnetic Resonance Imaging, and chairman of its corporate council and nominating committee. Bradley is a visiting associate in chemistry at Caltech.

DAVID C. WILCOX, PhD, of La Canada, California, is teaching in the aerospace engineering department at USC. He has also taught at UCLA, where he was nominated for a distinguished teaching award for 1989.

1974
ERNEST ROSS, MS, of Torrance, California, was promoted to vice president of Puritan-Bennett Corporation and general manager of the aero systems division.

POL D. SPANOS, MS, PhD '77, was awarded the American Society of Civil Engineers' 1989 Walter L. Huber Civil Engineering Research Prize for notable achievements in research related to civil engineering. He holds the L. B. Ryon Endowed Chair in Engineering at Rice University.

1975
ROSS M. MILLER, of Niskayuna, New York, recently had his first book, *Computer-Aided Financial Analysis*, published. He is a member of the technical staff at the GE Corporate Research & Development Center in Schenectady, New York. He and his wife, Mary O'Keeffe, have a three-year-old daughter, Alison, and are expecting a second child soon.

1979
MAJOR RICHARD A. SEARFOSS, MS, was selected as an astronaut candidate for the Space Shuttle program on January 17. He was selected from among 1,945 applicants and will report to NASA's Johnson Space Center in July to begin a year of training.

1980
THORNE LAY, MS, PhD '83, has been appointed professor of earth sciences and director of the Institute of Tectonics at UC Santa Cruz.

1984
DANIELA M. BONAFEDE-CHHABRA, of New Haven, Connecticut, writes, "I am finishing my PhD in neurobiology at Yale University. On September 4, 1989, Ashvin B. Chhabra, a theoretical physicist, and I were married on our [shared] 28th birthday. We are very happy and plan to move to St. Louis or Chicago in 1990."

THOMAS G. RUMMELHART, MS, of Clearwater, Florida, has taken a position in the communications department aboard the motor vessel *Freewinds*, a 7,000-ton charter cruise liner, sailing the Caribbean.

DAVID H. ZOBEL and his wife, Tanya Gurvich, of Redondo Beach, California, announce the birth of their son, Michael John Zobel, on January 3.

1986
SHIRLEY J. WHITMORE, MS, has accepted a new job with Arco Products Company in their process design group as a process design engineer at their engineering and technology center in Anaheim, California.

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In this
issue

Caltech *News*



Several members of the Caltech faculty find adventure as private pilots. They are ardent spokesmen for their chosen sport, as they describe their adventures in this issue.

Page 1

Harold Hubbard (Ex '20) is probably the oldest working newspaper reporter in California. In this issue he tells his story.

Page 6

As Mrs. Earnest C. Watson, Jane Werner Watson has one of the best-known names associated with Caltech history. She is also responsible for bringing Caltech one of its most famous romances.

Page 7

Members of the class of 1987 have been in the working world long enough to gain insight into the value of their Caltech educations. For this issue, we asked five class members to give their views on what their Caltech educations have meant to them.

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