

Caltech *News*

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James Donald
Taylor shares his
mortarboard with
a young friend.

Everhart: What you become depends on what you will to be

President Thomas E. Everhart welcomed 192 new bachelors of science, 157 new masters of science, 1 engineer, and 148 new doctors of philosophy on commencement day—an increase in the ranks of alumni of 498. Everhart announced that 87, or 45 percent, of the graduating class had graduated with honor, indicating a grade point average better than B+.

A cloudy sky cooperated to create a comfortable environment for the graduates, their families and friends, who sat together on Beckman Mall. Leis adorned many of those in caps and gowns. They were worn in memory of Birgitta (Bibi) Jentoft-Nilsen (BS '89), who was killed in a motorcycle accident on June 12, several days before commencement. Soap bubbles lazily spiraled up from one quarter, and confetti floated down from the roofs of

adjoining buildings as the recession began. A boom from the Fleming House cannon marked the ceremony's conclusion, as participants adjourned to the Athenaeum for a reception and lunch.

Dr. Everhart presented three awards to students whose names were not announced in the commencement program. Golda Bernstein won the Mabel Beckman Prize, awarded annually to a junior or senior woman student in recognition of demonstrated academic and personal excellence, contributions to the Institute community, and outstanding qualities of character and leadership. The Hinrichs Memorial Award went to Jerrold Von Hauck, as the senior making the greatest contributions to the welfare of the student body. The Milton and Francis Clauser Doctoral Prize was awarded to Chaitan Khosla for his

thesis in chemical engineering. This prize goes to a student whose PhD thesis, completed within the previous 12 months, reflects extraordinary standards of quality, innovative research, ingenuity, and the potential of opening new avenues of human thought and endeavor. Khosla's thesis is entitled "Vitreoscilla Hemoglobin: Gene Structure and Regulation, Function, and Applications to Aerobic Bioprocesses."

In his charge to the graduates, Everhart remarked that "Your education has not neglected the human spirit, nor interactions of humans—individually and collectively. Through the humanities and the social sciences you have learned basic principles and different ways of thought that will be important in these turbulent social times. And, most importantly, you have been challenged—challenged to understand just what the honor code means, and just what actions are appropriate—if you are to meet the trust placed in you by your fellow students, the faculty, and the rest of the Caltech community. *Living* the honor code has prepared you for life in vitally important ways.

"There are challenges and opportunities awaiting you," he continued. "You read about them daily in the newspapers. The environment is changing, our consciousness is being raised about waste, about greenhouse gases. You are conscious that the resources of the world are being depleted. Our nation's crude oil production peaked about the time many of you were born, and has been decreasing since. Now this country imports about 50 billion dollars worth of petroleum each year, for which we must pay in goods, services, or property. As a nation, we have not been earning enough selling goods and services, so we have been selling off our property.

"Most of these challenges will be solved by adapting science and technology to the basic human needs of food and shelter, mobility, information transfer, knowledge generation, and so on. However, we shall have to treat the world as a system, and understand far better than we do now what it can produce and what it can absorb, and still be fit for human life. With your knowledge and abilities, you are an important part of the solution to these important world-wide problems—problems that couple science and technology to the well-being of human society.

"Eighty-five years ago, speaking at an outside commencement somewhat larger than this one, Benjamin Ide Wheeler asked a graduating class at the University of California at Berkeley: 'You have one life to use; how can you make it count for the most and best?' He went on to say there is no standard recipe, that each person must find the answer for themselves. And then he advised: 'Effective living is largely a matter of will . . . What each one of you is to be in life will depend chiefly on what you *will to be*. During the rest of his talk, he amplified that advice, saying among other things that: 'The
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Noting the unparalleled pace of world change over the past year, Cornell University President Frank H. T. Rhodes told members of Caltech's class of 1990 that "your diploma gives you not only an obligation to lead, but also to serve." Otherwise, he admonished the graduates, one may get all A's in school and still flunk life.

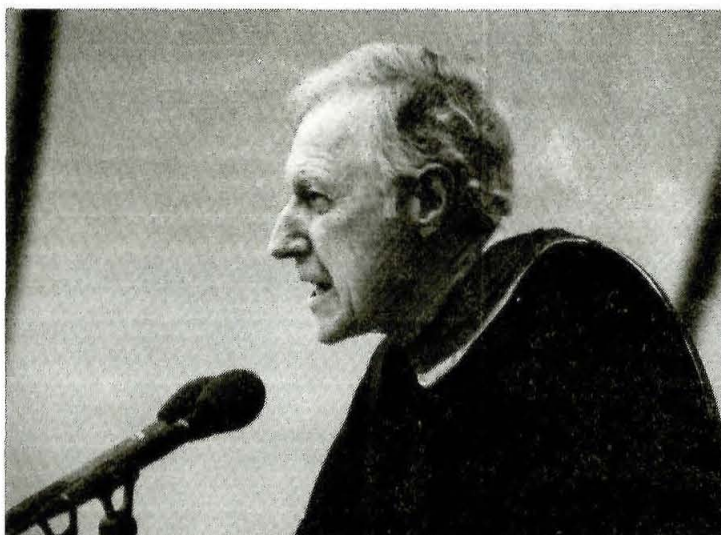
"This is a time of unparalleled change, taking place at unprecedented speed, that has made the world a far different place from what it was when you began your Caltech careers," he said. "Not since the late 18th century has the ideal of freedom carried such force in world affairs. The communist system is breaking down throughout Eastern Europe. Even within the USSR, Lithuanians, Estonians, Latvians, and separatist groups in Georgia and the Ukraine are seeking greater independence from Mother Russia—and the pace of reform is accelerating. There are renewed stirrings of democracy in South America and Central America. In South Africa, we are seeing the first hopeful signs that apartheid may soon be dismantled. Even in China, I expect that liberalizing reforms will continue, although perhaps less visibly and at a slower pace.

"A new generation of leaders has been born. In a complex and often brutal world, these individuals are proving that change is possible even after years of adversity and that it can be effected by individuals of courage and commitment, vision and will.

"And although many of you will find your life's work in technical and scientific fields, you also join the ranks of potential new leaders today. But the opportunity to develop all one's faculties, which you have had so abundantly here at Caltech, is no guarantee that the traits of leadership will emerge."

In fact, said the speaker, it is possible to get all A's and flunk life. Flunking life, he told the graduates, "is to ignore the link between professional practice and personal commitment. Flunking life is to deny that your diploma gives you not only an obligation to lead, but also to serve. Getting A's in life has at its heart not catchy slogans, but commitment reinforced by deeply and courageously held convictions. Those are the things that form the private face of public leadership. Those are the things from which change arises."

What recent political upheavals teach us, according to Rhodes, "is that leaders of courage and commitment can change and have changed the world. In 12 brief months, we have seen what might be the most extensive social change that has ever occurred in human history. And although some of its architects were politicians, most were not. They were instead a playwright and a political prisoner, a shipyard worker, a music professor, and a 60-year-old editor of a



Cornell University President Frank Rhodes addresses Caltech graduates at commencement services.

Rhodes charges graduates to lead, but also to serve

newspaper. These are people who have scored straight A's in life. What drives them and what unites them, it seems to me, is that they are not only men and women of commitment, but men and women with the courage of their convictions."

And courage may be expressed in ways that are not political, he told the graduates, citing the educational contributions of Caltech's founders, and the humanitarian commitment, intellectual courage, and broad vision of many of Caltech's trustees.

He reminded them that courage can also be "the courageous commitment of a doctor to a patient; of a professor to a pupil; of an engineer to the design

team; of a business executive to someone on the shop floor; of neighbor to neighbor; of son or daughter to elderly parent. Each of these can reflect a grounded belief in human dignity and a passionate concern for individual freedom, courageously and unswervingly held."

Rhodes told the graduates that the jurist Oliver Wendell Holmes, Jr., once remarked, "Every calling is great when greatly pursued." "That is the calling, the life, we wish for you today," Rhodes said.

"To gloss over that, to ignore it in pursuit of other goals, is to flunk life, however many degrees you have. By refusing to recognize both the burdens

and the consequences of that dignity and freedom is to flunk life, not just in the destinies of nations but in the quiet, humdrum events of each day's rounds. For the testimony of those who have preceded you as sons and daughters of Caltech is that life is a paradox: It is by losing ourselves in larger causes that we find ourselves; by giving, we receive; by squandering our lives for some great purpose, we free ourselves; by committing ourselves to others, we find fulfillment; by serving, we lead. And if those truths have an ancient ring, that is no accident. For they reflect the experience and convictions of those who went before us, of those who gave us this opportunity today. They represent the wisdom of the ages."

"Guided by those truths," Rhodes said, "all things are yours. Without those truths, professional success will prove empty; life's prizes will crumble in your grasp. With them, your way will be truly prosperous; with them you will have good success.

"Albert Schweitzer said it well: 'I don't know what your destiny will be, but one thing I do know. The only ones among you who will be truly happy are those who have sought and found how to serve.'"

"Your emergence, with all your energy, boldness, dreams, and professional skills, as our newest leaders—committed to those ancient verities demonstrated afresh from Beijing to Berlin, Capetown to Warsaw, Managua to Prague—rekindles the hope of humankind. That is cause for celebration. That is reason for hope."

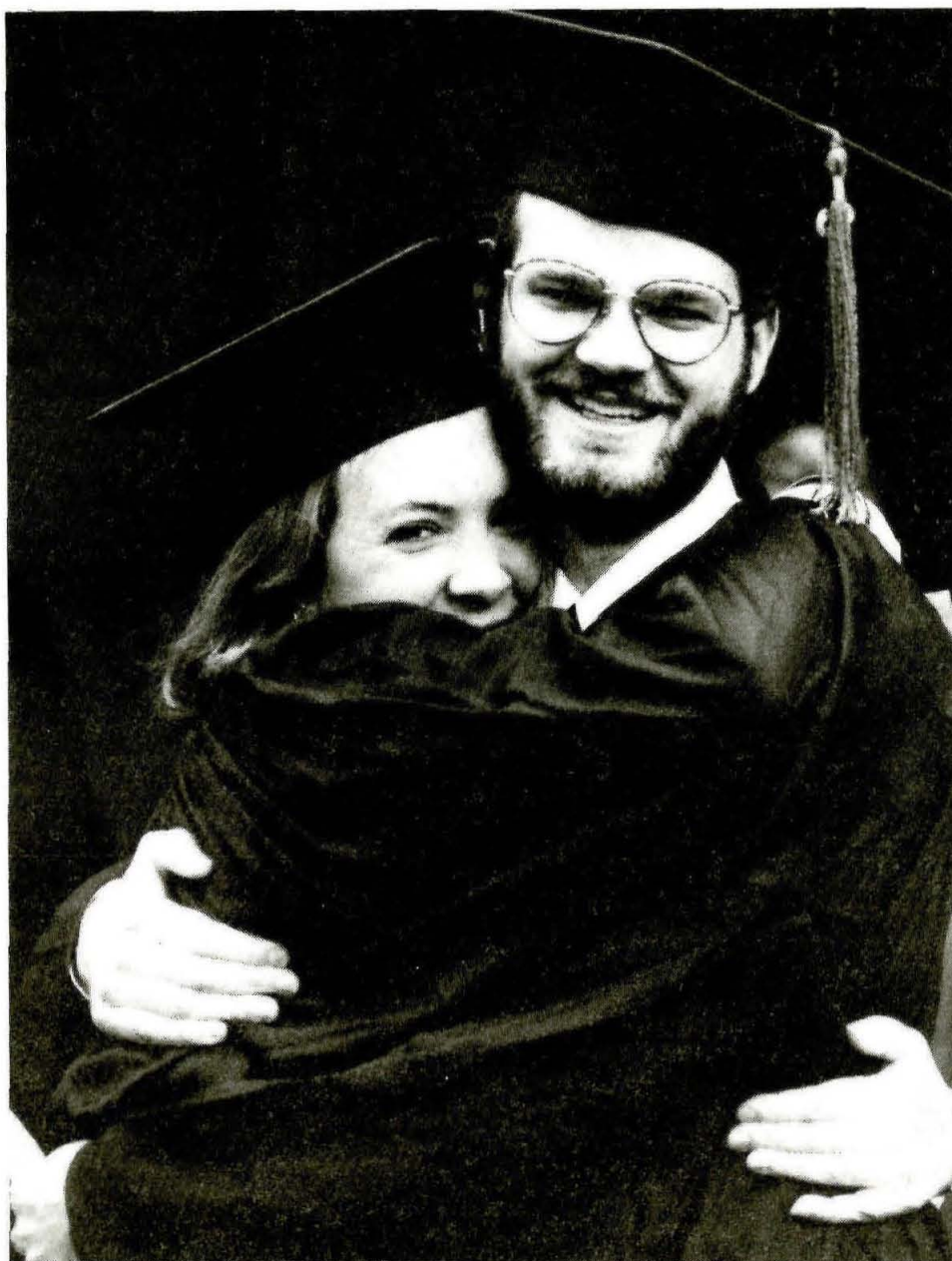
Everhart: The life of will is a life of work

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life of will is a life of work.'

"At Caltech, you have learned to work. I hope that President Rhodes' eloquence has persuaded you that it is by committing yourselves to others that we find fulfillment, that by serving, we lead. You have had the will to work successfully toward the goal of graduation. You now have the opportunity to work toward longer term goals that can improve human communication, safety, shelter, health, human vision and spirit, to say nothing of knowledge or the world environment.

"As you leave Caltech and your careers progress, may you find the will to work toward these larger goals. May you employ your considerable talents to solve some of the most vexing, and important problems that have ever been encountered by humans. On behalf of all of us who remain at Caltech, I offer our very best wishes for all your future endeavors."

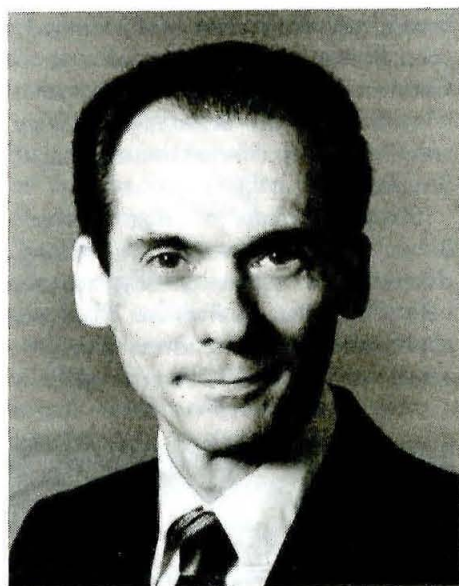


Kate Loomis and Mark Fey share a moment of joy after the awarding of degrees.

FRIENDS

Edward Stone selected as next JPL director

Edward C. Stone, Jr., vice president for astronomical facilities and Caltech professor of physics, has been selected as the next director of JPL, and he will remain a vice president of Caltech. The



announcement was made as *Caltech News* went to press. Stone will succeed Lew Allen Jr., who is retiring as a Caltech vice president and JPL director. Allen has agreed to serve until December to effect a smooth transition.

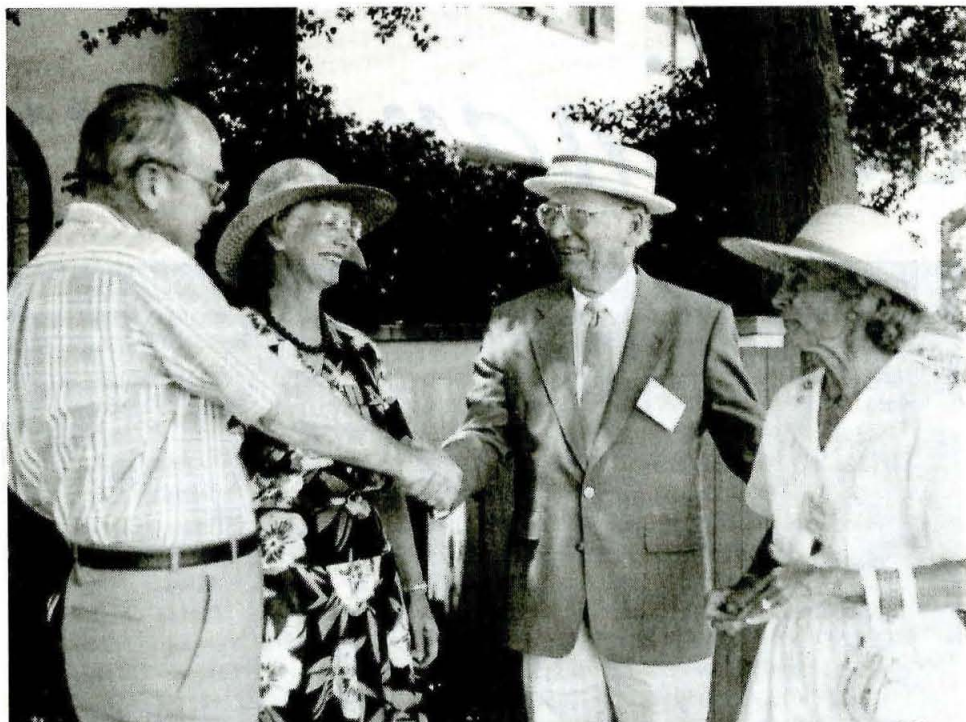
In 1972, Stone became the Voyager Project Scientist at JPL. Since the launch of the two Voyager spacecraft in 1977, Stone has coordinated the efforts of 11 teams of scientists in their investigations of Jupiter, Saturn, Uranus, and Neptune. Overall he has been a principal investigator on nine NASA spacecraft and a co-investigator on five others.

From 1983 to 1988, Stone served as chairman of Caltech's Division of Physics, Mathematics and Astronomy. Elected to the National Academy of Sciences in 1984, he is the recipient of many scientific honors and awards.

Caltech senior wins Watson Fellowship

Jennifer Ann Low, who received her BS degree in June, has been awarded a Thomas J. Watson Fellowship for 1990-91 for a year of independent travel and study. As a Watson Fellow, Low will conduct research into the epidemiology and sociology of AIDS in Rwanda, Zaire, and Belgium.

Low, who earned her degree in biology, is one of 76 winners chosen from 94 nominees from 50 small colleges and universities. The grants support a year of focused study and experience in a field in which the Fellow has demon-



Ralph and Bobbie Jones (right) with Tom and Doris Everhart at the old-fashioned band concert and picnic held for members of the President's Circle of The Associates in the garden of the president's residence. The event was held on the weekend of Alumni Seminar Day for the convenience of out-of-town alumni who are members of the President's Circle.

strated potential for leadership. Last summer, Low conducted research on HIV at the UC Medical Center at San Francisco as a participant in Caltech's Summer Undergraduate Research Fellowships (SURF) Program.

At Caltech as a freshman, Low was editor of *The California Tech*. She has been secretary of her student residence, Dabney House, chairman of the Biology Undergraduate Student Advisory Committee, and a member of the Caltech Speakers Bureau. She has played on the varsity tennis team for three years. After her year as a Watson Fellow, she plans to enter medical school with the long-range goal of doing clinical research.

Caltech junior wins Mabel Beckman Prize

Golda Bernstein, a junior majoring in applied mathematics at Caltech, was awarded the Mabel Beckman Prize for 1990. She received the \$3,000 award at Caltech's 96th commencement exercises on June 15.

Each year the Mabel Beckman Prize is presented to a junior or senior Caltech woman who "has achieved academic excellence, and demonstrated outstanding leadership skills, a commitment to personal excellence, good character, and a strong interest in the Caltech community." The award was established by the Institute in 1986 to honor Mabel M. Beckman, the wife of Arnold O. Beckman (PhD 28), chairman emeritus of Caltech's Board of Trustees. Mrs. Beckman passed away on June 1, 1989, at the age of 88.

After graduating from the University High School in Tucson, Arizona, Bernstein came to Caltech and became an active member of the Caltech Y Executive Committee and chair of the Community Services Committee. In that capacity she has spent one day each week for the past two years as a volunteer with the Pasadena Unified

School District. During that time she has presented science projects and tutored children, including the hearing impaired, who benefit from her ability to use sign language. Exercising leadership by example, she has also attracted other Caltech undergraduate students to involve themselves in this community service program.

In addition, she was co-organizer of a high-school field day staged earlier this year by the campus Society of Physics Students. Nearly 100 students from high schools throughout the Los Angeles area participated in this educational day of scientific challenges at Caltech.

An adventure on the Caltech campus

Two summers ago, an adventure began for Paul Groves, science teacher at South Pasadena High School. A Partners in Science award made it possible for him to come to Caltech and conduct research in the laboratory of Robert H. Grubbs, the Victor and Elizabeth Atkins Professor of Chemistry. This summer he is back for his third year, working as a member of Grubbs's research team and making molecules with nonlinear optic properties to be tested at JPL.

"When I went to college, I prepared myself to be a high-school teacher, so I never conducted research," says Groves. "To be in a sophisticated lab and interact with researchers—this has really been exciting. I had confidence in myself as a high-school teacher, but I didn't know where I stood as a chemist. This experience has built up my confidence as a chemist.

"The first summer, I was scared. I mean, this was Caltech! But everybody was very warm, friendly, and helpful."

"Paul Groves is one of the best high-school chemistry teachers I know," says Grubbs. "He teaches advanced placement chemistry and honors physics. Most of his students go on to college. His experience at Caltech has given him

insight into what his students' college classes will be like, and this is a real plus for him."

"Even the first summer, when he was learning, he made contributions. Now he's a real part of the team."

The goal of the Partners in Science awards is to involve high-school teachers in research projects at the frontiers of science, so they will bring new enthusiasm to the classroom. The award is used to pay Groves's summer salary.

Hurwitz to become president of Price Charities

As *Caltech News* went to press, it was announced that Theodore P. Hurwitz, vice president for Institute relations, has resigned effective December 31, 1990. Hurwitz will assume the post of president of Price Charities in La Jolla, California. Named as an honorary alumnus of Caltech in 1989, he has served the Institute on two different occasions, as vice president (1985-90) and director of estate planning (1969-74). As vice president, Hurwitz was responsible for the Institute's fundraising activities, alumni affairs, publications, and community, government, and media relations. Under his leadership the Alumni Association formalized 12 chapters around the country. He also coordinated the initial planning for a "Campaign for Caltech" with the Institute's centennial in 1991.

Four from Caltech elected AAAS Fellows

Caltech President Thomas E. Everhart and Daniel J. Kevles, J. O. and Juliette Koepfli Professor of the Humanities at Caltech, along with two Caltech trustees, have been elected Fellows of the American Academy of Arts and Sciences, one of the oldest honor societies in North America. The trustees elected were Stephen D. Bechtel, Jr., chairman emeritus, the Bechtel Group, Inc., and Gordon E. Moore, chairman, the Intel Corporation. The Academy was established in 1780 by John Adams and other leaders of the American Revolution and annually recognizes leading figures in the arts, letters, sciences, and public life. The election of Everhart and Kevles brings to 53 the number of Caltech AAAS members from the Institute's faculty and professional staff.

Seminar Day

Seminar Day visitors share exciting program

From global warming to the Voyager encounter with Neptune, from forecasting large earthquakes to concerns about the Antarctic ice sheet, 1,328 alumni and guests learned about the latest research under way on campus when they attended the 53rd annual Seminar Day and alumni reunion weekend on June 2-3. Thirteen faculty members shared their research findings, and three Summer Undergraduate Research Fellowships (SURF) students also appeared on the program to discuss their research.

Exhibits abounded on campus. The Caltech Seismological Laboratory had on display a "Real Time Picker," a computer-automated p-wave analyzer that makes a preliminary estimate of an earthquake's epicenter. Alumni visited the mineral and gem collection in the foyer of Arms Laboratory, and the Caltech bookstore where books by Caltech authors were on display. Robert Lang (BS '82, PhD '86), author of a recent *New Scientist* article on origami (paper folding), displayed some of the creations in an art that he has advanced considerably. Dan Langdale, Caltech's director of admissions, talked to high-school students about studies and life at Caltech. Videos were shown during the day, including "The Last Days of a Genius," a retrospective of Richard Feynman, and "The Story of Pi" and "Similarity" from the award-winning series, *Project MATHEMATICS!*

Caltech's brass quintet, part of the instrumental music program, performed during lunch hour on the Olive Walk as alumni enjoyed box lunches. All Seminar Day attendees were invited to a hosted wine and cheese reception outside Beckman Auditorium. After the reception, a festive informal dinner was served in the Glanville Courtyard of Beckman Institute. The Caltech Glee Clubs presented their annual home concert in Beckman Auditorium as the conclusion to an exciting day.



Recipients of the Distinguished Alumni Award, with President Thomas E. Everhart (right), are, from left: Kurt M. Mislow, Anthony J. Iorillo, Sidney R. Coleman, and Hugh F. Colvin.

Caltech confers its highest honor on four alumni

Four graduates of Caltech received the Institute's highest honor, the Distinguished Alumni Award, at Caltech's annual Seminar Day on June 2. The award is bestowed each year on a few former Caltech graduate or undergraduate students whose postgraduate careers have been marked by "high achievement in science, engineering, business, industry, or public service."

The award winners include two university professors—Sidney R. Coleman of Harvard and Kurt M. Mislow of Princeton—and two business executives—Hugh F. Colvin of Unitek Corporation and Anthony J. Iorillo of the Hughes Aircraft Company.

"This is the highest honor that Caltech awards," said President Thomas E. Everhart. "The 113 recipients of the Distinguished Alumni Award over the past 24 years comprise a most illustrious group. Their accomplishments extend into many fields of competitive endeavor, but each award winner shares a common trait—a career characterized by conspicuous achievement."

Coleman received his PhD from Caltech in 1962 after earning his undergraduate degree from the Illinois Institute of Technology. At 52, he is

currently the Donner Professor of Science at Harvard and one of the world's leading authorities in theoretical high-energy physics.

After graduating from Tulane University in 1944, Mislow came to Caltech where he earned his PhD in 1947. At present, he is the Hugh Stott Taylor Professor of Chemistry at Princeton. He is considered to be the preeminent stereochemical theorist and experimentalist in the world today.

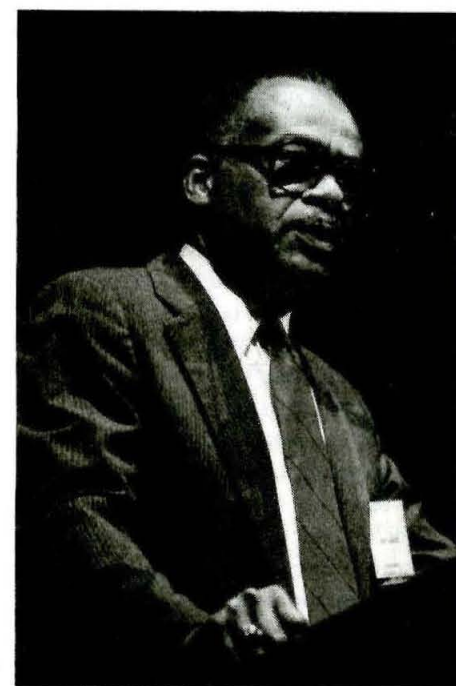
Colvin is a 1936 chemistry graduate of Caltech who later earned his MBA from Harvard. Now retired, he is the founder of Unitek. The company, which manufactured tools, equipment, and materials for orthodontists, was subsequently sold to Bristol-Myers. Colvin is also a past president of The Associates.

Iorillo is currently president of the Space and Communications Group of Hughes Aircraft. He is the inventor of gyrostat-stabilized aircraft that lifted prior limitations on the size, complexity, and capability of spinning satellites. Iorillo received his bachelor's degree in mechanical engineering from Caltech in 1959 and his master's in aeronautics in 1960.

Slaughter: science and social values must be linked

Science and social values must be linked together in the coming decades if the enormous advances in science that are so much a part of our time are to be used for the betterment of humankind, John B. Slaughter, president of Occidental College, told his audience when he spoke on "Science, Technology, and Social Consciousness" on Alumni Seminar Day.

Slaughter pointed out that discoveries in our research laboratories are reaching the public much more quickly than ever before, and that our lives are "filled with applications that are products of the feverish activity that has occurred globally



John B. Slaughter

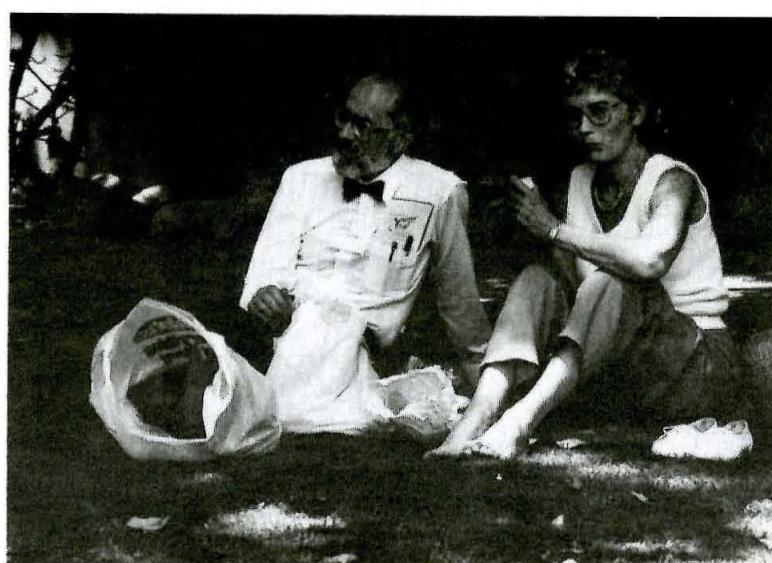
in research and technology."

The Occidental president recalled that "it was either Charlie Brown or Snoopy, each a noted philosopher, who said that there is no heavier burden than a great potential. Such," he said, "is certainly the case with the discoveries of the type that I've been referring to."

The fact that we are discovering new products with such rapidity has significant implications for society, he stressed. And the questions that these discoveries raise point out the potential conflicts between science and society, and the need for an appreciation of social consciousness in science and technology.

As examples of the many issues being raised, he cited whether we can afford to shortcut the FDA approval process to get a promising AIDS drug on the market, or whether we can justify research that may produce a cure for cancer but will require the sacrificing of thousands of animals, or whether we should allow offshore drilling.

"Answers to these questions require an exposure to, an appreciation for, and in fact an immersion in the study of



Bob Brown and Margie Cofer enjoy lunch on Seminar Day.

moral thought and human values," he said. "Without this understanding, the scientist or engineer is but a machine which dispassionately and mechanically crunches numbers and grinds out answers. But an effective scientist or engineer, a socially conscious scientist or engineer, is a person who is able to interpret as well as investigate, to evaluate as well as analyze. In order for the enormous advances in science that we will see in this decade to come to be used for the betterment of humankind, we have to have experts who understand the social and philosophical consequences of their research."

Many scientists and engineers draw the foundations for this moral and ethical thought from religion, he noted, observing that "they obtain guidance from Martin Luther King, who said that science deals mainly with facts and religion deals mainly with values. They obtain even more solace from the words of Albert Einstein, who remarked that science without religion is lame, and religion without science is blind."

"Whether it comes from religion or some other source of ethical and moral values, the scientist who cannot see beyond the facts has very limited use and may even be a threat to society. We must prevent those scientific developments in our laboratories or the emergent technologies in our testing facilities from hypnotizing us to the point where we fail to consider the moral and social consequences of our advances."

Human life is a primary consideration in all we do, and must guide our research, our ideas, our designs, and our products, Slaughter stressed.

But the need for understanding cuts both ways, he emphasized, stating that "it's unfortunate that many social scientists do not understand that the need for understanding both science and humanities is bilateral."

Slaughter then quoted the great educator Charles William Eliot, who noted in his inaugural address as its president that Harvard University "recognizes no

real antagonism between literature and science, and consents to no such narrow alternatives as mathematics or classics, science or metaphysics. We would have them all at their best."

"As an engineer and now the head of a liberal arts college, I believe that we must ensure that all of our students are well versed in the fundamentals of literacy and numeracy and, moreover, are infused with the desire for lifelong learning," said Slaughter.

"We need to assist our young people in our schools today in the development of manners as well as mathematics, compassion as well as composition, civility as well as the history of civilizations, accountability as well as accounting, and tolerance as well as topology."

"We need to help them make the connection between the arts, the humanities, and the sciences. They need to study both Milton and molecules, both Carlyle and calculus, both Bach and biology, and both Michelangelo and microcomputers. They need to understand the insight of Percy Lavon Julian, the eminent African-American biologist from the early part of this century, who spoke of the sciences and the humanities by saying that the goal of both is to enrich and to ennoble the good life of man."

Slaughter quoted James Botkin, coauthor of the book, *Global Stakes, the Future of High Technology in America*, who said in an interview that "there needs to be a rethinking of the social sciences and humanities in the general education of college students to ensure that they have both technological training and grounding in values and ethics. If they do not have both, we could wind up with either a technological illiteracy or technocracy."

Said Slaughter, "We are agreed that the questions that need answers, the ones that influence policy makers and opinion makers, must be based upon solid science as well as upon human concern. But scientists are becoming well aware that they alone can't give the answers to the question, 'What are we

going to do with the knowledge that we gain?'"

"Clearly," Slaughter pointed out, "science, technology, ethics, and public policy meet in a number of areas, particularly in the environmental sciences, in our quest for new sources of energy, in natural resource issues, and a host more."

"Engineers, social scientists, and humanists have a great deal to speak with one another about," he said. "They cannot afford to feel threatened by one another."

Slaughter praised Caltech for its heritage and its contributions. "I think about Caltech when I think of the many wondrous things that have taken place, and the wondrous people that have been on this campus," he said. "Certainly one thinks of the presence of Millikan, George Ellery Hale, Richard Feynman, Albert Einstein, and very recently the visit of Archbishop Desmond Tutu."

"To think of the contributions of persons of this magnitude to persons of this educational community fills one with awe and wonder about the limitlessness of higher education, and about the limitlessness of an institution that is dedicated to truth and knowledge. I stand in awe of you."

Slaughter closed his remarks with one more comment from Percy Lavon Julian: "Science, Julian noted, is more than methodologies, symbolisms, and technological devices. It is vastly more than the creation of mere things. Computers and mechanical robots are only incidental byproducts of its spirit of inquiry. And, he asked, is it not our mission to give our energies toward creative imagination in the world of ideas concerning the whole man, searching for that symphony of ideas about himself and human destiny?"

calls the results a "significant stepping-stone on the road to an eventual therapy."

●For the second year in a row a Caltech junior has won one of 20 *Time* Magazine College Achievement Awards. Mike Chou, a physics major, received the \$3,000 prize for a software program he wrote that helps study the acceleration process of solar flares by analyzing ratios of rare isotopes. *Time* said his subsequent discoveries have "given astrophysicists new information in their struggle to understand how the sun actually works." Last year's winner, Craig Sosin, was honored for his work confirming the existence of a warp in the plane of the Milky Way Galaxy.

●Ditch Day at Caltech on May 21 was as uproarious as ever, reported the local newspapers, the *Star-News*, and *The Los Angeles Times*. Stunts this year included a stack that required following a scavenger hunt to find all the pieces of a car engine, assembling it, and attaching it to a driveshaft sticking out of the senior's door. The senior neglected to provide a battery, so the frosh found his car, and used that one. Ultimately, the stack wasn't broken because some of the engine's parts were the wrong size. Another stack was an elaborate room-size maze through which the frosh had to maneuver a remote-control tank, using only the image on a TV screen being sent by a tiny camera on top of the tank. Other students were busy throwing calculators and computers off of Millikan, using a jackhammer to take apart a three- by five-foot block of concrete in which a computer chip was hidden, and trying to figure out how to get a test drive in a new Ferrari. The antics weren't limited to stacks: a reporter from Channel 7 was tied, upside down, to a tree and doused with water, after she asked, "What do you do to seniors you find on campus?"

●Cold fusion has gotten hot again, at least where tempers are concerned, reports the April 3 edition of the *Fresno Daily Legal*. At a three-day conference hosted by the University of Utah, supporters of cold fusion presented their case, but did not convince everyone. Cold fusion critic Steve Kellogg of Caltech said, "I feel a little bit like Alice in Wonderland or behind the looking glass being asked to accept so many impossible things before breakfast." The theoretical physicist continued, "I guess I am willing to accept maybe one miracle. But what I see from this conference is that the various groups that are reporting positive results are at variance with each other."

CALTECH IN THE NEWS

●"A 'Step' Toward Beating Multiple Sclerosis" is the title that *Newsweek* used in its article on the groundbreaking research being done by Lee Hood's group. The team has announced that "they have both cured and prevented a version of MS in mice." The Caltech team drafted huge numbers of a certain monoclonal antibody that specifically fit into the helper T-cells that cause the MS-like disease by attacking nerve cells. The attacking T-cells were destroyed by the monoclonal antibodies, but other, benign T-cells remained intact. The disease in humans is much more complicated, and the precise T-cells that cause MS have yet to be identified. Hood emphasizes that analogous human treatment is at least a decade away, but



Elizabeth Hotz and George Hotz plan their Seminar Day schedule.

Her office as president of The Associates has given Joanna Muir the opportunity to pursue a life-long interest in the biological sciences.



Joanna Muir: much to explore

By Winifred Veronda

If she had been born 10 or 20 years later, Joanna Muir believes she might have become a biologist. But young women in the 1930s and 1940s received scant encouragement to enter the sciences, and instead she went on to attend Pomona College ("It was known as a matrimonial college at the time") and to take a liberal arts curriculum. In college she met her future husband, Downie D. Muir III, and the two were married shortly after he graduated. "I made the choice to major in marriage, motherhood, and community," she says.

But today Muir finds herself in the thick of the scientific milieu, overseeing the activities and programs of the 1,150 members of The Associates in her second term as president. The Muirs' family home is in Newport Beach, but a small apartment on San Pasqual, across the street from the Braun Laboratories, allows her ample opportunity to satisfy her interest in the sciences by attending programs on campus.

Muir was in regular attendance (and frequently took notes) at the noon series on Science, Ethics, and Public Policy sponsored by the Division of the Humanities and Social Sciences. She also attended the series on Issues in Ethics and Policy Arising from the Human Genome Initiative. Each year she continues to enjoy the programs offered by the Earnest C. Watson Lecture Series.

She usually goes to hear any outstanding speaker who comes to campus (she was in the audience in May when Bishop Desmond Tutu was speaking), and she has attended some biology and chemistry seminars. She also enjoys Industrial Associates seminars on different aspects of economics and industrial research, and has attended many of them. Her interest in geology has been whetted through several trips she and her husband have taken through the President's Circle of The Associates with Caltech geologists as guides.

Muir attends about two programs a week, and says, "I wish I had the time to attend the many additional lectures that are available on the campus."

How does it feel to be "back in school"? "It feels marvelous, and very stimulating. The human mind is always

eager to learn, and it's exciting to satisfy that desire."

Muir believes the potentials in biology over the next 50 years are extraordinary, and she hopes to convey her own excitement about the field to her grandson, who is in college and interested in biology as a possible career.

Muir was born as Joanna Elliott in Indianapolis. Her mother, who was giving birth to her first child by cesarean section at the age of 40, died in childbirth, and Muir spent the first six weeks of her life in an incubator.

After her mother's death, Muir's father did not feel he could raise her alone, so she traveled by train to California in an improvised incubator with her new parents—her mother's sister and husband. Her new father was a prominent merchant in Long Beach.

In Long Beach she lived in a pleasant environment with her second parents, who told her the story of her origin when she was very young—from a time as early as she can remember. She also knew she had two names—her birth name, and the name of her second parents. Even as a child she was interested in science. She laughs when

she remembers her interest in raising mice in her improvised laboratory on her large back porch as a grammar school student.

All of this caused the young girl to ponder the influence of heredity versus environment, and to wonder how she would have been different if she had lived her other life. These musings, she feels, led to her interest in the biological sciences. She has found tremendous gratification as Caltech has opened doors for her to learn about its biological research.

Muir's interest in geology was awakened by the Long Beach earthquake in 1933. She was in elementary school at the time, and was with her class that afternoon at a production of *Little Women* at Jefferson Junior High School. The director decided to shorten the play so that the children could get home by dinnertime. Ten minutes after the audience left the auditorium, the earthquake struck and the ceiling of the hall collapsed. "I don't think any of us could have escaped alive," says Muir.

Time passed quickly during Muir's high school and college years, and Muir found herself a young matron, married

to an industrial engineer and living in Los Angeles. There she was active in the Ebell Juniors, a women's philanthropic organization.

The couple moved to a home in San Marino near the Caltech campus, and Muir became active with the Boy Scouts and served on the boards of the PTA, the Pasadena Assistance League, and the San Marino Guild. Her hobby was gardening, and she developed a large rose garden of some 80 bushes, the rose being her favorite flower.

The Muirs' three sons were growing up during these years, and the family enjoyed their vacation home at Lake Arrowhead, where they were involved in sailing, water skiing, hiking, and yacht club activities.

The Muirs bought a beach home in Newport Beach 18 years ago and lived for a time between the two communities. They eventually sold their home in San Marino and made their Newport home their exclusive residence. "Now I have roses in pots on my pier," Muir says.

In his early forties, Downie Muir changed careers and became involved with investment securities. He continues to work independently. He is active with the Long Beach and Newport Harbor Yacht Clubs, and has been a national yacht racing judge, traveling all over the United States officiating at sailing regattas.

The couple has traveled extensively—to Japan, Hong Kong, Cambodia, Thailand, Bali, New Zealand, Australia, Fiji, Tahiti, South America (including the Amazon River), the Caribbean, Mexico, and Europe. This fall they will visit Egypt for the first time as they travel with the President's Circle group, which includes Caltech Professors Ahmed H. Zewail and Kerry E. Sieh as their guides.

The Muirs' oldest son is described by his mother as "an adventurer." He has sailed the world in his own boat, and lived in many different countries. Recently he sailed from Newport Beach through the Panama Canal to deliver a yacht to a friend in the Caribbean. Muir says she wanted to accompany him, but

Continued in next column

was concerned about the political situation in that part of the world. Another son lives in Riverside County and a third in Orange County, one of them an accountant and the other working in investments. The Muirs have two grandsons and two granddaughters.

The Muirs joined The Associates in the early 1970s when they were living near the campus. "Living so near to Caltech, I was always fascinated with what was going on in the research laboratories," she says.

Muir is the third woman to serve as The Associates' president. Membership is by invitation and is extended to those who want to support the goals of the organization by making unrestricted gifts solely for Caltech. Muir emphasizes that a continuing commitment to the Institute is vitally important. Life Members who continue to contribute annually provide invaluable support for Caltech's research and education, she stresses. Muir notes that individual members of The Associates have joined with trustees and alumni in the funding of many campus buildings, and in endowing professorships for outstanding scholars.

The Associates maintain an active schedule of programs, both on and off campus. Dinner programs with speakers from each of the six academic divisions are regular features, along with a new-member dinner in February and a black-tie dinner in October. A feature during the past five years has been trips guided by faculty members. These have included the Lewis and Clark Expedition on the Oregon Trail; Monterey Bay and the Monterey aquarium; Death Valley; Mono Lake, Mammoth, and Yosemite; Cajon Pass; Glacier National Park; CERN; Santa Fe and Los Alamos; Palm Springs and the Imperial Valley; the Owens Valley Radio Observatory; the Normandy region of France and southern England; Cabo San Lucas in Baja, California; and Hawaii. There The Associates visited the William M. Keck Observatory and the Caltech Submillimeter Observatory, as well as Volcanoes National Park and Maui.

Among assorted interests other than Caltech, Muir was involved with the Claremont College Continuing Education Board during the early seventies, the Institute of Antiquity and Christianity which is associated with the Claremont Graduate School, Planned Parenthood of Orange County, and The Associates of the UC Irvine Medical School.

Nancy York, executive director of The Associates, praises Muir for the dedication she exhibits in her role. The fact that she was elected to a second term is a tribute to her leadership, York stresses. York also praises Muir for the research she conducts to be aware of what's going on on campus, and for the effort she puts forth to make sure she's

knowledgeable about the scientific programs that The Associates offer.

"She's worked hard to continue the momentum of The Associates in their support of the Institute," York adds. "And besides that, she's a very pleasant person to work with."

"Caltech is very influential throughout the world," says Muir, as she discusses her own involvement with the Institute. "Time magazine called it a national treasure. It's certainly rewarding to be involved with a national treasure. My participation with the Institute is an honor and a privilege."

This family got a bargain by moving a house

If someone offers to give you a house providing you'll move it, it's far from being free, but it may be a real bargain. That's what Selam Aklilu and her husband, Haile Tamru, discovered when they took one of the 16 houses Caltech was giving away in 1988.

Including the lot, the cost of relocating the house in downtown Los Angeles near USC was \$170,000. But a recent appraisal places the value of the structure at \$270,000—a gain of \$100,000 in equity. "Moving the house was a good project for us," says Aklilu.

At the time of the move, Aklilu was attending chiropractic college and Tamru was at Cal State Los Angeles, majoring in accounting. Both are from Ethiopia. Today Aklilu has her own chiropractic clinic and Tamru has a small accounting business and is studying for his CPA credential. They have two children, a boy, Dawit, two and a half years old, and a girl, Bethale, fourteen months. The couple had been

looking at houses when they saw the Caltech ad, but had never thought of moving one.

When the Beckman Institute was conceived, Caltech owned 16 houses that had to make way for the project. All were in the Constance-Wilson-Lura area, northwest of the campus. The houses were from the 1910-1930 era, and most were California bungalows. The Pasadena Cultural Heritage Commission advised that they were architecturally significant, and that all of them should be saved if possible.

So Caltech advertised the houses in the *Los Angeles Times* and the *Pasadena Star News*. The Aklilu-Tamru family was one of the applicants. Before they applied, they researched the project carefully, and knew just how complex a task they were facing.

Caltech required all of its applicants to show proof of ownership of a lot, and the financial capacity to move a house. Many didn't qualify, but the Aklilu-Tamru family was successful.

The house they chose is described as English vintage, somewhat reminiscent of English Tudor in style, according to Aklilu. It has three bedrooms, and 1,550 square feet, and was constructed in 1930.

The first task facing Aklilu and her husband was to get a house-moving permit from the City of Los Angeles, which cost \$5,000. Getting the permit was so complicated that they hired someone who moves houses professionally to obtain it for them. The family knew the cost of moving the house would be in the \$17,000-\$25,000 range. They also had to take out a \$35,000 bond, deposited at city hall, guaranteeing they would finish the job.

Once in its new location, the house would need a new foundation, and new electrical wiring and gas and plumbing lines. It would also have to be given new stucco and paint, as well as a new roof. The roof was so high-pitched that it was cut down and removed for the moving process.

On May 5, 1988, at 11:30 p.m., the

house—off its foundation at 346 South Wilson and loaded onto the moving platform—began its tedious journey to its new location. Aklilu followed behind in her car. The house moved over surface streets at a speed of about five miles per hour, as workmen occasionally paused to lift tree branches out of the way so they wouldn't be damaged. No-parking signs had been placed on all the streets where it traveled—one of the services provided by that \$5,000 permit. In a couple of instances, workmen stopped to lift a street-parked car up and onto the sidewalk.

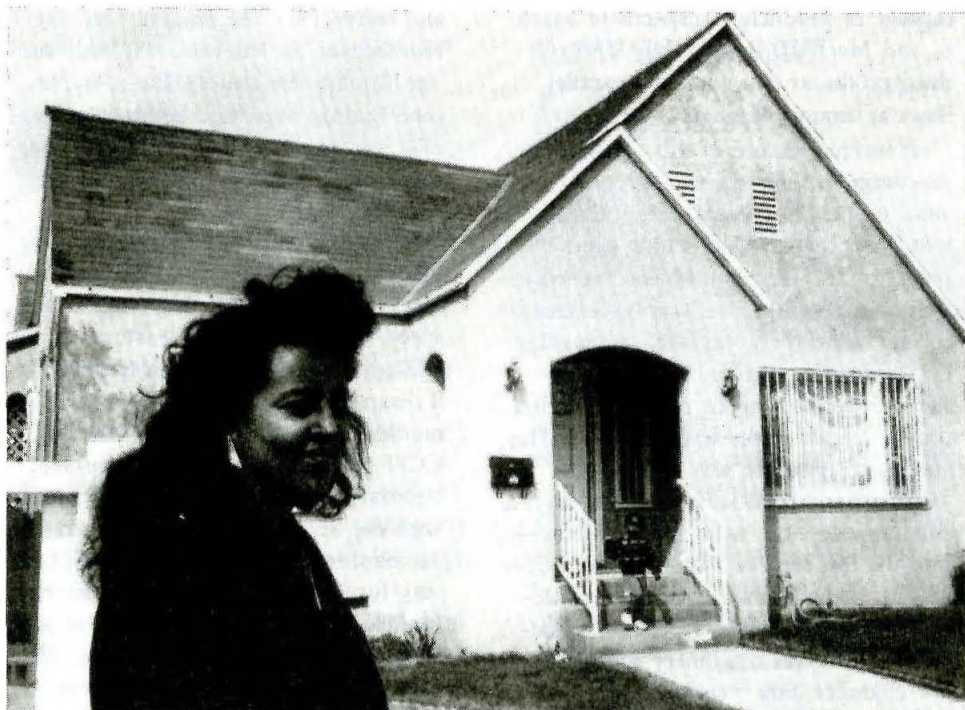
Twenty-three miles later, at 6 a.m., the house was parked at its new location at 3007 Brighton Avenue in Los Angeles. Roofless and without a foundation, and with a hole where the fireplace had been, it was a sad-looking sight. Aklilu knew what to expect, but the house's appearance was a shock to her husband and family. "What are you ever going to do with this mess?" her relatives asked her.

To save money, Aklilu had acquired an owner-builder permit, which enabled her to subcontract the electrical, plumbing, and other work. To fill this role, she had to be at the house every day, overseeing the efforts of the workmen. Inspectors came every two weeks to check on progress. Aklilu feels the family saved \$20,000 to \$30,000 through this process.

Besides the routine rehabilitation work, Aklilu and Tamru also converted closet space to a half-bath (the house had only one bathroom), installed central air conditioning, and added a fireplace. The new roof went on, along with new paint and stucco. By September, the work was finished, and a perky little gray house stood in place of the sad-looking structure of a few months before. The Aklilu-Tamru family moved in in January.

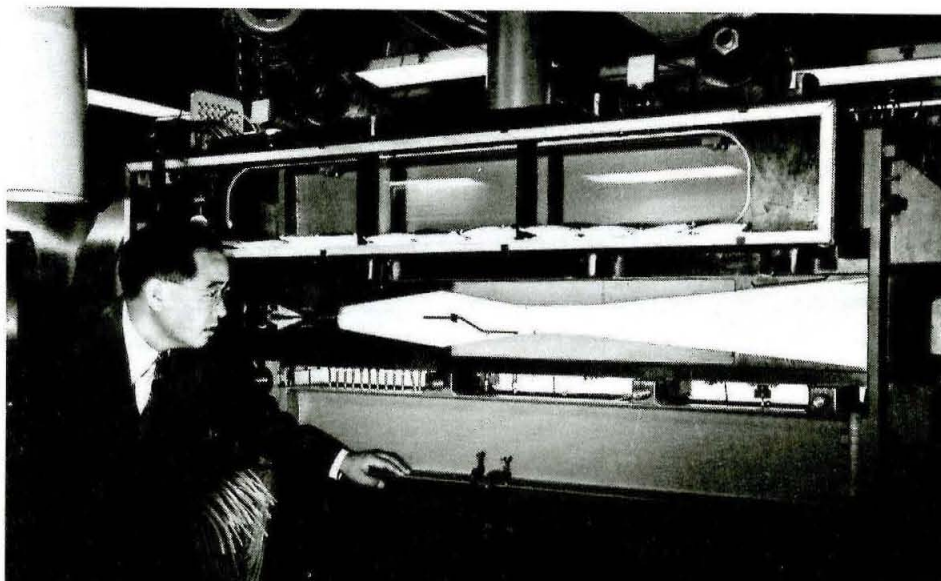
"There was no way we could have afforded a house when we moved this one," says Aklilu. "This was really a good way to start. The whole effort was well worth it." She praises Caltech personnel highly for their cooperation and helpfulness.

Caltech was able to give away only five of the sixteen houses it advertised in 1988. Too many of the people who applied couldn't qualify when they were evaluated. The Institute expects to have better luck with nine houses it is offering at Lura and Wilson, to make room for additional parking. It has learned more about making sure applicants are qualified and has found good prospects for all the houses. The houses should be moved by fall.



Selam Aklilu (pictured) and her husband spent \$170,000 to relocate this house, given away by Caltech, on a lot in downtown Los Angeles. Now the structure is worth \$270,000. Aklilu's two-year-old son, Dawit, stands in the doorway.

The hypersonic wind tunnel was, for a time, the fastest apparatus in the world.



This historic picture shows Henry T. Nagamatsu, Caltech aerodynamicist and director of the hypersonic wind tunnel, examining the test section during the tunnel's heyday in the early 1950s. Photo courtesy of the Archives, California Institute of Technology.

Historic wind tunnel finds a new home

By Betsy Hatch

Providing winds faster than a speeding airplane, more powerful than a 1000-horsepower motor, the hypersonic wind tunnel at GALTIC was, in its time, the "Superman" of wind tunnels. Built after World War II under a U.S. Army Ordnance Department contract, the hypersonic wind tunnel (known as the HWT) could test designs for rockets, missiles, and airplanes at airspeeds several times faster than those previously attainable. It was a pioneer in wind tunnel technology and was, for a time, the fastest apparatus in the world.

"Hypersonic knowledge was extended greatly from 1949 to 1965," stated alumnus Henry T. Nagamatsu, former director of the HWT. "The work done at Caltech, and other institutions, made possible the development of the Apollo vehicles (traveling at Mach 20), the ICBM nose cones (Mach 20), and the Space Shuttle (Mach 25)."

But what is cutting-edge technology in 1950 may be considered obsolete, unused equipment in 1990. The HWT operated at very low temperatures, and modern tunnels test at the high temperatures that mimic the conditions present when a rocket is flying through the atmosphere. Also, the HWT used a great deal of power—about 750 kilowatts per hour. During the height of the energy crisis in the mid-1970s operations were restricted to nighttime only. The hypersonic tunnel has not been used since 1975. But the HWT has found a new home at the Chung Cheng Institute of Technology (CCIT) in Taiwan through the help of alumnus James Wu (MS '59, PhD '65), professor of aerospace engineering and director of the gas dynamics division at the University of Tennessee's Space Institute.

"I thought such a good wind tunnel should be saved," Wu states. "I contacted a former graduate student of mine, Dr. C. H. Chen, president of the Chung Cheng Institute since I knew that CCIT was trying to establish a program in hypersonics. Dr. Chen was very interested, since it will save several years and a great deal of money." And so a deal was arranged for Caltech to sell the HWT to the Chung Cheng

Institute of Technology for \$50,000.

Hypersonics, the study of airspeeds greater than five times the speed of sound, is measured by Mach number, the ratio of the velocity of a moving body to the speed of sound. Mach 1 is equal to the speed of sound; greater than Mach 1 to Mach 4 are supersonic velocities; and Mach 5 and above are considered hypersonic. In the late 1940s and early 1950s, the fastest rocket went Mach 7; but the HWT could deliver speeds of Mach 10—equivalent to 7,600 miles per hour at sea level. The Army Ordnance Department was conducting basic research at the higher speeds in order to develop what were then called, "the inevitable intercontinental missiles of the future."

Henry T. Nagamatsu (BS '38, BS '39, MS '40, PhD '49), appointed director of the wind tunnel in 1949, recalls, "The HWT was designed in 1947 by Allen Puckett (PhD '49), a student of Theodore von Kármán's." The tunnel and its lab cost \$300,000 to build.

The hypersonic wind tunnel was housed in the basement of a wing of Guggenheim built especially for it. It consisted of three test sections, or legs, each used separately. Legs 1 and 2 were capable of producing airspeeds of Mach 6, and Mach 10, respectively, and the third produced two adjacent, parallel flows at around Mach 1.

A unique feature of this facility was its continuous airstream; most other wind tunnels of the era were intermittent types that produced only short bursts of air. The equipment needed to sustain this continuous blast was considerable. Fifteen compressors and a maze of 12-inch-diameter pipes, taking up the entire subbasement of Guggenheim, routed the air to the test chamber. The airstream's pressure was boosted to 1000 psi and then was forced through a small nozzle—the wind tunnel throat—into the test section. The air was sucked out of the other end of the test section to finally achieve hypersonic velocities. All of this machinery supported a test chamber only 5 inches high, 5 inches wide, and 20 inches long. The shape of the test chamber could be varied depending on the requirements

for each test. The airspeed could be varied by adjusting the throat—the smaller the opening, the faster the speed. To achieve Mach 10, as was done in October of 1949, the throat was opened about the width of a piece of paper.

Models used in testing were made of stainless steel and, due to their small size, had to be extremely accurate. Models were generic forms such as wedges, cones, and plates, as well as rocket shapes. Led by Clark B. Millikan (PhD '28), director of GALTIC, and by wind tunnel director Nagamatsu and his successor, Lester Lees, graduate students investigated phenomena such as the shock waves from different shapes of models, and the drag caused by air flowing over the model's surface. Nagamatsu remembers, "Ten PhDs and 14 aeronautical engineering degree graduate students conducted theoretical and experiment hypersonic research. The results from these projects were relevant to the design and development of medium range and intercontinental ballistic missiles."

Caltech Professor of Aeronautics Emeritus Toshi Kubota (MS '52, PhD '57) adds, "The hypersonic wind tunnel did some pioneering work in the 60s and early 70s. The trails of high-temperature air left behind a body moving through the atmosphere at hypersonic speeds were 'hot' research subjects in ICBM work, and the Caltech hypersonic research group made significant contributions."

And so after all the testing for airplanes and missiles, the HWT finally made its own journey, although at a speed far slower than it was used to. It was crated and shipped via freighter to Taiwan in March. Professor of Aeronautics Chang S. Tai, and a team of CCIT technicians, came to campus in February to disassemble the wind tunnel with the help of Caltech staff from aeronautics and physical plant. "We are very fortunate to be able to obtain this tunnel," said Professor Tai. "There are no hypersonic facilities in Taiwan. The fastest velocity currently available is Mach 4."

The researchers plan to construct a new building for the HWT and to

install a computer system to regulate the valves and air flow. "The old controls were pneumatic and had to be operated by hand," stated Tai. "The computer system will adjust the flow automatically. We will be doing basic research on structural dynamics, and developing our own program in hypersonics. Not only will the tunnel be used for research, but we can study the technology evidenced in the tunnel itself."

But first the tunnel must be reassembled and modified. "We are going to change it to an intermittent type," says Tai, "since it will need only two compressors; as opposed to the original 15 needed." Tai wanted to take some compressors, but their location in the subbasement of Guggenheim, and their weight of 17 tons each, made it just too difficult. They did take the test sections for Legs 1 and 2 which are the most critical pieces of the system. Also crated up were supporting pipes, fittings, and frames. Tai estimates that it will take about a year and a half to make Leg 1 operational, and probably longer for the ultrafast Leg 2.

A part of Caltech's historic past is gone, but will get a second wind at CCIT. Bon voyage, HWT.

Three on faculty elected to NAS

Three Caltech faculty members have been elected to the National Academy of Sciences (NAS), one of the highest honors that can be accorded an American scientist or engineer. The new Caltech members are Michael Aschbacher (BS '66), professor of mathematics; John E. Bercaw, the Shell Distinguished Professor and Professor of Chemistry; and Barclay Kamb (BS '52, PhD '56), the Barbara and Stanley R. Rawn, Jr., Professor of Geology and Geophysics.

Kamb was chairman of Caltech's Division of Geological and Planetary Sciences from 1972 to 1983, and served as the Institute's vice president and provost from 1987 to 1989. His current research focuses on the dynamics and physical properties of glaciers, particularly the mechanisms that are responsible for triggering a type of rapid glacier flow called "surging" or "galloping."

Bercaw conducts research in organometallic chemistry, developing ways to synthesize and structurally characterize transition metal compounds containing molecular nitrogen, carbon monoxide, and hydrocarbons.

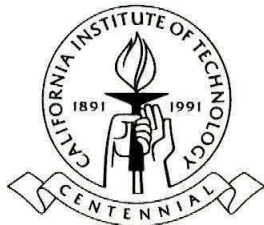
Aschbacher works in the area of group theory, and he is known in the scientific community for his role in the classification of finite simple groups, a problem whose solution had eluded mathematicians for nearly two centuries. He has since worked on refining this work and extending its mathematical applications.

Caltech float to reveal secrets of gravity discovery

Why did that apple really topple on Newton's head and trigger his fateful insight into the nature of gravity? Caltech Beavers were responsible, if the Institute's entry in the 1991 Rose Parade is to be believed.

On New Year's Day 1991, the crowds lining the Rose Parade route in Pasadena, and the millions watching at home, will see beavers navigating a winged time machine down Colorado Boulevard. Inscribed on the front will be the theme, "For Every Action . . . a Reaction."

As a mechanical beaver with a telescope assesses the crowd's reaction from



a crow's nest atop the vessel, two more animated beavers at the bow will put a Rube Goldberg machine (which runs the length of their spacetime ship) through its paces.

One beaver will pop out of a floral cuckoo clock to drop a hefty watch, propelling a second beaver upward on a teeter-totter to knock over a line of books that will topple, domino-fashion, into yet another timepiece, freeing a ball to roll down a ramp and ignite a Bunsen burner. The explosion will rattle a tree perched on a small island float tethered to the time machine and shake down some fruit, attracting the attention of the 17th-century mechanical gentleman dozing beneath it.

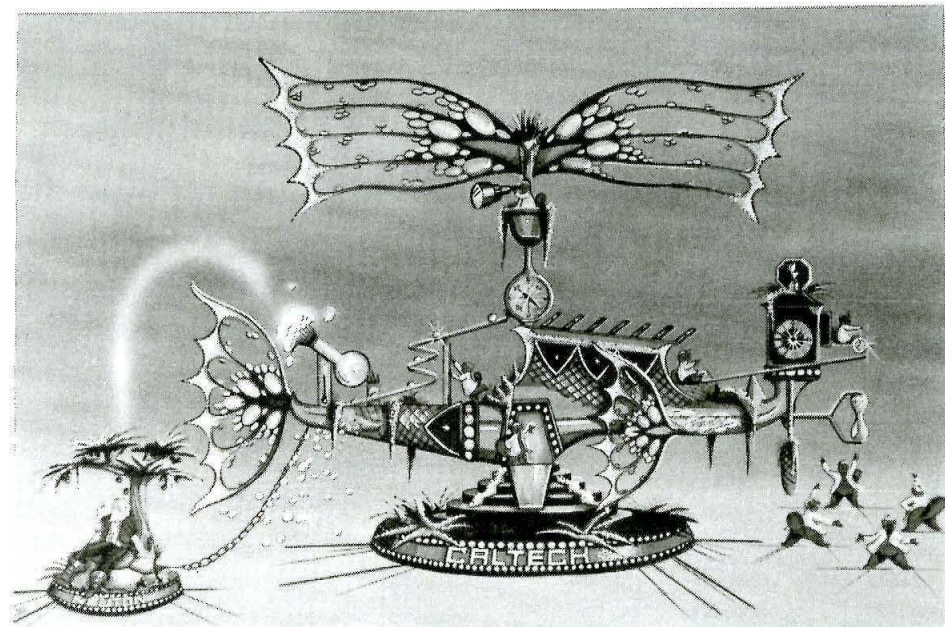
The purpose of these high-tech theatrics? To make the apple fall on Sir Isaac's head.

"This float is completely different from any I've worked on before," says engineer Ross Young, who with his wife, designer and artist Ollie Wright-Young, owns and operates Charisma, the float company that is creating Caltech's entry for the 1991 Rose Parade.

Unlike Newton's insight into the laws of gravity, the idea for the float didn't emerge in a flash from the deliberations of the centennial float subcommittee.

Last fall, the campus/JPL community was asked to submit ideas for float designs and themes to the subcommittee, which then spent several months considering them before sending its final recommendations to the administration. According to Hall Daily, chairman of the float subcommittee, several people wrote in to suggest the idea of a Rube Goldberg device—a contraption that performs an apparently simple operation in as complicated a manner as possible. Beavers also had many supporters.

Isaac Newton was brought into the picture by JPL graphic artist Herman Herrera, who contributed a whimsical sketch of the scientist quizzically watching an apple fall from a tree. "Everyone on the committee liked the idea of com-



binning Newton and the apple with the Rube Goldberg idea," says Daily, "and we asked Charisma to develop a design that would tie them together."

It was Wright-Young who came up with the unifying touch of the time machine and presented the committee with the first renderings of the complete concept. The float's appearance has been variously compared to a fish, a butterfly, a fantasy vehicle out of Baron Munchausen or the Wizard of Oz, and Aladdin's lamp.

"There's never been a time machine in the Rose Parade before, and the big winged vehicle is also really unusual," says Wright-Young. "We tried to put more emphasis on whimsy, and less on high-tech, than some people might expect from Caltech. I've never seen a float with so much happening on it before."

The float will feature some unusually sophisticated animation. When the apple strikes Newton, for example, he will open his eyes, raise his head in amazement, lift his finger in a classic "eureka" gesture, and wriggle his toes, before falling back into a doze.

Animation for Newton, and for the float's Rube Goldberg elements, including a conveyor belt to reroute the falling apples, was worked out by Charisma's Ross Young, and the Caltech undergraduates in Mechanical Engineering 100, an independent-study class taught by assistant professor of mechanical engineering Joel Burdick.

"The students developed most of the ideas for what the Rube Goldberg machine will do," says Young, who has sat in on every class, engaging the students in a lively dialogue over what engineering schemes are and are not feasible, even on a Caltech float.

Burdick's class ended in June, although a few of the students continued working on their projects over the summer. Come September, Burdick hopes to informally reconvene those members of the class who didn't graduate this spring.

Construction of the float's main chassis has already begun in the Rosemont Pavillion near the Rose Bowl. After most of the structure is completed this fall, the float will be ready for large numbers of volunteers to help in applying first, the float's "skin" of leaves, and starting the day after Christmas, the flowers.

Daily is counting on many members of the Caltech community to turn out to help decorate. "We'd like to make this

project a campus-wide activity," he said, "and people are invited to bring their families and friends."

Wright-Young's color scheme includes shades of purple, yellow, scarlet, pink, and of course, Caltech orange, a color that the designer says poses a special challenge since it tends to appear very dark from a slight distance. She expects to use chrysanthemums, carnations, roses, marigolds, daisies, and orchids, along with silverleaf, coconut, mille palm fiber, seaweed, and a variety of seeds.

There will also be a human presence on the float in the form of three riders in beaver costume. Current plans are to seek permission for at least three more beavers to stroll alongside their winged chariot as "outwalkers," directing the crowd's attention to the float's mechanical marvels. Each cycle of the Rube Goldberg machine is expected to last about one minute—plenty of time to create some parade-stopping imagery for television, and to keep the beaver escort very busy.

Anyone who would like to volunteer for float decoration this fall should contact Lenore Freise, 818/356-2188.

Order parade tickets early. Contact Shays Seating (795-4171) or Marsden Seating (394-6639).

Five on faculty named Sloan Fellows

Five Caltech faculty members are among 90 young scientists of exceptional potential to be awarded Alfred P. Sloan Research Fellowships for 1990 by the Alfred P. Sloan Foundation of New York City. Along with UC Berkeley, which also has five new Sloan Fellows among its faculty, Caltech has the largest number of Sloan recipients this year.

Caltech's new Sloan Fellows are: Ursula Hamenstadt, assistant professor of mathematics; Andrew Myers, assistant professor of chemistry; Sterl Phinney, assistant professor of theoretical astrophysics; Nai-Chang Yeh, assistant professor of physics; and Kai Zinn, assistant professor of biology. Each will receive \$25,000 in unrestricted research funds over the next two years.

Recruitment efforts, TV show, E&S win awards

The Council for Advancement and Support of Education (CASE), a society for professionals in university public relations and development departments, has awarded seven medals to the Institute as part of CASE's yearly recognition program.

The Institute's new undergraduate recruitment materials, produced by the publications staff in the public relations office, won three medals—two gold and one bronze—for visual design. In addition, the entire student recruitment program won a bronze medal in the student marketing improvement category.

Director of Admissions Dan Langdale said, "We wanted to reveal the essence of Caltech in the new program. Seeing the viewbook take shape was most gratifying as it came from an upbeat, cooperative effort on the part of many members of the Institute community. Winning the medals feels good—outside recognition is confirming."

The public relations office also won medals for three other projects. *Engineering & Science* magazine picked up a silver medal in the best-articles-of-the-year category for "Quest for Fusion," written by Doug Smith. Appearing in the summer '89 issue, the article was cited by CASE for its "snappy, not-too-cute style, and the way it examined the issues surrounding cold fusion, including the pack journalism mentality."

In the low-budget publications category, a brochure entitled "Seismology" was awarded a bronze medal. The pamphlet answers often-asked questions on earthquakes, and explains the history and duties of Caltech's Seismological Laboratory.

The final award was given to "AirTalk: The Caltech Edition," which is broadcast on KPCC, 89.3 FM, and simulcast on KPAS, channel 55, on the third Wednesday of every month. The show received one of two gold medals out of 71 entries in the special projects category. "AirTalk" features Caltech and JPL personnel discussing subjects such as earthquakes, the exploration of the solar system, science education, and the moral responsibility of scientists. Regular features of the show include a piece on Caltech's history, and Caltech-in-the-news items.

"These national awards are a testimony to the effectiveness of our public relations staff," said Robert L. O'Rourke, assistant vice president for public relations. "I congratulate them on receiving this recognition."

ALUMNI

Class of 1940 celebrates busy reunion weekend

It was a busy weekend for 63 members of the class of 1940 and their guests who came back to campus for their 50th reunion, timed to coincide with Alumni Seminar Day. Festivities began with a dinner in the Athenaeum on Thursday night where Keith Anderson was the master of ceremonies and J. Kent Clark, professor of literature, emeritus, was speaker. After a continental breakfast on Friday morning, the class toured the campus, and at noon, met with their guests at the Athenaeum to be inducted into the Half Century Club. On Friday evening they converged for dinner in San Marino at the home of Mr. and Mrs. Herbert M. Worcester, where they admired his vintage 1931 Model A. The dinner was hosted by the reunion committee: George Barber, chair, and Charles Palmer, Herbert Worcester, and J. B. Stevens.

Saturday was filled with attendance at seminars, a wine and cheese reception at Beckman Auditorium, dinner in the Glanville Courtyard of Beckman Institute, and the Caltech Men's and Women's Glee Clubs' annual home concert on Saturday evening.

Two members of the class flew in from Hawaii to be with their classmates, and others came from as far away as Massachusetts and Connecticut.

Alumni Association President Rhonda MacDonald (BS '74) presided at the Half Century Club luncheon, distributing certificates of membership to members of the class of 1940. Two members from the class of 1926, four from the class of 1930, two from the class of 1932, one from the class of 1935, one from the class of 1937, five from the class of 1938, and one from the class of 1939 also attended the reunion.

Master of Ceremonies Keith Anderson apologized for announcing the previous evening that class member Harold Mickley had died. "Hal is alive and well in Connecticut," he told the class, noting as an aside that Mickley is a distinguished alumnus. Two other



Herbert Worcester, Juanita Worcester, Anne Partch, and Newell Partch. Worcester was a member of the reunion committee for the class of 1940.

distinguished alumni from the class were present—Leo Brewer and Clifford Burton.

MacDonald introduced Caltech President Thomas E. Everhart, who told the class that he found himself in a peculiar position. "I've been here three years and I'm talking with people who have had an association with Caltech for 54 years," he said.

One indication of how much Caltech has changed could be found in the fact that Rhonda MacDonald was passing out Half Century Club certificates, he told the class. "About 30 percent of the members of last year's class were women, and this year the percentage is about the same," he said. "From 1970

to 1988 the percentage was only about 15 percent. The women are doing just fine, and holding their own very well."

Of the class of 1940, 173 had received BS degrees; 78, MS degrees; and 34, PhDs, Everhart said. He went on to note the increase over the years in students getting graduate degrees from Caltech. "The breakdown over the last decade has been in the range of 190 BS degrees, 144 MS degrees, and 128 PhD degrees," he noted. "Caltech has become popular as a place to get a graduate education," he went on, pointing out that in the fields in which it graduates PhDs, Caltech graduates one percent of those given in the country.

"We would like to feel that we get

the best undergraduate students in the country and give them the best undergraduate education of any institution," he said. "Robert Millikan said to offer the best possible education, and to bring together the best faculty and students—none of them afraid to work. Everybody here still works hard. Our freshmen are bright and articulate. They are not afraid to come here and tackle the challenges of the program.

"Our emphasis hasn't changed. We're still small and highly focused. We do what we can do in a superlative way. We don't try to do everything.

"Tuition has changed since you were here," he continued, noting that it will be \$13,300 in the fall, and that 75 percent of the undergraduate students now receive financial aid. Raising restricted funds for scholarships is a priority with the Institute, he told his audience.

Funding sources have also changed, he pointed out. "When you were here, none of the budget came from the federal government. Today, over 60 percent does. This is a source of pride, and also of concern. But the funding is spread out over several agencies and is very stable."

Everhart praised Caltech alumni, noting that, while small in number, they have had a major impact on the world. He also praised the faculty for its strength, and pointed out that Caltech has the highest percentage of faculty members who are members of the National Academy of Sciences of any institution in the U.S. "Last year we had three winners of the National Medal of Science," he said, "and over the last two years, young faculty members have won six Sloan Fellowships and 11 Presidential Young Investigator awards. We feel Caltech is doing well in obtaining fine young faculty members."

Ted Weaver, Annual Fund chairman for the class of 1940, praised the team effort that had enabled the class to set a new reunion gift record. The class contributed \$107,126, and in addition, \$23,310 of that amount qualified for matching gifts from three anonymous members of the class.



George Barber, Professor Kent Clark, and Maisie Barber at the reunion dinner for the class of 1940. Barber was the reunion committee chair; Clark was the dinner speaker.



Jack Tielrooy, Terry Tielrooy, Celeste Brunner, and Fred Brunner came back for the class of 1940 reunion.

Marcus honored for achievement in chemistry

Rudolph Marcus, the Arthur Amos Noyes Professor of Chemistry, has been awarded the Theodore William Richards Medal for Conspicuous Achievement in Chemistry. The award is presented biennially by the Northeastern Section of the American Chemical Society. It was conferred at Harvard University where Marcus gave a talk on "Chemical Reaction Rates—Theory and Experiment."

No one knows better than an alumnus what it's like to be a Caltech student. For this reason, alumni in increasing numbers are playing a significant role in recruiting for the Institute. At the helm of this endeavor is the Undergraduate Admissions Support Committee (UASC), chaired by William M. Whitney (BS '51) and Edward M. Lambert (BS '82).

Alumni volunteers have been active in recruiting applicants to Caltech for 30 years or more. Since 1984, their activities have been coordinated by a member of the Alumni Association staff, who has also worked with personnel in the admissions office. With the coming of Dan Langdale as director of admissions, recruiting by alumni has received increased emphasis. "The ties between the Alumni Association and the admissions office have been greatly strengthened during this period," says Whitney.

The shared goals of the UASC and the admissions office, Whitney explains, are to increase the pool of highly qualified applicants to Caltech, to increase the number of applicants who choose to enroll, and to provide feedback to the admissions office on the concerns of prospective applicants and their parents.

Langdale has suggested that the corps of alumni admissions representatives (AARC) be increased from the current size of 140 to 300 during the next two to three years, and perhaps eventually to 500 over the next five years. According to Langdale, "The AARC creates a network of qualified people who can speak on the quality of a Caltech education. When high-school students come to guidance counselors to ask questions, the counselors can refer them to members of the AARC, who are eminently capable of responding to their queries."

The AARC volunteers are expected to maintain close relations with three to five high schools where they know the faculty and the guidance counselors. They attend college fairs in their home areas and assist visitors from the admissions staff and the Faculty Admissions Committee in arranging receptions for prospective candidates and their parents in the fall. They help in the same way in setting up and attending receptions for admitted students in the spring, as well as assisting with the coordination of August get-togethers in home towns for new freshmen, upperclassmen, and local alumni. The volunteers in charge have tried to size the job so it can be done



Director of admissions Dan Langdale discusses ways to increase alumni participation in student recruitment with Edward Lambert and William Whitney, co-chairmen of the Undergraduate Admissions Support Committee.

Alumni strengthen support for student recruitment

with the expenditure of about an hour a week, on the average, according to Whitney.

With the goal of increasing the size of the corps from 140 to as many as 500 comes a need to change the volunteer structure. To facilitate the coordination of such a large group of people, the country has been divided into six regions, each the responsibility of a regional director in the Los Angeles area. Whitney said that all six positions have now been filled. The new regional directors are: Harry J. Moore, Jr. (BS '48), the Northeast District; Kiroshi Kamei (BS '51, MS '52), the Southwest; Joseph A. Dobrowolski (BS '49), the West; David Holtz (BS '64), the Mid-Atlantic; Joe K. Cheng (BS '85), the Midwest; and Dale R. Burger (BS '56), the South.

The next job is to name about 20 area coordinators and to increase the number of AARC volunteers by an initial group of 30.

The area coordinator's job will be to recruit members for the AARC and to assist them with their work of making contact with high-school representatives and with students. The six regional

directors meet periodically with the UAS coordinator, Karen Carlson, and serve on the UAS committee.

The AARC activity provides alumni the opportunity for contact with other Caltech graduates, Whitney points out, and can become a focus for alumni activities. "The volunteers feel the work is rewarding," he says. "It's inspiring to find bright and able young people who would be good candidates for Caltech, and to help steer them here."

Alumni chapters see the AARC as a means of drawing alumni together and providing a focus for their activities, Whitney notes. The AARC can also be a focus for the organization of new chapters. For example, Whitney says that when the Boston area chapter was formed, the members decided that the AARC should be one of their main projects. "We feel that the AARC can grow into something very important for Caltech," Whitney says.

Any alumnus who wants to spend an hour a week volunteering for the AARC, or wishing more information about its activities, should contact Karen Carlson, UAS coordinator at the Alumni Association, 818/356-6593.

Association welcomes two honorary alumni

The Alumni Association welcomed David B. Wales, professor and executive officer of mathematics and former dean of students, as an honorary alumnus at its annual dinner in June. Calvin A. Ames, deputy director of finance and deputy controller, who was out of town on the date of the annual dinner, will become an honorary alumnus on September 7. Honorary alumni are chosen on the basis of contributions to the campus community and to student life.

Installed as officers for 1990-91 were: 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). Outgoing president Rhonda MacDonald (BS '74) will also serve on the executive committee.

Installed as directors were: Leo L. Baggerly (BS '51, MS '52, PhD '65), Warren G. Goda (BS '86), Lisa L. Heinz (BS '78), Peter V. Mason (BS '51, MS '52, PhD '62), Harry J. Moore, Jr. (BS '48), and Donald P. Wilkinson (BS '48).

MacDonald, 1989-90 president, was presented with a birch armchair with the Institute logo, and a plaque bearing the presidential gavel. A short business meeting preceded the festivities.

Harry Gray awarded Priestley Medal

Harry B. Gray, internationally known as an inorganic chemist and educator, is the 1990 winner of the American Chemical Society's Priestley Medal, the nation's highest award in chemistry. Gray is the Arnold O. Beckman Professor of Chemistry and director of the Beckman Institute at Caltech. He is being recognized for his many fundamental research contributions and distinguished services to chemistry over the last 25 years.

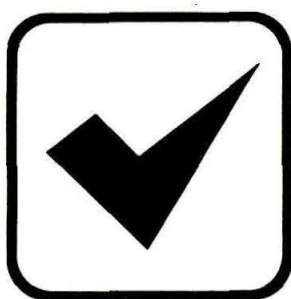
Gray joins previous Caltech winners of the Priestley Medal who include Linus Pauling and John D. Roberts.

His current research in inorganic photochemistry explores the possibility of designing chemical systems that can function as artificial counterparts of photosynthesis, the process by which plants gain energy from sunlight.



David Wales, new honorary alumnus, with Rhonda MacDonald, 1989-90 Alumni Association president.

ALUMNI



Alumni Activities

October 13, 1990, *Day trip to the San Onofre power plant.*

October 22, 1990, *Final payment for East African safari due.*

January 1, 1991, *Rose Parade event, breakfast and lunch, the Athenaeum. Reserved seating for the 102nd Tournament of Roses Parade at Hill and Colorado. A Caltech float will be a feature of the parade.*

January 22–February 6, 1991, *East African safari (Kenya/Tanzania) travel/study program with Edwin S. Munger, professor of geography, emeritus.*

May 16, 1991, *50th reunion dinner, class of 1941, the Athenaeum.*

May 17, 1991, *Half Century Club reception and luncheon, the Athenaeum.*

May 18, 1991, *Alumni Seminar Day, the Caltech campus.*

May 18, 1991, *All-classes reunion dinner.*

June 20, 1991, *Alumni Association annual meeting, the Athenaeum.*

June, 1991, *Yellowstone travel/study program with Robert P. Sharp, the Robert P. Sharp Professor of Geology, Emeritus, and Leon T. Silver, the W. M. Keck Foundation Professor for Resource Geology.*

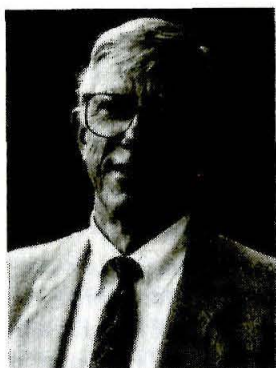
Class of 1950 sketches solicited

Ralph J. Stone is collecting written sketches of members of the class of 1950, the collection to be compiled and sent to the entire class membership. Members are asked to send their sketches to Stone at 2122 Nina Clare Road, Billings, Montana, 59102.

From the alumni president

Rhonda MacDonald has done an outstanding job of leading the Alumni Association toward its goals during the 1989-90 year. As 1990-91 gets under way, I look forward to an exciting and eventful year as Caltech celebrates 100 years of extraordinary achievement.

More than 1,300 alumni and guests returned to the Institute for the 53rd annual Alumni Seminar Day and reunion weekend. A total of 63 members of the class of 1940 were at the Half Century Club luncheon to celebrate their 50th reunion. The classes of 1945, 1950, 1965, and 1980 celebrated their



E. Micheal Boughton

reunions with an architectural tour of the campus, a reception at the President's residence, and dinner at the Athenaeum.

The many lectures presented at Seminar Day were enthusiastically received by alumni. Superb presentations on issues such as global warming and the forecasting of earthquakes illustrated the range of research being conducted on campus. Many thanks go to the Alumni Association staff, Seminar Day committee, and reunion committee for a job well done. Hard as it is to believe, these individuals are already hard at work on the 54th annual Alumni Seminar Day. There will be a number of firsts for the centennial Seminar Day, among which will be an all-class reunion dinner on May 18, 1991. More details will appear in later issues.

There are some new faces at the Alumni Association house, and I would like to introduce them to you. As assistant director, Arlana Bostrom coordinates chapter affairs and membership activities, and supports the executive director, Judy Amis, with broad responsibilities. Karen Kurilich, program coordinator, works closely with the committees organizing Seminar Day activities, travel/study programs, and publication projects. Michelle Clem, administrative secretary, provides administrative support to Judy and Arlana, and will assist with centennial events.

Next year—1991—isn't far away, and the Alumni Association is planning exciting events for our centennial celebration. The Institute will have a float in the Rose Parade for the first time since 1950. In honor of this occasion, the Association has ordered extra tickets for its annual Rose Parade viewing

event, which will kick off the year. We expect a large attendance; be sure to look for more detailed information this fall.

The East African safari is the first trip set for our travel/study program for 1991, and special centennial trips are planned that will focus on Caltech contributions. In June 1991, we will depart on the second of three trips to Yellowstone, and in the fall of 1991, we will go to Owens Valley, and also to the Island of Hawaii.

We appreciate feedback from alumni regarding any Association issue. If you would like more information on Association activities, or are interested in volunteering for a committee, please contact us by mail or phone: Caltech Alumni Association, mail code 1-97, Pasadena, California 91125, 818/356-6592.

Alumni to visit San Onofre generating station

The Caltech Alumni Association invites alumni on an excursion to the San Onofre Nuclear Generating Station (SONGS) on October 13.

The day will begin with a greeting from Harold Ray (MS '70), senior vice president of Southern California Edison, followed by an overview of nuclear energy at the SONGS Training and Education Center. Many important issues surrounding nuclear energy—from its environmental advantages, to radiation and its health effects—will be discussed.

Next alumni will learn about the various safety challenges of SONGS. Topics will include seismic and public safety, Chernobyl versus San Onofre public-safety design, and radiological releases at Chernobyl and Three Mile Island.

After the presentations and a light lunch, participants will go on an operational safety walk-through that will include a full-sized control-room simulator, an emergency communications facility, and a mechanical lab.

Although the visitors will not go into the working areas of the plant, this is an excellent opportunity for alumni to connect the sciences with the realities of engineering work, and to learn more about the concerns involved in producing nuclear energy today.

The tour is limited to 40 participants. For more information, please contact the Alumni Association at 818/356-6592.

Reunion classes announce gifts to Caltech

The class of 1940 led reunion classes this year in the size of its gift to the Institute. The class raised \$107,126 in unrestricted funds from 77.4 percent of its members, which represents the largest gift from any 50th reunion class. Of this amount, \$23,310 qualified for a matching gift challenge sponsored by three anonymous members of the class.

Theodore Weaver (BS '40, MS '42) was chairman of the reunion committee. His committee members were Stuart A. Krieger (BS '40), Eric G. Laue (BS '40, MS '46), Willys T. Lemm (BS '40), Howard W. Reynolds, Jr. (BS '40), Raymond G. Richards (BS '40), David H. Steinmetz (BS '40), Jack Tielrooy (BS '40), Don L. Walter (BS '40, MS '41), and Robert W. Wayman (BS '40).

John S. Davis (BS '45) was chairman of the reunion committee for the class of 1945, which raised \$32,560 from 47.4 percent of its class. Robert C. Tookey (BS '45) was his committee member.

The class of 1950 raised \$44,339 from 51.8 percent of its members. Ralph Lutwack (BS '50, PhD '55) was chairman of the reunion committee with committee members Jared Abell (BS '50), James R. Allder (BS '50), Harvey J. Amster (BS '50), William L. Burriss (BS '50, MS '53, Eng '54), William P. Cox (BS '50), Merle T. Kam (BS '50), Ralph H. Lovberg (BS '50), Richard M. McIntyre (BS '50), David R. Viglierchio (BS '50, PhD '55), and James R. Wilcox (BS '50).

Michael I. Baskes (BS '65, PhD '70) was reunion chairman for the class of 1965 which raised \$32,611 from 30.8 percent of its members. Members of the reunion committee were Donald L. Blumenthal (BS '65, PhD '70), W. Kendall Brown (BS '65), I-Lok Chang (BS '65), John D. Chidley (BS '65), Lewis M. Fraas (PhD '65), Barry L. Goldberg (BS '65), P. Douglas Josephson (BS '65), Arnold J. Kelly (PhD '65), Harold T. Larson (MS '65, PhD '70), Momtaz N. Mansour (MS '65, PhD '74), Hugh M. McAlear (MS '65), Thomas M. Menzies (BS '65), Michael L. Neeser (MS '65), Maurice J. Nugent, Jr. (PhD '65), and Lawrence K. Oliver (BS '65).

Mark S. Fischer (BS '80) was chairman of the 1980 reunion committee which raised \$5,483 from 17.6 percent of the class members. Fisher's committee consisted of Donald G. Bacon (BS '80), David B. Ritchie (BS '80), and Kerry J. Vahala, (BS '80, MS '81, PhD '85).

Volunteering for Caltech

Each year, hundreds of enthusiastic alumni take time out to help the Institute. This year alone, 723 individuals volunteered to work for the Annual Fund. You can be part of this active group of Institute advocates!

All of Caltech's volunteers have a few things in common—a great respect for the education they received, and a desire to share their experiences with other alumni.

As a volunteer, you are key to the success of the Annual Fund. Time spent talking with fellow alumni provides a link with the Institute that no other solicitation can possibly achieve. Help spread the word about Caltech and influence others to support the Institute.

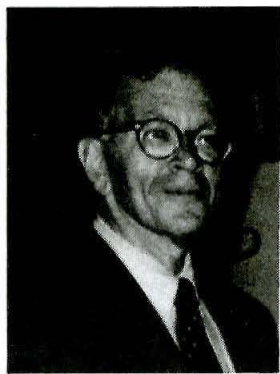
If you are interested in volunteering for the Caltech Annual Fund and would like more information, please write or call:

The Office of Annual Giving
Caltech 105-40
Pasadena, California 91125
818/356-6323

Chapter news

Gottschall elected chairman of Denver alumni chapter

Carl Gottschall (BS '60) is the newly elected president of the Colorado alumni chapter, which held its first meeting in Denver in May. Some 35 alumni attended the meeting, where they heard



President Thomas E. Everhart talk about Caltech and its future.

Gottschall says his goal is to see the chapter grow into a dynamic and useful organization. "We should serve local alumni by offering them scientifically and intellectually stimulating programs, and we should increase Caltech's visibility in this area," he stresses. "Some people in this part of the country don't know Caltech very well. With 200 alums in this area, we can help to



Caltech's first mother/son alumni team was created when Chris Bertani received his BS degree in June. Elizabeth Bertani (PhD '57), the Institute's first woman graduate student in biology, is now a staff biologist in Judith Campbell's lab.

change that."

One way of supporting Caltech will be through the Undergraduate Admissions Support Committee (UAS), whose members help to recruit students for the Institute, Gottschall says.

The new chapter chairman feels he has a challenge confronting him: to build up momentum within the group so that the chapter can have regular, well-supported programs. "We've been getting together sporadically and we're just starting to attempt to meet on a regular basis," he explains. "Making that transition requires quite a lot of effort, but it's a rewarding task."

After graduating from Caltech, Gottschall went on to earn a PhD from the University of Colorado and to work as a research associate at Argonne National Laboratory. He then joined the faculty at the University of Denver and also served on the faculty of the Linus Pauling Institute and at Princeton University when on academic leave.

After 20 years, he exchanged his professor's mortarboard for the functional cap of a training coordinator in nuclear operations with the Public Service Company of Colorado. He has done consulting work and has been active in the American Chemical Society. In support of Caltech, he has helped to recruit students through the UAS.

Saltman talks to San Diego alumni about nutrition

Paul Saltman (BS '49, PhD '53), professor of biology at UC San Diego, was the speaker for an enthusiastic

group of alumni at the San Diego chapter meeting on May 3. Saltman, who is a Caltech Distinguished Alumni Award recipient, discussed the scientific elements of human nutrition. His audience included 47 alumni, who converged at the Ida and Cecil Green Faculty Club on the UC San Diego campus.

Dividing nutrition into "real," "unreal," and "surreal" categories, Saltman gave the audience fascinating examples of each. Humans' normal dietary requirements—"real" nutrition—include 45 chemicals, combined with the number of calories needed to provide the energy for life. "The science of nutrition is so exact," said Saltman, "that some people are kept alive, without food or liquid, on a semisynthetic solution, composed of these chemicals, that is injected into their veins."

Fad diets making up the "unreal" aspects of nutrition often guarantee remarkable health benefits based on the use of specific foods. These "mystical, magical diets" often don't include all of the essential nutrients, and in such cases their promises cannot be fulfilled.

"No-calorie" brownies, fat without cholesterol, and diets that guarantee winning tennis performances, are examples of the "surreal" aspect of nutrition, Saltman said. He added that the future holds an abundance of possibilities as humans seek new ways to sustain a healthy life.

The San Diego chapter is currently preparing its calendar for next year. Anyone who would like more information should contact Lee Hanon at 619/755-5570.



These two Japanese alumni were recently photographed along the Ginza in Tokyo. They are Hisayuki Kurihara (BS '36, MS '37, MS '38), left, and Tamotsu Miyama (BS '30), right. Both will help plan a meeting for alumni in Japan to coincide with a trip there of the President's Circle of The Associates

Letters

Dear Editor:

Alumni and other friends of Caltech are invited to become delegates on a study mission to the Soviet Union October 9-22. The mission, to exchange views with Soviet engineering and manufacturing experts, is under the auspices of People to People, the international relations organization founded by President Eisenhower. The mission will visit Moscow, Tbilisi, Kharkov, and Leningrad, with an overnight stay in Helsinki. A consulting engineer who made a similar visit last year, I will be the delegation leader. Those interested can reach me at 415/851-4628, or People to People at 800/777-0067.

Sincerely,
Samuel R. Phillips (BS '56, MS '57)

OBITUARIES

1918

OLIN L. ARMSTRONG, EX, of Whittier, California, on February 4; he was 95. Armstrong came to Whittier in 1913 and attended Whittier College and Caltech. He enlisted in the Army in 1917 and later became an engineer in the Coast Guard Auxiliary. After the war, Armstrong became a partner in a well-known Whittier hardware store owned by his uncle. He worked for the company for 50 years, retiring as president in 1970. He was active in many local groups: First United Methodist Church, American Legion Post No. 51, the Whittier Rotary Club, and the Whittier Gem and Mineral Society, which he helped to found. Armstrong married Helen Boyle of Salem, Ohio, in 1918; she died in 1963. In 1964, he married Vivian Braskamp; they enjoyed fishing, rockhounding, and traveling by trailer throughout the U.S. and Canada. He is also survived by his son, Victor and his wife, Jean; a daughter, Marylee and her husband, Richard Post; a stepson, Leon; seven grandchildren and 14 great-grandchildren. A son, Glenn, preceded him in death.

1924

DONALD F. MORRELL, of San Anselmo, California, on February 24. He is survived by his wife, Minnie.

1925

ALFRED L. ERICKSON, in February. He is survived by his daughter, Linda Fults. A memorial fund has been established at Caltech. Those wishing to contribute should write to: The A. L. Erickson Memorial Fund, Caltech, 1201 East California Boulevard, 105-40, Pasadena, California 91125.

1928

CHARLES C. LASH, MS '30, PhD '31, of Tulsa, Oklahoma, on December 28, 1989, of a stroke. He is survived by his daughter, Mary.

MARTIN E. NORDBERG, PhD, on June 5, 1989. He was a retired research chemist for Corning Glass Works. He joined the company

in 1929 as a research chemist and played a major role in the development of many types of glasses. He was a cowinner of the John Price Wetherhill Medal of the Franklin Institute for his work. In 1965, Alfred University awarded him the Knight Order of St. Patrick for outstanding contributions to the ceramic industry. He was a fellow of the American Ceramic Society, and a member of the American Chemical Society, the Society of Glass Technology, Sigma Xi, and Phi Kappa Phi. He was a past president of the Corning Philharmonic Society and a member of the Corning Chamber of Commerce. He is survived by his son, M. Emery; two daughters, Idana Flynn and Carol Reynolds; 10 grandchildren, and two great grandchildren.

1929
WADSWORTH E. POHL, MS '30, of North Hollywood, California, on February 12, one day before his 82nd birthday. He was retired from the position of vice president and technical director, following a 30-year career at Technicolor Motion Picture. He was a fellow of the Motion Picture and Television Engineers, a member of the Academy of Motion Picture Arts and Sciences, and a recipient of the Herbert T. Kalmus Gold Medal Award for "outstanding achievement in color motion pictures." Pohl had won five Academy Awards, including one special Oscar given only occasionally, in recognition of outstanding technical advances. He was one of four men selected to set the standards for color television. He is survived by his wife of 52 years, Nancy; sons, Michael and Terry; daughter, Debbie Hafer; three grandchildren; and his sister, Marjorie White.

CLINTON M. STICKNEY, EX, of cancer, on January 31, in Encinitas, California. He is survived by his daughter, Patricia A. Portier.

1930
J. R. LESTER BOYLE, of Corona del Mar, California, on April 2, of complications from Alzheimer's disease. He is survived by his wife, Frances; two sons, David and Daniel; seven grandchildren; and six great-grandchildren. Boyle received his BS in mechanical engineering. While a student at Caltech he earned four letters each in football and baseball, and was elected captain of each team in his senior year. Boyle founded Boyle Engineering Corporation in 1945. The company has worked on many aqueduct and water-main projects in Orange County. Under Boyle's leadership, the company grew to be one of the top 100 engineering design firms in the U.S. He retired in 1973.

1931
FRANCIS W. HUTCHINSON, professor emeritus of mechanical engineering at UC Berkeley, on February 15, in Walnut Creek, California, after a brief bout with pneumonia. He was 79. Hutchinson became an instructor at UC Berkeley in 1938, the same year he received an M.E. there. He was a specialist in thermodynamics and heat transfer, with research projects in the thermodynamics of ship refrigeration and improved insulation techniques to protect perishables during global journeys. Hutchinson became a full professor in 1947, and retired in 1974. He is survived by his wife, Kathleen Kay; and his daughter, Kay H. Martin.

1932
BRUCE H. RULE, of Pasadena, California, on May 9. He was 80 years old. Rule began a long career at the Institute when he started work in 1937 as superintendent of engineering projects. For 12 years Rule was chief engineer of the Synchrotron lab. Other titles he held include chief engineer of the Hale Observatories, staff member of the Owens Valley Radio Observatory, and chief officer and project officer of the 100-inch telescope at Las Campanas Observatory. Around

campus he was affectionately known as "Mr. Telescope." He is survived by his wife, Olga; two daughters, Shirley Horton and Carol Roth; six grandchildren; and two great-grandchildren.

1934
NICO VAN WINGEN, on June 19, after a short illness. Born in Amsterdam, and educated in his early years in Switzerland, he earned his advanced degrees at the University of California, Berkeley, and at Adamson University, in engineering. He was a petroleum engineer for four major oil companies, and traveled around the world in his job duties. He was a professor of petroleum engineering at the University of Southern California from 1950 to 1976. Van Wingen also acted as a consultant to oil companies, banks, utility companies, and state, county, and federal agencies, to name a few. He was frequently called as an expert witness in petroleum engineering cases. He was a member of the Tau Beta Pi Association and an honorary member of Pi Epsilon Tau. In 1985 he received the Anthony F. Lucas Gold Medal Award from the American Institute of Mining and Metallurgical Engineers.

1935
NELSON NIES, MS '36, retired from U.S. Borax, in March, of Creutzfeldt-Jacob Disease. He was a longtime member of the Sierra Club, and had recently climbed mountains on every continent with "The Canyon Explorers." He is survived by his daughter, Nancy.

SAMUEL ROSEN, EX, of Agoura Hills, California. He is survived by his wife.

GEORGE J. TOOBY, on March 13. He is survived by his wife, Grace; sons, Ernest, Paul, Frank, and John; and a brother, Arthur.

1936
ALBERT G. BODINE, JR., EX, on January 25, in Santa Monica, California. Bodine was a lifelong inventor, and was granted over 1100 U.S. patents, said to be the largest number for one person since Thomas Edison. Much of his work was in the field of vibration technology, including ultrasonic. Bodine developed the "orbiting mass" vibration generator and applied it to the separation of materials, and even to pile driving and the installation of underground cables. He owned and managed his own company, Bodine Soundrive, in Van Nuys. He received numerous awards and citations for his ingenuity, including the Silver Medal in Engineering Acoustics in 1986 from the Acoustical Society of America for "his ingenuity in developing sonic and vibratory devices of great technological importance." He is survived by his wife, Jean; son, John, associated with him in business; and a daughter, Linda Fox.

SHERWOOD K. HAYNES, PhD, retired from a faculty post in the physics department at Michigan State University, on March 4. He was 79. Haynes held faculty positions at Williams College, Brown University, the radar school at MIT, and Vanderbilt University, before joining MSU in 1957. He served as the chairman of the physics department from 1957 to 1969. In 1974, he served as president of the American Association of Physics Teachers. He retired in 1980. He is survived by his wife, Pauline, their four children, and six grandchildren.

WALFRED E. SWANSON, on February 27, in La Jolla, California. He was born on April 6, 1913, in Chicago, Illinois. He is survived by his wife, Jean, and a son.

1937
SAMUEL L. LIPSON, MS, of Vancouver, British Columbia.

ROBERT B. JOHNSTON, MS, on April 28. After graduation he worked for the Ryan Aeronautical Company in San Diego as chief of structures and chief aerodynamicist. In 1950 he moved to the Rand Corporation in Santa Monica. He was a founding member of the San Diego branch of the Institute of the Aeronautical Sciences, serving as its president from 1946-47. Johnston was a member of the American Aviation Historical Society, the Cross and Cockade Society, and the San Diego Flying Club. He is survived by his daughter, Nancy Watts; four sons, Bruce, Allan, Gordon, and Robert; and three grandchildren. His wife, Nancy, whom he married in 1940, died in February.

1938
ROBERT E. CARR, on February 11, in Seal Beach, California. He was 73 years old. Carr worked on defense projects at Caltech during the war years and then spent most of his career at North American. He was a lead engineer on the Apollo missions. He is survived by a brother, John (BS '41, MS '43); and two sisters, Muriel Carlson and Patricia Chasteen.

EDWIN N. LASSETTRE, PhD, retired professor of physical chemistry at Carnegie-Mellon University, on January 16, of cancer. He was 78 years old. After his graduation from Caltech, Lassettre joined the faculty of Ohio State University and taught there for 25 years. He later joined the faculty of Carnegie-Mellon and was a staff fellow in physics and director of special studies from 1971 to 1973. He retired in 1974. Lassettre is survived by his wife, Ilse; two sons, Edwin and Carroll; four grandchildren; two half brothers, David Scott and James Scott; and a half sister, Isobel Elery.

1941
DONALD C. CAMPBELL, of San Mateo, California, on December 29, 1989, following his second bypass operation in 13 years. He served in the Navy for 28 years, leaving with the rank of captain. Campbell had recently retired from Bechtel Group, Inc., where he was manager of market and geographic research. He is survived by his wife, Janet.

1944
DAVID C. KOF AHL, EX, on February 4. He began his career with Richfield Oil Company as a petroleum engineer and worked for 39 years with Atlantic Richfield Company in international oil exploration. He traveled extensively and was involved in many milestone oil-drilling and construction projects throughout the world. In retirement, Kofahl was active in volunteer work with Big Brothers, Executive Service Corp., Kiwanis, and the Los Angeles County Probation Department, and was a leader in church affairs at Faith Lutheran Church, Pasadena. He is survived by his wife, Connie, whom he married in 1946; sons, Victor and David; daughter, Mardi Caruso; sister, Betty Ellen Morgan; and two grandchildren.

1946
ROBERT W. PENTNEY, MS, of Auburn, Washington, on February 1, of a brain hemorrhage. He had worked for the National Weather Service at the FAA facility in Auburn, until his forced retirement in 1984 due to a severe stroke. He was buried at Willamette National Cemetery in Portland, Oregon. He is survived by his wife, Leanore.

ROBERT H. REECE, MS, of Sunnyvale, California, in November, 1989.

1949
DENNIS V. LONG, MS '55, PhD '61, on May 24, of a malignant brain tumor. He was president of LF Geotechnical Inc., of Anaheim Hills, California. He is survived by his wife, Marilyn; three children; and two grandchildren.

1950
RICHARD D. DELAUER, ENG, PhD '53, a Distinguished Alumnus, of leukemia, on April 22, in Los Angeles. He was 71 years old. DeLauer served as Under Secretary of Defense from 1981 to 1984; he was in charge of research and engineering. Previously he had worked for 15 years at TRW Inc., where he was its executive vice president from 1970 until 1981. He played a major role in developing technical aspects of the Air Force's intercontinental ballistic missile programs, and other space, military, and electronic systems. He later formed a consulting organization, The Orion Group Ltd., and then became chairman and CEO of Fairchild Space and Defense Corporation last year. He was a member of NASA's Advisory Council, the Defense Science Board, and the National Research Council. He was a fellow of the American Institute of Aeronautics and Astronautics and the American Astronautical Society, and a member of the National Academy of Engineering. He is survived by his wife, Ann; a son, Richard, Jr.; two brothers, Clifford and Leland, and two grandchildren.

JAMES E. SCHOFIELD, of Yoncalla, Oregon, on November 11, 1989, during surgery for an aneurysm. He is survived by his wife and daughter.

1953
CARL A. ANDERSON, JR., on January 31. For the past 15 years he was employed as a chemist for the South Coast Air Quality Management District. He is survived by two daughters and four granddaughters.

1989
BIBI JENTOFT-NILSEN, on June 12, in a motorcycle accident. Jentoft-Nilsen had been accepted into graduate school at Columbia University, but was on leave and living in Haines, Alaska. While at the Institute, she was a member of the cross-country, track and field, and soccer teams. In 1988 she won SCIAAC honors and was the most valuable runner and the captain of the cross-country team. Jentoft-Nilsen was president of Blacker House, served as director-at-large on the ASCIT Board, and was a student representative on the curriculum committee. She participated in chamber music and in the Model U.N. In 1988 she was the winner of a Masters' Cup for outstanding service to the undergraduate community. Her family lives in Delhi, New York.

PERSONALS

1936
WILLIAM C. COOPER, MS, PhD '38, of Winter Park, Florida, writes, "Since retirement from the USDA as director of the U.S. Horticultural Research Lab in 1975, I have been writing books about oranges: *In Search of the Golden Apple* in 1982, and currently, *Odyssey of the Orange in China*, published by the author. I visited with two Caltechers, Dr. H. C. Yin and Dr. Jiazhen Tan, in Shanghai in 1984."

1941
STANLEY E. SOHLER writes, "Under my pen name of 'Jayson Loam,' I have recently coauthored and self-published *Hot Springs and Hot Pools of the U.S.*, the only illustrated nationwide guide to places where you can go and legally put your body in hot water. The 288 pages does not contain a single scientific analysis

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News _____

of any geothermal outflow, but it does provide maps and directions to publicly accessible waters, and lets you see what to expect when you get there. This project is the culmination of my 40-year interest in outdoor recreation and 30 years of paying my dues as a writer, photographer, editor, designer, and production manager of related publications. How nice it is to find out that doing what I love to do is a constantly expanding source of satisfaction, sometimes even accompanied by economic rewards as well. Copies are available in most bookstores, including the Caltech bookstore. In an emergency, you can send \$19 to AQUA THERMAL ACCESS, Dept. T, Box 91, Soquel, CA 95073."

1942

ROBERT A. COOLEY, PhD, founder of Aero-spex Corporation, in National City, California, was awarded the rank of fellow of the American Ceramic Society at its annual meeting in Dallas on April 24. The award was made for his contributions to ceramic fiber and heated ceramic tooling for metal-forming technologies.

1950

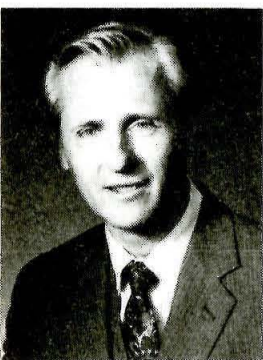
BERNARD S. STRAUSS, PhD, professor in molecular genetics and cell biology at the University of Chicago, has received the school's prestigious Quantrell Award in recognition of his excellence in teaching undergraduates. The nation's oldest prize for undergraduate teaching, the Quantrell Award has a \$1,000 prize. Strauss studies the biochemical mechanisms of mutagenesis and carcinogenesis; he teaches a human heredity course and an advanced genetics class. During the next school year Strauss will be visiting the Imperial Cancer Research Foundation Laboratories in England to learn new technologies for studying the repair of DNA in humans.

1953

ROBERT J. STANTON, JR., PhD '60, department of geology, Texas A&M University, has recently finished writing, with J. Robert Dodd (PhD '61), the second edition of *Paleoecology, Concepts and Applications*, to be published by John Wiley-Intersciences.

1958

RICHARD FIDDLER, of Seattle, Washington, will serve as the treasurer of the national Sierra Club. He is an energy conservation analyst, and has been a volunteer leader of the Sierra Club for many years. He has served as the chair of the Puget Sound group, regional conservation leader for the Pacific Northwest, and a member of several national committees. Fiddler has been a member of the board of directors of the Sierra Club for 8 years, including a two-year term as vice president.



Wayne Nelson

WAYNE NELSON, a consultant on statistics to the GE Research and Development Center, has been honored by the Section on Physical and Engineering Science of the American Statistical Association for delivering the most outstanding presentation of a paper at the organization's 1989 meeting. His paper, titled "Analysis of Left Truncated Data with Hazard Plotting," was selected from among 75 competing papers delivered at the meeting.

1959

MARTIN E. (EMERY) NORDBERG, JR., MS, PhD '61, writes, "Your recent report of my death [in the June issue] is greatly exaggerated." However, my father, Martin E. Nordberg, PhD '28, did die on June 5, 1989, after an illness."

1960

HENRY H. DEARMAN, PhD, professor of chemistry at the University of North Carolina at Chapel Hill, has been named associate provost and dean of the graduate school at the university. He joined the graduate school in 1981 as associate dean and has been a UNC faculty member in the chemistry department since 1962.

1961

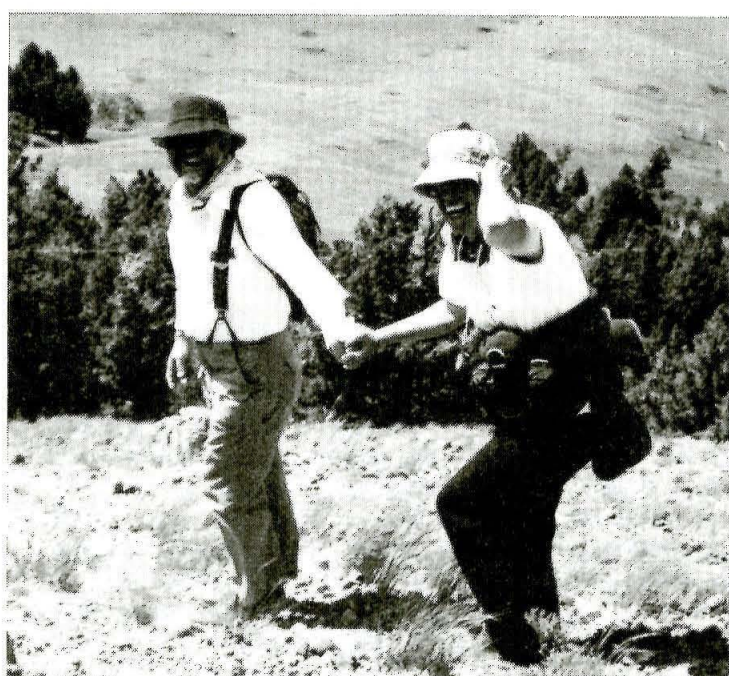
J. ROBERT DODD, PhD, of the department of geology, Indiana University, has finished writing, with Robert J. Stanton, Jr. (BS '53, PhD '60), the second edition of *Paleoecology, Concepts and Applications*, to be published by John Wiley-Intersciences.

1962

JEAN-CLAUDE RIVET, MS, is European manager for Adaptec Inc., an electronics company based in Milpitas, California. He writes, "I read with interest the article 'No Fear of Flying Here' in the April issue. I am also a private pilot, flying mainly in Belgium, France, and the Netherlands. I wish the weather here was of the California variety!"

1966

ALDEN (DOUG) HOLFORD, of Houston, Texas, writes, "I am in my seventeenth year of practicing law, the last eight as a solo practitioner. I would like to see more alumni activities in Houston."



Walter and Ruthann Specht climb up Specimen Hill to look at a fossilized tree on the Alumni Association Yellowstone-Grand Teton trip.

OZIREZ SILVA, MS, was appointed minister of infrastructure (mining, steel, communications, energy, and transportation) of the new Brazilian government, inaugurated on March 15.

1977

DAVID J. D. HARPER, MS, has been elected a director of the Consulting Engineers Association of California (CEAC). He started his three-year term on July 1. Harper is a senior vice president and the director of finance and administration for James M. Montgomery, Consulting Engineers, Inc., of Pasadena, California.

1980

CONSTANCE (STANZI) ROYDEN and her husband, Robert (R.C.) Colgrove (BS '81), announce the birth of their first child, daughter Caitlin Royden Colgrove, born on May 3. Royden writes, "R.C. graduated with his MD/PhD from UCSF in June, and we are moving from San Francisco to Boston, where he will be doing his residency at Beth Israel Hospital. I will be doing a second postdoc in vision research at MIT."

1981

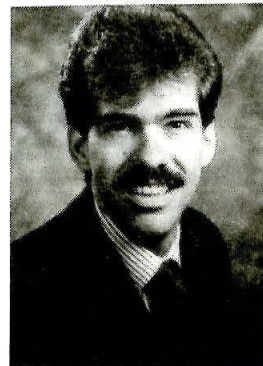
JOHN A. MURPHY, MS, writes, "I have received my PhD from the University of Cambridge, and I am taking up a lecturing post in the experimental physics department at St. Patrick's College, Maynooth, Ireland."

1984

MICHAEL A. ENESCU, writes, "I just graduated from Stanford University with a MS in computer science. I got married on September 9, 1989, to Florica Tulcan, a very successful realtor in Los Angeles. I am still an engineer with IBM in Menlo Park, working on artificial intelligence."

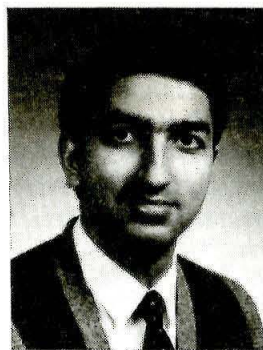
1985

ANIRVAN GHOSH writes, "Lee Anna [Moreland] (BS '86) and I are happy to announce the birth of our son, Rhyen Sheel, on April 13. The training we got pulling all-nighters at Caltech will surely come in handy now!"



Kevin J. Gunning

KEVIN J. GUNNING, technical center manager at TRW Overseas Inc., was awarded the TRW Chairman's Award for Innovation in recognition of his part in the development of the gas-damped air bag crash sensor. This innovation reduced the number of required sensors to one, a major advance in reducing the cost of the air bag's deployment system. Gunning is one of 52 individuals who shared in 14 awards.



Nabeel A. Riza

NABEEL A. RIZA, MS, PhD '90, of Clifton Park, New York, has joined the GE Research and Development Center, in Schenectady, New York, as an electrical engineer.

JEANNE WEAVER, and her husband, Everett Simons (BS '86), announce the birth of their first child, James Everett Simons, on December 8, 1989. They are currently residing in Cedar Knolls, New Jersey.

FREDERIC WONG, of Santa Monica, California, had a four-day showing of his paintings entitled "Three Generations of Chinese Paintings," at the Chinese Arts Society in Los Angeles. The show was partially financed by a grant from the City of Los Angeles Cultural Affairs Department.

1986

G. GARING GIBBS graduated from the Washington University School of Medicine in May. He is going on to the Stanford University School of Medicine for a three-year residency in internal medicine. Following that, he plans to specialize in cardiology.

STEVE RABIN has moved to Serra Mesa, California (near San Diego), and is now working as an engineer at Iotape, a new division of Iomega Inc.

1987

EDWARD YIN, of Berkeley, California, was married to Cathy Chen (BS '88) on July 7, in Dallas, Texas.

1988

TIMOTHY M. SWAGER writes, "I will be an assistant professor of chemistry, as of July 1, at the University of Pennsylvania, and will be pursuing research in materials chemistry."

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Contributors — Phyllis Brewster,
Heidi Aspaturian

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In this
issue

Cornell University President Frank H. T. Rhodes tells graduates that those who fail to serve may get all A's in school but still flunk life. **Page 2**

Joanna Muir combines her tasks as president of The Asso- ciates with an oppor- tunity to "go back to school." **Page 6**

In its time, the hyper-sonic wind tunnel at GALCIT was the "Superman" of wind tunnels. Now obsolete by Caltech standards, it has found a new home. **Page 8**

Alumni in increasing numbers are playing a significant role in recruiting students for the Institute. **Page 11**