

Caltech News

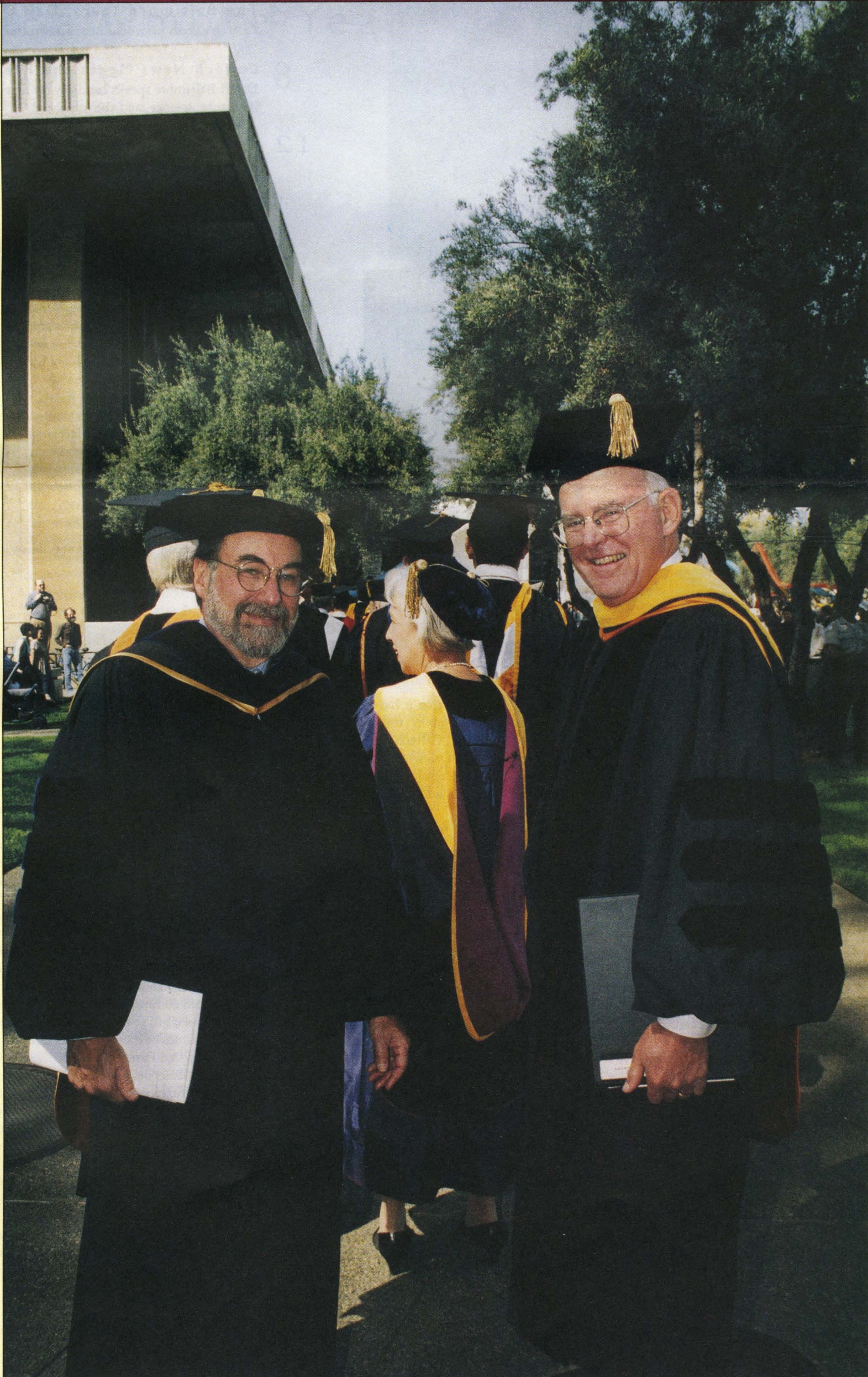
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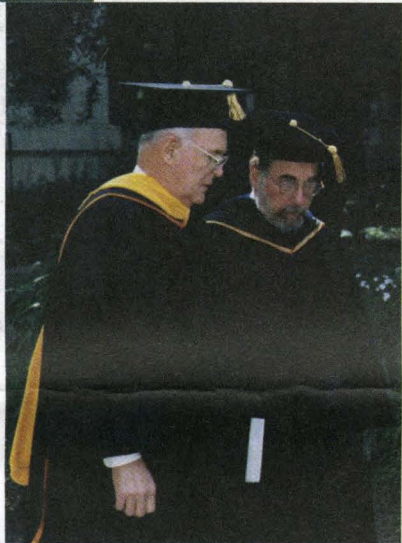
Presidential Sound Bites



Caltech News



ON THE COVER:
At the end of the
inaugural line,
Caltech President
David Baltimore (left)
and Board of Trustees
Chair Gordon Moore
stand poised to lead
the Institute into a
new era.



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Caltech's sixth president heads down the aisle.

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David Baltimore speaks candidly on first impressions, the road to Caltech, literature, science, and the job ahead.

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Excerpts from Baltimore's speech take readers back to inauguration day.

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Campus and alumni updates; Class Notes; students in Alaska hear call of the wild; and serenity descends upon the campus (on our back-page poster).

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Thomas J. Tyson
President of the Alumni Association
J. Ernest Nunnally
Vice President for Institute Relations
Robert L. O'Rourke
Associate Vice President for Institute Relations
Jane S. Dietrich
Director of Periodicals

Executive Editor – Heidi Aspaturian
Contributors – Hillary Bhaskaran, Ryan Poquette, Mike Rogers, Rebecca Rothenberg, Robert Tindol, Betsy Woodford
Copy Editors – Michael Farquhar, Julie Hakewill
Circulation Manager – Susan Lee
Photographer – Robert Paz

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U p F r o n t

The Royal Swedish Academy of Sciences has announced that it has awarded the 1998 Crafoord Prize in geosciences, with special emphasis upon "the dynamics of the deeper parts of the Earth," to Don Anderson, PhD '62, Caltech's Eleanor and John R. McMillan Professor of Geophysics, and to Adam Dziewonski, Frank B. Baird, Jr. Professor of Science at Harvard University, in recognition of their "fundamental contributions to our knowledge of the structures and processes in the interior of the Earth."

The prize is valued at \$500,000, and will be presented to Anderson and Dziewonski at a ceremony on September 16 in Stockholm.

Anderson and Dziewonski were cited by the academy for having "together developed a generally accepted standard model of how Earth is organized and of the dynamics of the processes at its core and in its mantle that govern continental drift, volcanism, and earthquakes."

Commenting on the news, Anderson said, "I think it's very significant that deep-Earth geophysics is being honored by this award. It is rare for our field to be acknowledged in this way. I am really delighted that Adam Dziewonski, a close colleague of mine, is also being honored for his work. Most people, when they think of geophysics, think of earthquakes, but seismologists do other things, such as x-raying Earth using seismic tomography to see what is going on in the deep Earth."

Anderson and his team have studied changes arising from the pressure deep down in Earth's mantle. Sudden changes in the rock types at depths of 400 kilometers and 660 kilometers are explained by conversions undergone by the rock types, so that they contain minerals entirely unknown at Earth's surface. At 400 kilometers, the mineral olivine, common in lava, changes to spinel, a high-pressure mineral. At 660 kilometers, the mineral perovskite is formed, a mineral otherwise only produced in the laboratory at very high pressures and temperatures. Anderson's research has shown that such changes in composition of the mantle may explain the occurrence of tensions in Earth's crust that can lead to earthquakes. Anderson and his research team have also used seismic data to study convection currents in the mantle, important for understanding continental drift and volcanism. Recently, Anderson has also used geochemical and chemical-isotope methods not only for mapping Earth's development, but also for under-



Caltech geophysicist Don Anderson, PhD '62, will share the 1998 Crafoord Prize, awarded by Royal Swedish Academy of Sciences for scientific achievement in fields not covered by the Nobel.

standing the development of the moon and Mars and Venus.

A leading figure in "deep Earth" research since the 1960s, Anderson received his BS from Rensselaer Polytechnic Institute in 1955 and then came to Caltech for his graduate studies. He joined Caltech's faculty as a research fellow in 1962, was named assistant professor in

1963, associate professor in 1964, and full professor in 1968. From 1967 to 1989, the year he was named the McMillan Professor, he served as director of Caltech's Seismological Laboratory. In 1989 he published *Theory of the Earth*, described by the Crafoord committee as "a remarkable synthesis of his broad and provocative research and a guide for georesearchers from different fields for future exploration of the dynamics of the deep parts of Earth."

The Crafoord Fund was established in 1980 by a donation to the Royal Swedish Academy of Sciences from Anna-Greta and Holger Crafoord. The fund promotes basic scientific research in Sweden and in other parts of the world in the following disciplines: mathematics, astronomy, geosciences, biosciences with particular emphasis on ecology, and polyarthritis. Support to research takes the form of an international prize—the Crafoord Prize—awarded annually to outstanding scientists, and of research grants to individuals or institutions in Sweden.

The third Institute professor and second alumnus to be awarded the Crafoord Prize (and the first Caltech awardee to fall into both categories), Anderson joins Caltech's John D. MacArthur Professor of Geology and Geophysics Gerald Wasserburg (1986), Carnegie Institution astronomer Alan Sandage, PhD '53 (1991), and Caltech's James G. Boswell Professor of Neuroscience Seymour Benzer (1993).

The Baltimore Years: Day One

Every Caltech graduate knows this scene: the rows of folding chairs spanning the Institute's Court of Man; flowers banked beneath a freshly erected stage; the expectant crowd; some sweet and stirring music from the Glee Clubs and the brass and percussion ensembles. Then, down the aisle winds the procession of distinguished scholars in medieval robes and squashy hats designed for the cool, diffuse light of Cambridge or Heidelberg, not for the hard sun of Southern California (thus the incongruous juxtaposition of sunglasses and velvet and ermine stoles).

It looks like commencement; it sounds like commencement; it must be commencement.

And in a way, it was. But what commenced on March 9 was not the next phase in the life of a graduating class, but David Baltimore's term as the sixth president of Caltech, accompanied by all the ceremony appropriate to the dawn of a new era in the Institute's life. And while no official commencement speaker heralded the occasion, the event featured addresses by a number of people vital to the life of the Institute and to the intellectual life of the nation.

The day's keynote speaker, Carnegie Institution president, geneticist, and longtime Baltimore friend and colleague Maxine Singer, used a particularly impressive visual aid—the 5,000-foot peak of Mount Wilson, studded with white observatory

“He asks good questions and learns quickly. Our new president is at least as good as our freshmen in this regard.”

—Faculty chair David Stevenson

domes, shining in the distance—to illustrate her remarks about the Institute's history and to evoke a bridge that stretched from Mount Wilson astronomer George Ellery Hale—whose vision helped shape Caltech in the early 1900s—to Baltimore, who will steer the Institute into a new

century and the new millennium. Other speakers included past Caltech presidents Marvin Goldberger and Tom Everhart, Martha Throop Smith (the great-granddaughter of Amos Throop, who founded the institution that ultimately became Caltech), Alumni Association President Tom Tyson '54, PhD '67, and Caltech physicist Kip Thorne '62, chief marshal of the ceremony.

Before an audience that included Caltech alumni, faculty, staff, and students, Nobel and Crafoord laureates, Baltimore friends and family members (among them daughter Teak and wife Alice Huang), and representatives from more than 60 universities, research institutions, and learned societies around the world, Baltimore, himself a Nobel laureate who is best-known for his work on AIDS and reverse transcriptase, said that his “deepest goal as president is to maintain the essence of Caltech while helping it adapt to a changing world.”

Said Baltimore, “As an outsider here, I've spent the last five months learning as much as I can about Caltech . . . What I found is a most remarkable institution. The depth of scholarship, the rigor of training, the commitment to the highest ideals of personal behavior make Caltech a very special place. It manages to cover an extraordinary range of scientific and technical areas with a minimal faculty. It has provided so many new excitements for one trained in biology that it has been a continual feast for me, and I know that there are many more fine meals awaiting me.” (Excerpts from Baltimore's inaugural address appear on page 12.)

Welcoming Baltimore on behalf of Caltech's alumni, Association President Tyson took note of the new president's interest in reaching out toward the Institute's graduates. He recounted how shortly after arriving on campus in October, in the midst of an extremely busy schedule, Baltimore had “graciously accepted an invitation to spend part of a Saturday afternoon talking to the Alumni Association's board of directors. . . . He gave freely of his time in a candid, relaxed, and thoughtful exchange. . . . Most important for us was the realization that Dr. Baltimore recognized the Caltech alumni as a valuable resource available to him, as

people who care deeply about Caltech and who want to be actively engaged in the support of its mission to provide the very best education in science and engineering to the very best students.”

Commenting on Baltimore's encounters with the undergraduates (which commenced in September, when Baltimore boarded the boat to Freshman Camp a month before officially assuming his duties as president) senior Kohl Gill, the immediate past-president of the Associated Students of the California Institute of Technology, said, “Dr. Baltimore has done more than just listen to our concerns and suggestions. He has also been enthusiastic about sharing with us his own thoughts. On numerous occasions, he has listened carefully to our . . . problems and . . . used his own insights to present angles of attack to which we had been completely blind.”

Additional revelations about Baltimore's first months on campus came from faculty chair David Stevenson, the George Van Osdol Professor of Planetary Science, who commented in particular on the new president's proclivity for dropping into the labs of his fellow Institute scientists to satisfy what Stevenson called “a childlike curiosity.” “He asks good questions and learns quickly,” Stevenson remarked judiciously. “Our new president is at least as good as our freshmen in this regard.”

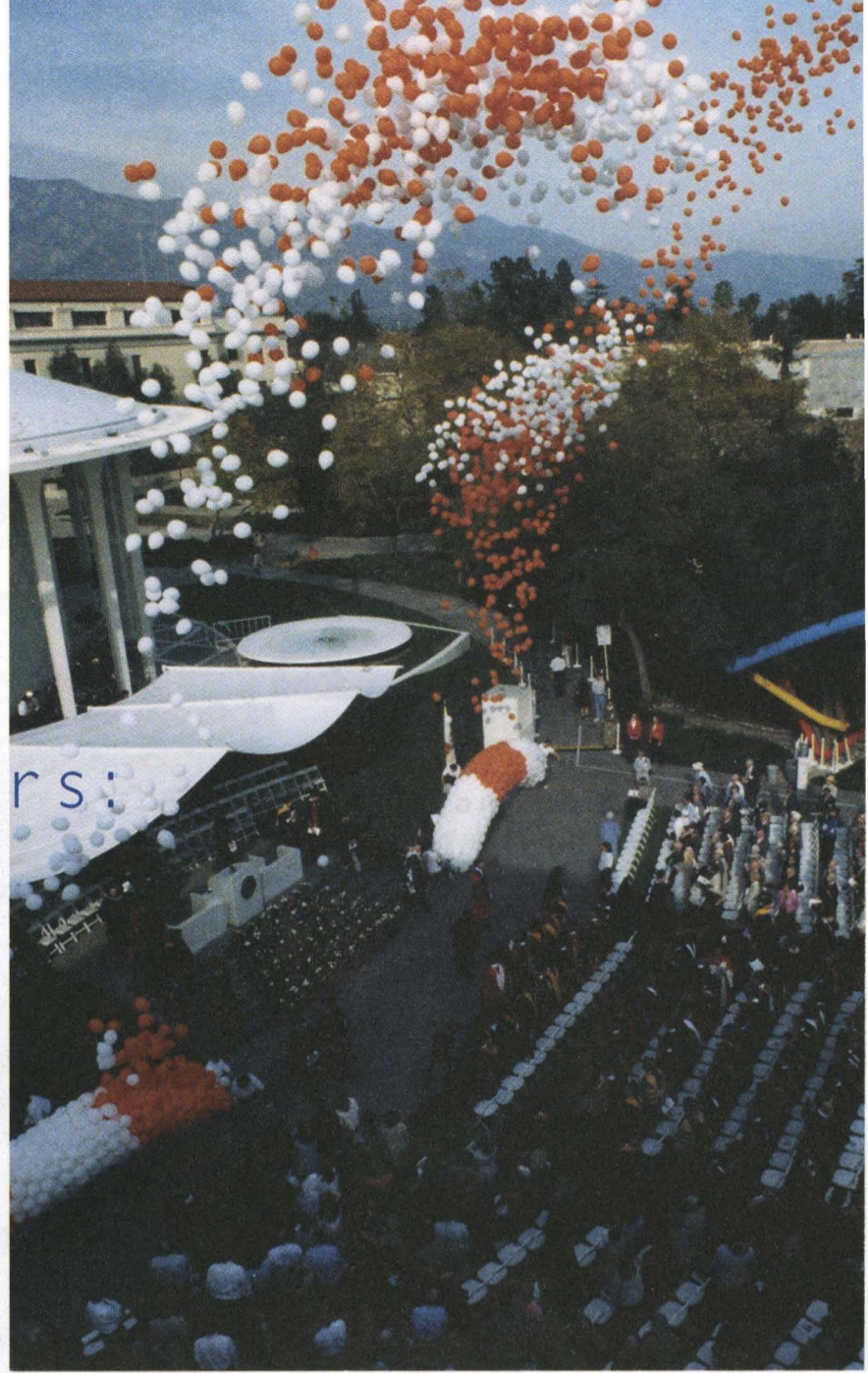
Kip Thorne, the Richard P. Feynman Professor of Theoretical Physics, who headed up Caltech's faculty presidential search committee, read several of the recommendations that Baltimore's colleagues and students had submitted during the presidential search, touting the new president's ability to inspire, to lis-

ten, to build consensus, and, in the words of yet another anonymous informant, “to stand up to smart and arrogant physicists.”

If Baltimore has already impressed the Caltech community with his energy, originality, and commitment, keynote speaker Singer noted that he has demonstrated the same qualities in other arenas throughout his career. “In our contemporary world, preserving the special freedom of private institutions requires the exercise of public responsibilities. One essential responsibility [of scientific institutions] is to help the larger society understand the choices and dilemmas posed by science and technology. For this, you can count on your new president. Again, in the mid-1980s, when the growing AIDS epidemic was still viewed by some as a problem restricted to an unpopular sector of our society . . . David led a group that would study and define the threat to all and call for a large, targeted research effort. This serious scientific endeavor helped to change the mind of our nation and the world.”

This same outlook, Singer said, will enable Caltech to meet future challenges. “You have, in your new president, an optimistic person with the spirit and nature of a leader, who, with you, will give shape to the future. He will not be a caretaker. And he will espouse your dreams as well as his own; the grand successes of his presidency will be mutual accomplishments; for that is the way of our time. . . . You have chosen well. I congratulate you all.”

Besides several university presidents and chancellors, including



We have liftoff: Balloons ascend as optimism soars at the March inauguration.

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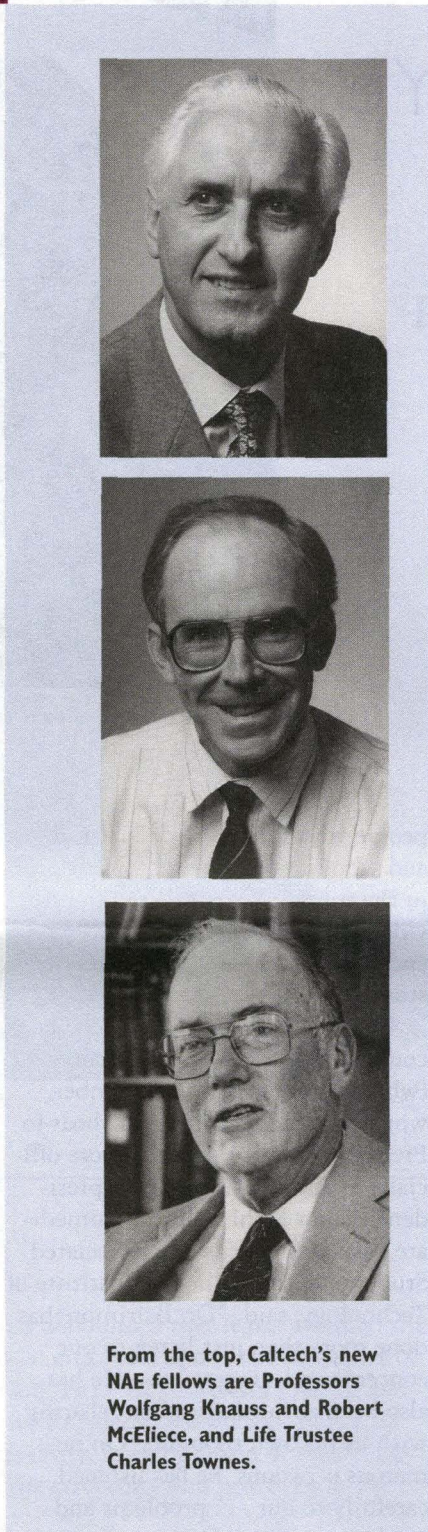
**NATIONAL ACADEMY
OF ENGINEERING
NAMES THREE FROM
CALTECH**

Institute faculty members Wolfgang Knauss and Robert McEliece and Institute trustee Charles Townes—Caltech alumni all—have been elected to the National Academy of Engineering (NAE), one of the highest distinctions that can be accorded an American engineer. Their election, announced on February 13, brings to 46 the number of faculty (31) and trustees (15) who are members of the Academy.

NAE membership honors “those who have made important contributions to engineering theory and practice, including significant contributions to the literature of engineering theory or practice, and those who have demonstrated unusual accomplishment in the pioneering of new and developing fields of technology.”

Knauss, a professor of aeronautics and applied mechanics, studies the origin and expansion of cracks that arise from defects in plastics, rubber, composite materials, and adhesives—research that has significant applications to the design and safety of airplanes, spacecraft, pipelines, and many other structures. He was recognized, in the Academy’s parlance, “for engineering work on time-dependent fractures of polymers, at interfaces and dynamic loading.” Born in Germany, Knauss received his BS in mechanical engineering and his MS and PhD degrees in aeronautical engineering from Caltech. After two years on campus as a research fellow, he was appointed assistant professor in 1965, associate professor in 1969, and full professor in 1978. He is a Fellow of the American Society of Mechanical Engineers; his other honors include the 1995 Murray Medal of the Society for Experimental Mechanics.

Cited by the NAE for his research into “error-correcting codes and cryptography,” Robert McEliece received his BS and PhD, both in mathematics, from Caltech and joined the Institute’s faculty in 1982 as professor of electrical engineering. Before returning to his alma mater, he spent four years as professor of mathematics at the University of Illinois and prior to that served as supervisor of JPL’s information processing group from 1970 to 1978. McEliece is widely recognized for his applications of discrete mathematics to various problems in communications theory, work that has applications in the areas of telecommunications, deep-space telemetry, information theory, and



From the top, Caltech’s new NAE fellows are Professors Wolfgang Knauss and Robert McEliece, and Life Trustee Charles Townes.

error-correcting codes. Currently the executive officer for electrical engineering, McEliece was elected a Fellow of the Institute of Electrical and Electronics Engineers in 1984 and was honored with Caltech’s ASCIT award for outstanding teaching in 1989.

Elected to Caltech’s Board of Trustees in 1979 (he has been a Life Trustee since 1987), Charles Townes won the 1964 Nobel Prize in physics for his investigations into quantum electronics, and specifically for the invention of the laser and maser. Townes earned his PhD in physics at Caltech in 1939, and is currently professor of physics, emeritus, at UC Berkeley, where he’s been on the faculty since 1967. His numerous honors include election to the National Academy of Sciences in 1956, and the National Medal of Science, which he received in 1982.

**SCIENTISTS DEVELOP NEW PLASTIC RECORDING
MATERIAL THAT CAN BE USED TO SEE THROUGH
TISSUE WITHOUT X RAYS**

Scientists have recently achieved a certain amount of success in using laser light to see through scattering media such as human tissue. The new technology could eventually have medical applications in situations where X rays are ineffective or downright dangerous.

According to Caltech scientist Seth Marder, his team and a group of collaborators from the University of Arizona have developed a photorefractive polymer that is highly sensitive to near-infrared light.

Using this polymer, the group is now able to see through about half an inch of 2 percent milk. They have achieved this by custom-designing a polymer for a state-of-the-art laser holography setup.

Marder, a chemist at Caltech’s Beckman Institute, says the work capitalizes on the fact that certain low-energy wavelengths can indeed penetrate solid substances to a certain

extent. Visible light, radio and TV waves, infrared heat from an oven, and X rays are all manifestations of electromagnetic radiation that differ only in wavelength and energy.

“If you hold your hand up to a bright light source with your fingers closed tightly, you can actually see light coming through the skin itself,” he explains. “In your body there are various things that absorb light, such as amino acids, DNA, hemoglobin—which means that you can’t see through them with ultraviolet or visible light.

“But many of these tissues stop absorbing light at a low enough energy,” he says. “It turns out that, in the near infrared, your body is relatively transparent.”

The goal, then, is to analyze this light that has penetrated tissue, and this is where Bernard Kippelen and

Continued on page 6 . . .

**OLFACTORY WORKER
MAKES GOOD WITH
CALTECH NOSE**

“This is a high-school science project,” a passerby remarked when examining Professor of Chemistry Nate Lewis’s electronic nose, a device that “smells” substances by using sensors made from household materials. Mark McGrath, a high-school junior in Hilton Head Island, South Carolina, has made good on that assertion.

McGrath, a devoted inventor, read an article about Lewis’s research, and contacted Caltech for more information, before making a nose of his own. Like Lewis’s nose, McGrath’s project consists of a number of sensors, each made up of a different type of conducting plastic, similar to a bathtub sponge. Each sensor is exposed to a certain odor-producing agent, while an electrical current is passed through the sensor. By measuring the pattern of resistance for each sensor and odor, the nose can assign a chemical fingerprint to the smell.

And now McGrath’s electronic nose is smelling whiffs of victory. After placing first at McGrath’s high-school and a regional science fair, the nose took third place in the engineering division at the International Science and Engineering Fair in Fort Worth, Texas this past May.

As for Lewis ’77, MS ’77, he has his own perspective on McGrath’s success. “Given his talent, it seems like only a matter of time before McGrath improves upon our invention by the addition of four legs, a wagging tail, and a friendly bark to his science fair project. That would be really impressive!”

**NATIONAL
ACADEMY OF
SCIENCES ELECTS
FOUR CALTECH
ALUMNI**

“In recognition of their distinguished and continuing achievements in original research,” four Institute alumni have been elected to membership in the National Academy of Sciences. The new inductees, whose election was announced on April 28, are William Dove, PhD ’62, professor of oncology and medical genetics at the McArdle Laboratory for Cancer Research, University of Wisconsin, Madison; Thomas Jordan ’69, PhD ’73, the Robert Shrock Professor and head of the department of earth and planetary sciences at MIT; Robert Kirshner, PhD ’75, chair of the astronomy department at Harvard; and Paul Steinhardt ’74, the Mary Amanda Wood Professor of Physics at the University of Pennsylvania. Election to the academy is considered one of the highest honors that can be accorded an American scientist or engineer.



A BRIEF HISTORY OF SCIENCE—AND CALTECH

The new “Heights of Excellence” display, located in the second-floor exhibit cases of Parsons-Gates Hall of Administration, does more than commemorate the inauguration of a new president. The exhibit—curated by Institute Associate Archivist Charlotte Erwin and designed by Jerry Todd Campbell—offers a visual overview of the various scientific and philosophical landmarks in humanity’s and Caltech’s history. The four

cases include the two shown here. “Awakened Astronomy” (above, left) details landmark events in the growth of our understanding about the universe. The “Natural Philosophy and Natural History” display (above, right) highlights key developments in natural philosophy and natural history, the forerunners of modern-day science. The other two cases are specific to Caltech. The third case offers a visual tour of Throop Poly-

technic Institute, Caltech’s predecessor. The fourth case, “Caltech’s Nobel Laureates,” pays tribute—through documents, photos, and memorabilia—to the Institute’s more than two dozen Nobel laureates (faculty and alumni) since 1923, when Robert Millikan was the first Caltech recipient. The case also includes five gold-plated replicas of Nobel medals. The exhibit, open to the Caltech community, runs indefinitely.

PATHFINDER ALUMS SPACEBOUND ONCE AGAIN

So what are Brian Muirhead and Rob Manning going to do now that they’ve finished their integral roles in JPL’s Mars Pathfinder mission—go to Disneyland? Nope, they’re too busy working on other celestial projects.

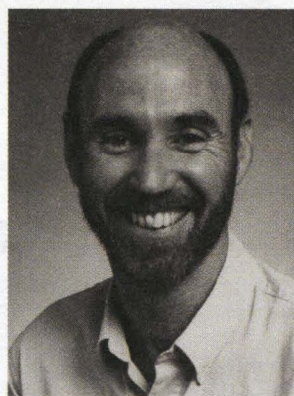
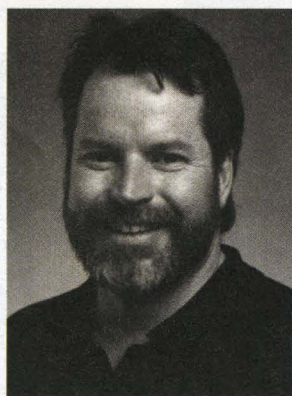
Muirhead, MS ’82, was the former project manager for Pathfinder (See *Caltech News*, Vol. 31, No. 3, 1997). He now holds the project manager post for Deep Space 4/Chimpollion, the fourth mission to be flown under NASA’s New Millennium program, and whose aim is to demonstrate cutting-edge technologies for future space missions.

Muirhead’s team will attempt the first-ever rendezvous with a comet, landing on its surface, where the unmanned lander will analyze the comet’s surface composition and collect a sample for potential return to Earth. It’s not entirely unlike the events in the film *Deep Impact*, which premiered in theaters this spring, about a manned mission to land on a large comet headed for Earth. Unlike some makers of big-budget films, however, Muirhead has become expe-

rienced at getting phenomenal results at a relatively low cost.

In fact, for his work in helping to complete the highly successful Pathfinder mission on a skeleton budget, Muirhead was recently named Engineer of the Year by the readership of *Design News*—which represents a national audience of design engineers. The Pathfinder mission introduced more than 25 new technologies and sent back an abundance of new information about Mars.

Muirhead will receive a \$25,000 educational grant, which he is donating to Caltech. He is also donating his portion of a \$10,000 educational grant (divided among Muirhead and the other winners of the magazine’s Special Achievement and Quality awards). Both grants have been earmarked for economically disadvantaged engineering students attending Caltech. Muirhead was honored on March 17 at an awards ceremony at



Rob Manning (left) and Brian Muirhead will continue to make a big impact on space exploration.

the Ritz Carlton Hotel in Chicago.

In related news, Manning ’82, was Pathfinder’s flight systems chief engineer, and has been named chief engineer of JPL’s long-term program of robotic exploration of Mars.

This newly created position will build on Manning’s knowledge and experience with the Red Planet, as he coordinates the engineering efforts of all robotic spacecraft and instruments currently in development for future missions to Mars.

HONORS AND AWARDS

Michael Alvarez, associate professor of political science, and coauthor Jonathan Nagler have been selected by the Midwest Political Science Association to receive the 1998 Robert H. Durr Award for their paper, “A New Approach for Modeling Strategic Voting in Multiparty Systems.” The award is for the best paper applying quantitative methods to a substantive problem in political science.

Michael Brown, assistant professor of planetary astronomy, has been awarded an Alfred P. Sloan Research Fellowship, which carries with it a grant of \$35,000, to be used in a flexible and largely unrestricted manner. Sloan recipients are selected on an extraordinarily competitive basis from a group of nominees representing the very best of young scientists.

Peter Dervan, the Bren Professor of Chemistry, and chair of the Division of Chemistry and Chemical Engineering, and Caltech Trustee David Ho ’74, director of the Aaron Diamond AIDS Research Center in New York City, have been elected to membership in the Institute of Medicine of the National Academy of Sciences. The Institute is a unit of the Academy but with separate membership; it is based in the biomedical sciences and health professions.

Richard Flagan, professor of and executive officer for chemical engineering, has been awarded the Thomas Baron Award in Fluid-Particle Systems by the American Institute of Chemical Engineers.

Harry Gray, the Arnold O. Beckman Professor of Chemistry and director of the Beckman Institute, has been elected a foreign member of the Royal Swedish Academy of Sciences. The journal *Inorganica Chimica Acta* has also presented Gray with the Siggillum Magnum award, an honor conferred on individuals judged to have made the greatest contribution to inorganic chemistry during the last 30 years. Gray has also been awarded an honorary degree of Doctor of Science by the University of Arizona.

Philip Hoffman, professor of history and social science and executive officer for the humanities, has been selected by the Economic History Association to receive the 1997 Gyorgy Ranki Prize for *Growth in a Traditional Society: the French Countryside, 1450–1815*, which the Association judged the outstanding book in European economic history published between 1994 and 1996. The book also garnered Hoffman the Allen Sharlin Memorial Award from the Social Science History Association.

Jonathan Katz, assistant professor of political science, was named corecipient of the Pi Sigma Alpha Award for Best Paper at the 1997 Midwest Political Science Associa-

Continued on page 7.

Imaging . . . from page 4

Nasser Peyghambarian and their team at the Optical Sciences Center of the University of Arizona come in. Using extremely fast lasers, the Arizona team is able to look only at photons of light referred to as "ballistic photons," while filtering out scattered photons that arrive an instant later. The scattered photons lead to tremendous distortions of the image, rendering it useless. By filtering out the scattered photons (leaving only the ballistic photons) it is possible to recapture the original image.

The filtering technique, in fact, is holographic time gating and keys on the ability of a femtosecond laser (with light pulses of a millionth of a billionth of a second) to isolate the information from the ballistic photons.

First, a laser pulse is shot at the tissue to be imaged while a reference beam originating from the same laser source is also introduced into the optical system from another angle. The ballistic photons then interact with laser pulses from the reference beam and record a hologram in the photorefractive polymer developed by Caltech and the University of Arizona.

That hologram contains only the image from the ballistic photons. The delayed scattered photons do not form an interference pattern with the reference pulses because they arrive later and consequently do not write a hologram.

The ballistic photon hologram can

then be reconstructed by sending a third laser beam from the opposite side (parallel to the original beam hitting the tissue). This beam is altered by the hologram recorded in the polymer. This altered probe beam then is isolated by the optical system to reconstruct a nearly undistorted image of the object.

The result is an image built of light, using infrared energy that has looked inside the object to a slight extent, but an image that has not required the use of high-energy radiation.

An application that Kippelen sees for the future is the imaging of human retinas. The onset of glaucoma can be detected quite early if certain structural changes just beneath the surface of the retina can be imaged.

Marder cautions that the techniques are still rudimentary, and even in their final form may not see through nearly as much tissue as X rays. But the object is not to replace X rays in all applications, he says—just certain ones in which the conditions are appropriate.

A technical report on the research was published in the January 2 issue of the journal *Science*. In addition to Kippelen, Marder, and Peyghambarian, the other authors of the paper are Eric Hendrickx, Jose-Luis Maldonado, Gregoire Guillemet, Boris L. Volodin, Derek D. Steele, Yasufumi Enami, Sandalphon, Yonj-Jing Yao, Jiafu F. Wang, Harald Roeckel, and Lael Erskine.

YORK LIAO ELECTED TO CALTECH BOARD

Caltech has announced the election of Institute alumnus York Liao '67 to its board of trustees.

Liao is one of the cofounders of Varitronix Ltd. of Hong Kong, one of the very first LCD manufacturers in the world and the first such Hong



York Liao

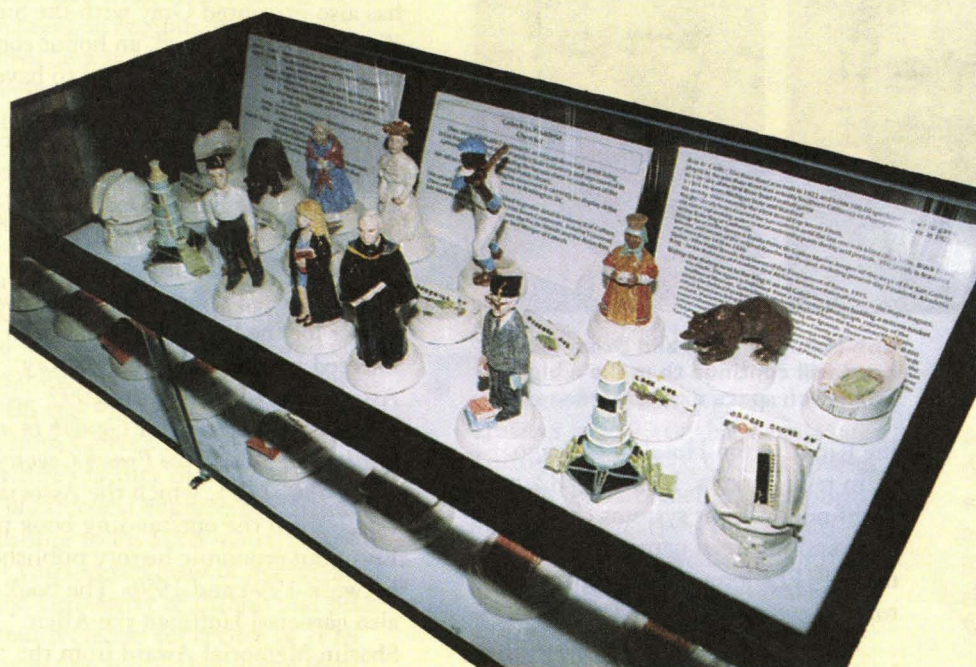
Kong-based venture. In his current role of executive director, his primary responsibilities are strategic planning and new business development within the group of companies under Varitronix International Ltd. Varitronix is ranked in the top 100 public companies in Hong Kong and now operates out of Hong Kong, China, and Malaysia with four factories and a work force of over two thousand. It has sales offices in the United States, Canada, the United

Kingdom, France, Germany, and Italy, and distribution networks in more than 30 countries.

In addition to his responsibilities with Varitronix, Liao also serves on several academic and industrial committees. Since 1994 he has been a member of the University Grants Committee, the overseeing body appointed by the government for the funding of tertiary education in Hong Kong. He has also served on the Industrial and Technology Development Council, the main government advisory body on such issues, and as a board member of the Hong Kong Industrial Technology Center, a government-sponsored incubation center.

In January 1997, Liao was awarded the Most Excellent Order of the British Empire (MBE) for his services to the Hong Kong community in education and high-tech industry.

Born in China and raised in Hong Kong, Liao came to the United States to attend Caltech, where he earned his BS in physics. He continued his studies in applied physics at Harvard, and was awarded an MA in 1968 and a PhD in 1973. Liao is married with three children and lives in Hong Kong.



CALTECH PUTS ON A GAME FACE

"Feynman three to Ranger spacecraft four. Check." Is this some quirky new code that Caltech scientists are sending to their JPL counterparts? Perhaps a top-secret satellite transmission to the Institute? Nothing as far-fetched as that. This is simply what a game of chess might sound like, using the "Caltech vs. Pasadena" chess set, commissioned by Ned Munger, professor of geography, emeritus, and currently on display in the lounge of the Caltech Athenaeum. The Caltech side consists of notable Institute people, places, and productions, including Caltech's first chief executive, Robert Millikan (king); and Caltech's first female tenure-track faculty member, Professor of Literature Jenijoy La Belle (queen); the JPL Ranger spacecraft (knights); and the Palomar Observatory (castles).

As for Nobel laureates in physics Murray Gell-Mann and Richard Feynman—they're bishops. The opposing side gives a snapshot history of Pasadena, featuring Jackie Robinson (king), a Pasadena native and the first African American major league baseball player; grizzly bears (knights), which were prevalent in the San Gabriel Mountains until 1916; and the Rose Bowl (castles). More complete descriptions of the pieces can be found both in the display case itself and in the second volume of Munger's multi-volume book series, *Chess, Culture, and Art*. The series, the first two volumes of which are now available in the Caltech bookstore, uses the medium of chess to explore the history and culture of different geographic regions. The set was designed and created by Margaret Robinson, a local African American artist, whose work is represented in other college collections as well.



Photo left, top: At the Associates' board meeting this winter, new president Ilene Marshall (center) welcomed new board members. From left: Peter Cross '68, Douglas Nickerson '40, Marshall, Anne Kennedy, and Gregory Jenkins. Not shown is new member Pat Russell.



Below, Ilene Marshall joins the new officers of the 1998 executive committee (left to right): Carel Otte Jr., PhD '54, vice president; John Glanville, secretary; Milton Mohr, ex officio; Marshall; Janet Rogers, treasurer; and ex officio members George Smith '44, PhD '52, and Warren Schlinger '44, PhD '49. Not pictured are Roland Smoot '50, vice president, and ex officio member Thomas Tyson '54, PhD '67, president of the Caltech Alumni Association.

STARR AND LUCE FOUNDATIONS EXTEND SUPPORT TO CALTECH GRADUATE STUDENTS

The Institute has received two new grants in support of its graduate student program: the Starr Foundation has awarded Caltech \$200,000 for international graduate student support; and the Henry Luce Foundation, through its Clare Boothe Luce Program, has extended \$142,100 in graduate fellowship support for women.

Over the next four years, by providing financial assistance to those in need, the Starr Foundation grant will give international graduate students the chance to take full advantage of Caltech's educational opportunities. Many international students require special support during their first and second years on campus, in areas ranging from improving language skills to addressing work restrictions for spouses. The Institute admits approximately 100 international graduate students each year.

The Starr Foundation is a private nonprofit organization whose activities have focused on education, particularly scholarship support in the

United States and Asia; health issues; and local assistance for international studies, community funds, and other civic and cultural organizations.

The Luce Foundation award continues support of the Clare Boothe Luce Program at Caltech by providing two two-year fellowships for graduate women. The fellowships will be used to recruit and support outstanding women who wish to pursue careers in science and engineering. The fellowship program at Caltech has been funded since 1989 and has contributed significantly to the increase in the number of female graduate students.

The Clare Boothe Luce Program, part of the Henry Luce Foundation, began with a bequest from the late Clare Boothe Luce, and is intended "to encourage women to enter, study, graduate, and teach" in fields where there have seemingly been obstacles to their advancement. The fields identified by Clare Boothe Luce include science and engineering,

Honors and awards. . . from page 5

tion convention. The paper, "A Statistical Model of Multiparty Electoral Data," was coauthored with Gary King.

Daniel Kevles, the J.O. and Juliette Koepfli Professor of the Humanities, has been elected a fellow of the Society of American Historians, in recognition of the literary and scholarly distinction of his historical work.

Rod Kiewiet, professor of political science, has been named an executive council member of the Midwest Political Science Association. He has also been awarded a 1998 Haynes Foundation Faculty Fellowship for his proposal, "Educational Finance in California in Comparative Perspective."

Wolfgang Knauss, '58, MS '59, PhD '63, professor of aeronautics and applied mechanics, has been awarded the Kapitsa Medal by the Russian Academy of Natural Sciences, in recognition of his contribution to understanding the time-dependent mechanical behavior of polymers and composites.

Stephen Mayo, PhD '87, assistant professor of biology and assistant investigator, Howard Hughes Medical Institute, has been selected to receive the 1997 Johnson Foundation Prize from the Johnson Research Foundation at the University of Pennsylvania.

Michael Ortiz, professor of aeronautics and applied mechanics, has been elected a fellow of the U.S. Association of Computational Mechanics for his contributions to the field of computational mechanics.

Anatol Roshko, the Theodore von Kármán Professor of Aeronautics, Emeritus, is the recipient of the 1998 AIAA Fluid Dynamics Award, presented by the American Institute of Aeronautics and Astronautics "for outstanding contributions to the understanding of the behavior of liquids and gases in motion as related to needs in aeronautics and astronautics." Roshko is internationally known for his research in areas vital to aerospace engineering, vehicle aerodynamics, and wind and ocean engineering. An AIAA Fellow, he has received several awards for his work, including the AIAA 1976 Dryden Lectureship in Research.

Thayer Scudder, professor of anthropology, has been appointed to the World Commission on Dams, which is being organized by the World Conservation Union and the World Bank to review the costs and benefits of large dams throughout the world. Scudder is an authority on resettlement and social issues related to river-basin infrastructure development.

David Stevenson, the George Van

Associates Activities

All events will be held at the Athenaeum unless otherwise noted. Individual invitations for each event will be sent monthly.

June 30–July 12, "Exploring the Dalmatian Coast: Shores of Enchantment." President's Circle Trip with Lance Davis, the Mary Stillman Harkness Professor of Social Science.

July 17–29, "Voyage to the Lands of Gods and Heroes." Associates Trip to Greece and Turkey, with Edward Stolper, the William E. Leonhard Professor of Geology, and chair, Division of Geological and Planetary Sciences.

September 12, Event to Introduce President David Baltimore to Bay Area Associates and Alumni, cosponsored with the Caltech Alumni Association.

September 20–25, "The Grand Tetons," President's Circle Trip, with Clarence Allen, PhD '54, professor of geology and geophysics, emeritus.

Continued on page 14. . .

Caltech News Meets the President

"He asks good questions," it was said of David Baltimore at his inauguration. And, when the occasion calls for it, Caltech's new president also proves to have a deft way with the answers, as he demonstrates in this interview, which he gave about two weeks before his inauguration to *Caltech News* editor, Heidi Aspaturian.

Caltech News: You've been on campus for slightly more than four months now. How would you sum up your initial impressions?

David Baltimore: The key impression I have of Caltech is of a really remarkable institution that is probably underappreciated for its unique qualities. These qualities are its continual emphasis on excellence everywhere, from the humanities and social sciences to nuclear physics, and its focus on remaining an institution that has not outgrown its ability to foster interactions across what are often barriers in larger institutions. I'm impressed by the remarkable quality of the students and by the physical beauty of the campus, which I think is very important. I was a graduate student at Rockefeller University, which had a gorgeous campus set in the middle of New York City, where you rarely find such beauty. The contrast really does create a sense of having entered a different world, in which the value system is in some respects distinct from the value system around it. And that's important because the academic world, particularly in its most abstract moments, deals with a different set of issues than one comes across in the usual activities of life.

Has anything been less than impressive to you?

As I have said on a number of occasions, I have been a bit distressed by the lack of diversity in the student body and by the very small number of underrepresented minority students that we have been attracting. I think we can change that.

When you speak about diversity, are you also thinking about the numbers of women on campus?

I am, although that's a problem that is, at least numerically, a little less severe. There is a strong, very impressive group of women on campus. But the numbers are less than representative, and that's clearly something that needs to be of concern to us. The number of women at MIT shows that there are many more interested female students, and indicates that to some extent we are not attracting the women who I think would benefit from a Caltech education. It would be good for them, and it would be good for us. It was interesting that in our recent survey of student life, both the men and the women said they would like to see more women here. This is a clear desire on the part of the campus and one that we need to figure out how to satisfy.

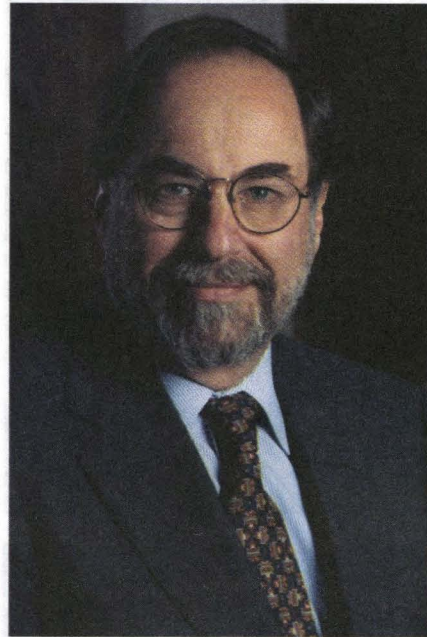
Has there been anything here that really surprised you?

Probably the thing that surprised me most is that Pasadena is a community. Before accepting this job, I had only been here for individual days—for scientific meetings, to give lectures, and so forth—and so I really had no sense of the place. To me, Pasadena was the home of Caltech and a dot on a map, and to discover that it is an old and flourishing community with a real sense of its own style and its own events was a big, and a very positive, surprise. I had thought I was coming to a little piece of L.A., and in fact I was not—I was coming to Pasadena.

You spent roughly 25 years at MIT before coming here. How would you assess the major differences between the two campuses?

They are both institutions that are essentially devoted to the same set of ideals, and the people who work for them have a similar outlook on the world. The major difference is in size. At MIT, the individual faculty feel part of a larger enterprise, one that is focused in the same direction they are. At Caltech we're trying to cover almost as wide a range of science as MIT, but with far fewer people. There are also differences between the two institutions in pinnacles of strength. Astronomy, at Caltech, because of the Institute's observatories, and the history of key discoveries, is a major strength that I think MIT could not match. Seismology is another area.

Caltech's smaller size also means that the president is not so removed from the faculty. The layers are very few. Basically, there's the provost, the division chairs, and the faculty. And Caltech has a tradition, which it treasures, of the faculty being involved in a serious way in all Institute activities. And they do get in-



You have been described as "a scientific man of action" and as a "real intellectual." What does this kind of statement mean to you? Anything?

involved—particularly some of the faculty who have been here a long time and have a real sense of ownership of Caltech. It's easy to develop a deep respect for their opinions, because they're very thoughtful, very intelligent people. And not shy.

As they looked for Caltech's future president, the Presidential Search Committee, in Kip Thorne's words, "sought your counsel." What did they ask you?

The committee asked, would I come and talk to them about Caltech. I didn't know a lot about Caltech, so I told them I could come and talk about what I thought were worthy ideals of education and research. But, such discussions are often a prelude to more in-depth consideration. By calling it a "seeking of counsel," nobody's embarrassed when that's the end of it. It's not unlike the ritual opening of a courtship.

Well, what did they ask you? What did you tell them?

They asked me what I cared about. I think that initially one of the things they were worried about in even considering me was whether I had any appreciation for the other sciences outside of biology. After all, I am known scientifically for the work that I've done in biology, and I've been pretty monomaniacal about that interest since I was a graduate student. I don't think they wanted to consider somebody who had no appreciation of the values and the achievements of other scientists. But I had in fact developed a lot of interest and some familiarity with other scientific fields because of my involvement in the Scientist-to-Scientist Colloquium, which is a meeting of scientists from many disciplines that took place during a number of summers in Keystone, Colorado. I had really enjoyed immensely the interaction with the physicists, cosmologists, and planetary scientists, computer scientists, psychologists—with people from many fields—and the experience prompted me to think a lot about the other sciences. Also because of my time at Rockefeller University, I had thought a lot about the future of neurobiology and its interaction with the other sciences. So I had a lot to talk to the Caltech committee about in those areas. That's certainly what stands out in my mind.

What was key in your decision to accept this job?

I think it was a desire to be involved in larger issues of science and to participate in shaping scientific activities over the next decade. To do that in the context of Caltech seemed like an incredible opportunity. It became clear to me that Caltech was an institution that knew what it was about and that was well placed to carry out what it believed in. At the same time, administering it wouldn't be as enormous a task as, for instance, the presidency of MIT. One of the things I hadn't appreciated when I discussed the job was the extent of the campus's involvement with JPL. I knew of course that Caltech managed the laboratory for NASA, but I didn't know what that meant. What it means is dealing with administrative issues, and a wonderful opportunity to see the more theoretical science of Caltech played out in a more practically oriented but still very scientific context, in which the main objective is to get machines up off the earth and have them do science.

Have you spent much time up at JPL?

I have spent some time there. I have spent a lot of time with people from the lab. It's a fascinating place.

Are you turning into a bit of a space-science groupie?

Well, I guess yes. It would be hard not to. I have also become a great fan of Dan Goldin, the head of NASA, who is a guy with real vision.

When the news broke that you'd accepted the presidency of Caltech, a local editorial referred to you as "a scientific man of action" and as a "real intellectual." What does this kind of statement mean to you? Anything?

Oh, I don't know. Maybe because I like to read novels, I'm a real intellectual.

What have you read lately?

I'm in the middle of but am, I must say, slightly bogged down in *Underworld*, the new Don DeLillo novel.

Is this the same one that you quoted in your first letter to the campus community several months ago?

Right. I'm still plowing through it. It's a beautiful book, but it's a slow read. In the meantime, I've read a bunch of mystery stories and a lot of *New Yorkers*.

So you like modern novels.

I like modern novels—I like modern everything. One of the things I've noticed about whatever I do is that my focus is on things contemporary. Modern writing, modern jazz, modern painting. I can't tell you why, but these things mean more to me than the things of the past.

Do you think that this has been an ongoing theme throughout your life?

Oh, absolutely. And, when you think about it, that's how a scientist does science. It's a frequent observation about young scientists that they don't have an appreciation for the past. They think science started when they got interested in science. And that's fine—in fact, it's in some ways the reason young scientists can be so creative, because they haven't accepted all the paradigms of the past, and they approach things with a fresh eye and often see connections that people who are more steeped in tradition will miss. But I don't think it's particularly characteristic of scientists to extend that contemporary focus to most other areas of their lives, although it has been the case with me.

How about the phrase "scientific man of action"?

I don't know what that means! How can you be a passive scientist?

What interests you outside of science?

A lot of things. Skiing, fly-fishing, art, jazz, wine-collecting, good coffee. I'm a rank amateur, with a thin veneer of experience, in all these areas. In other words, a real intellectual.

As the founding director of MIT's Whitehead Institute and a former president of Rockefeller University, you bring lots of administrative experience to this job. What have you learned about running research institutions that you think will have the greatest impact on your tenure here?

I should point out that those were two totally different situations. The Whitehead Institute was a start-up. I was lucky enough to be approached by a man—Jack Whitehead—who wanted to put \$135 million into building a research institute. There was a lot of politics involved because we had to establish what was then an unprecedented relationship between the newly formed Whitehead Institute and MIT. Once we got through the political phase, it became a matter of shaping the environment of science and of attacking particular molecular-biology and developmental-biology questions within a very small physical framework that was quite tractable and that we built from scratch. It was in a sense administrative heaven, because there was no baggage that came along with it, and there was the terrific support of the founder, Jack Whitehead, from whom I learned a tremendous amount. I had an absolutely remarkable experience at Whitehead, and I still remain very close to the faculty and staff there.

At Rockefeller, it was completely different. This was an old institution with a well-established faculty and a variety of problems that had to be dealt with—some of them with great urgency. I also had much less time because I only stayed there for about a year and a half, compared with eight years at Whitehead.

Looking back, I think if I had to single out the one crucial thing I learned, it would be that the role of director or president of an institution can mean very different things at very different times. You have to tailor your role as an administrator to the needs of the institution. Caltech is neither Whitehead nor Rockefeller: it's not new like Whitehead, but it also doesn't present the same—well, let me put it this way: Caltech is an institution lacking a crisis, whereas there were crises at Rockefeller. And so I have the luxury of approaching this position with less sense of urgency and more opportunities to get to know the people and the institution and to work within the established framework here. I see myself doing things much less dramatically than it was necessary to do them at Rockefeller.

In your own field, biology, what do you foresee for this campus and for society at large over the next decade? What kind of impact is an undertaking of the scope of the genome project, for instance, going to have?

The genome project is a great challenge to biology because it represents such a different way of doing biology—mass-scale biology. People have tried to sum this up as a distinction between big science and small science, but I don't think that's the issue. The issue the genome project has brought to biology is how to handle the acquisition of massive amounts of data as opposed to a kind of focal boring into specific problems. My science has always been very much in the latter mode—I get interested in a particular phenomenon and I try first to understand it more or less in isolation from the rest of biology, and then later to reintegrate it into a larger conception. But today, there's a whole class of scientists who have been brought up in, and who threw in their lot with, the genome project, and they think in terms of thousands or tens of thousands of genes. It's a different way of doing science, and it gives you a different kind of information. It's information that we're still in the process of acquiring, and the jury's out about how important it is, although many people consider it of overriding importance. I personally believe that what we get from these kinds of global acquisitions and data are, basically, catalogs. They're very, very useful and important catalogs, but I believe that in the end the deeper understanding will come from people who are devoted to particular biological phenomena. And from this particularity will grow up yet another science that we're just beginning to see emerging, and that is the systems-level description of biology. It will use information from the genome project, as well as information from the studies of individual biological phenomena. I think Caltech is moving a little more in the direction of the systems analysis.

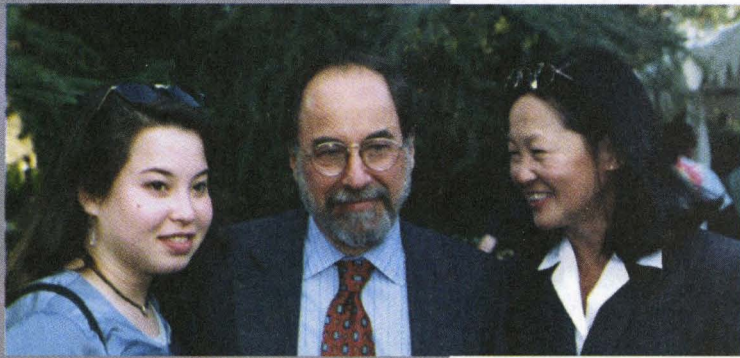
Beyond this emphasis, where do you see Caltech heading in biology in the first part of the new century?

I think Caltech will worry a lot about the integrative aspects of biology. The most impressive problem that we face in this regard is the brain, where we need to think about the integration of vast numbers of neurons and tracts of information flow. I think Caltech will play an important role in understanding how all those elements fit together. This effort is by no means limited to the bio-



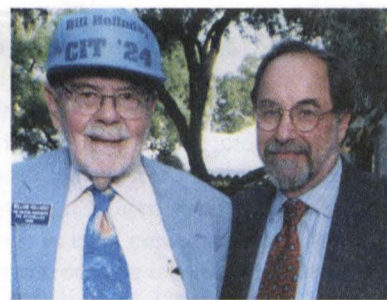
Board of Trustees Chair Gordon Moore (left), head of the Institute trustees' Presidential Selection Committee, and Feynman Professor of Theoretical Physics Kip Thorne (right), head of the faculty Presidential Search Committee, welcomed Baltimore and his wife, Alice Huang, to campus on May 13 of last year, the day that Baltimore's selection as Caltech's new president was announced.

Continued on page 14 . . .



All in the family: Teak Baltimore, Dad, and Mom Alice Huang join the Caltech community.

Welcome Ab



At left: Past president of the Alumni Association (1962–63) Bill Holladay '24 greets the new

Carnegie Institution President and keynote speaker Maxine Singer: “You can count on your new president.”

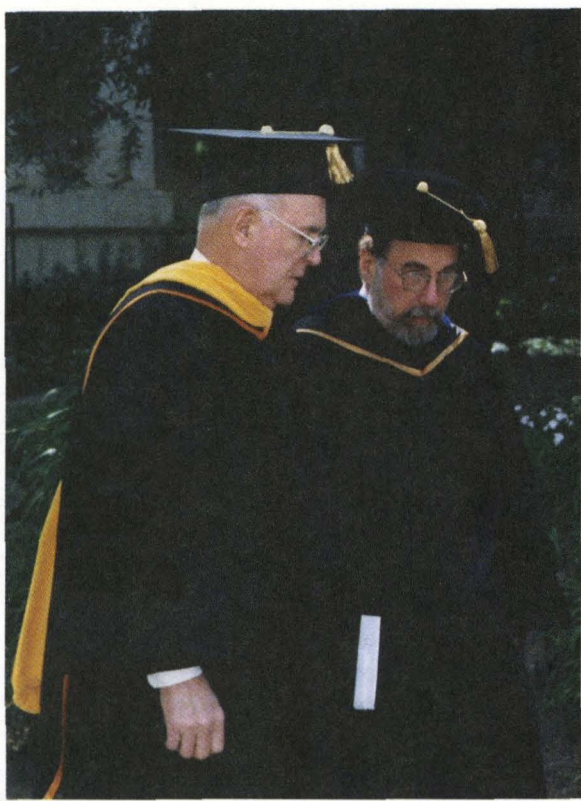
Hats off (lower left): Baltimore’s day in the sun called for graduation caps and, well, sturdy, oversized programs.



A presidential parade (below): From right, presidents emeriti Tom Everhart and Marvin Goldberger are joined by Caltech’s Graduate Student Council President Geneviève Sauvé, Alumni Association President Tom Tyson '54, PhD '67, and Vice Chair of the Caltech Trustees Walter Weisman.



board



Do you, David Baltimore, take Caltech . . .

A noble train: A parade of Nobel and Crafoord laureates joins the procession. From left, Doug Osheroff '67 (Jackson and Wood Professor of Physics at Stanford) chats with fellow Nobel Laureate Renato Dulbecco (president emeritus of the Salk Institute), while top-hatted Nobelist Ed Lewis (Morgan Professor of Biology, Emeritus), PhD '42, falls into line with his Caltech biology colleague, Crafoord Laureate Seymour Benzer (Boswell Professor of Neuroscience, Emeritus); Nobelist Paul Berg (Cahill Professor in Cancer Research at Stanford); Crafoord Laureate Gerald Wasserburg (MacArthur Professor of Geology and Geophysics); and Nobel Laureate Rudy Marcus (Noyes Professor of Chemistry).



"What an act to have to follow"

As he began his inaugural address, David Baltimore reeled off the names of his predecessors, exclaiming "What an act to have to follow!" Little did he know that even the inauguration itself was ripe for comparison to previous ceremonies. Here is a selection of some of the more interesting highlights from Caltech inaugurations past. (Note: Robert Millikan is conspicuously absent here, because he was never inaugurated; he refused throughout his lengthy tenure to accept the official title of president.)

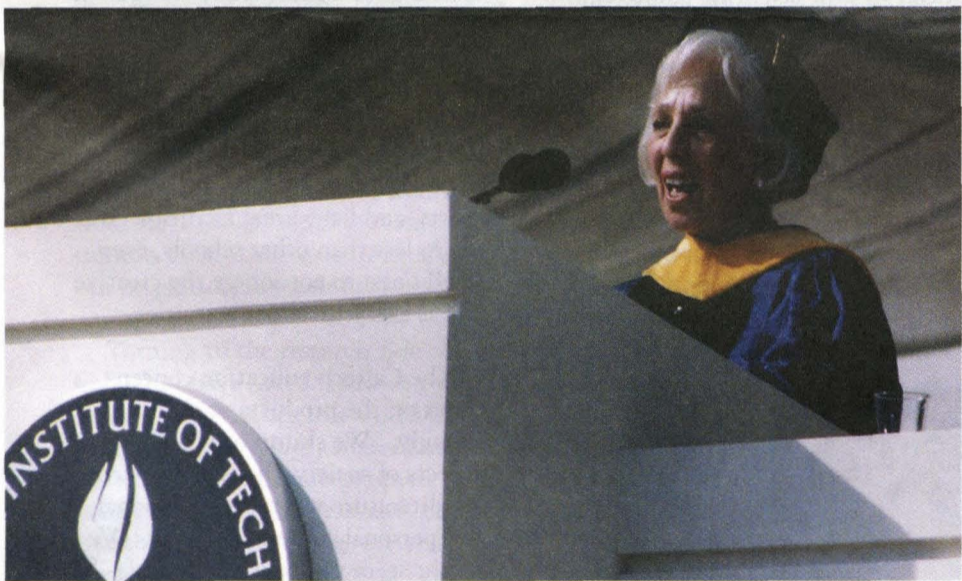
• **Lee DuBridge (November 12, 1946)**—Caltech's first official inauguration was also the only one (so far) held off campus. It was held in the Pasadena Civic Center, because of the pouring rain—the same place Caltech had planned to move Dr. Baltimore's inauguration this year, in the event that El Niño struck again. DuBridge's inauguration was also the only ceremony to feature a large military contingent—not surprising, since World War II had officially ended September 2, 1945, a mere 14 months earlier. A total of 12 delegates from the Army and Navy were present, including one vice admiral and four rear admirals. Of course, a large part of the military connection was the fact that DuBridge had served as director of MIT's Radiation Laboratory during the war, overseeing research that proved crucial to the Allied war effort. "Under his general supervision, the nation's entire research program in radar, radio countermeasures, underwater sound, infrared detection, and other detection techniques was carried out," noted Karl Compton, MIT's president at the time, who gave the inaugural opening address.

• **Harold Brown (October 30, 1969)**—While DuBridge's convocation avoided the downpour, Brown's assemblage was subjected to sweltering 90° heat. There was also weather of another type—the massive media storm that ensues when the Nobel Prizes are handed out. *Two* new Nobel laureates from the campus were on hand that day: Max Delbrück, professor of biology, and Murray Gell-Mann, the Robert Andrews Millikan Professor of Theoretical Physics. Gell-Mann's award had been announced the very morning of Brown's inauguration, and Delbrück's award the previous week.

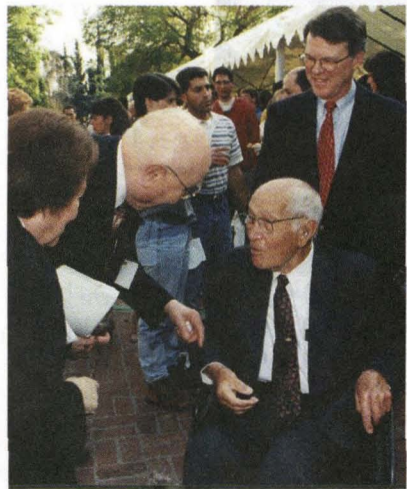
• **Marvin (Murph) Goldberger (October 27, 1978)**—In a quirky stroke of coincidence, Gell-Mann, the Nobel laureate who shared some of the spotlight at Brown's inauguration, introduced Goldberger, a longtime friend and colleague. Goldberger's inauguration was also given wide publicity when *Time* magazine published a story on Caltech and its new president (the November 6, 1978, issue, in case you're interested). Twenty years later, at Baltimore's inauguration, Goldberger recalled his own emotions upon being named Caltech's president, declaring: "Let me tell you, David, that even though you've been acting as president for over six months, you'll feel somehow distinctly different after this ceremony."

• **Thomas Everhart (April 12, 1988)**—Caltech inaugurations are traditionally considered family affairs, and Everhart's inauguration took the tradition one step further: his daughter, the Reverend Janet Everhart, delivered both the invocation and benediction. Also, the orange and white balloons released during the recessional were a surprise at Everhart's ceremony, but are now officially a tradition with their inclusion at Baltimore's inauguration—an event where Everhart offered his own perspective, not only on the Caltech presidency, but also on the significance of universities throughout history. "Universities have been important institutions for over three-quarters of a millennium; at no time have they been more important than they are today." An appropriate comment, since Everhart attended Baltimore's inauguration as the delegate for Cambridge University, founded in 1284.

Top brass: Trumpeting the arrival of the Institute's sixth chief executive, Caltech musicians make note of the day.



Honorary marshal Stephen Hawking proceeds down the walkway.

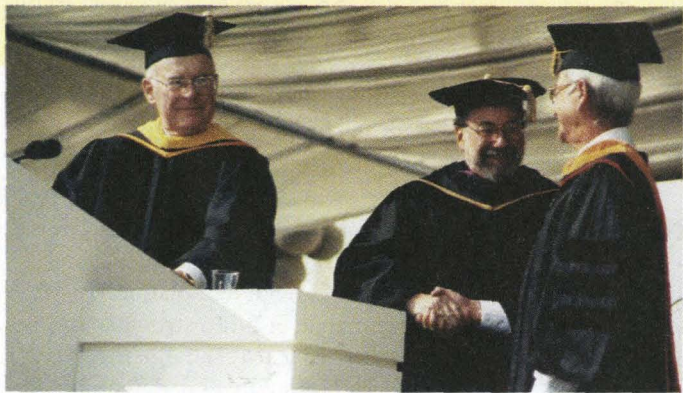


Déjà vu: Arnold Beckman, PhD '28, has been on hand for the inauguration of every Caltech president, beginning with Lee DuBridge in 1946. Behind him is Peter Dervan, Bren Professor of Chemistry and chair of the Institute's Division of Chemistry and Chemical Engineering.



"Let us move ever forward"

Excerpts from the inaugural address of David Baltimore



The Board of Trustees chair and vice chair, Gordon Moore (left) and Ben Rosen (right), welcome Baltimore into the fold.

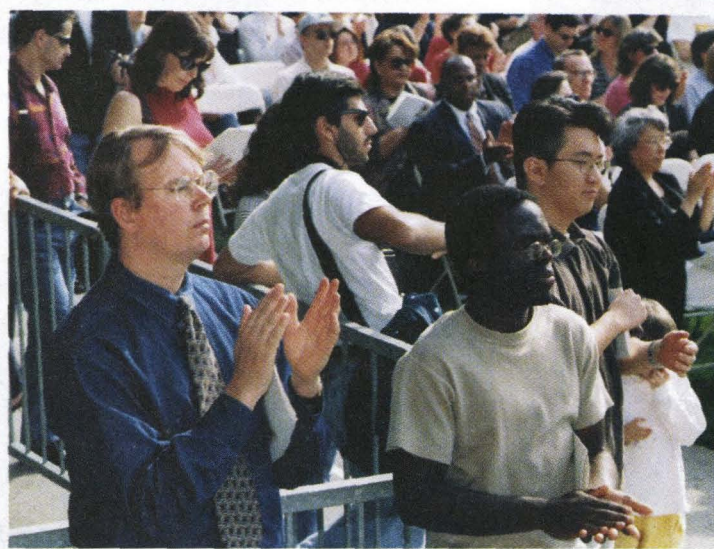
... Universities are enduring institutions. They go to great efforts to mark the transitions of their leadership with the honored and historic ritual of an inauguration. But the truth is that they change slowly, and new chief administrators do not alter that measured pace. Thus, this overwhelming event, marking such a deep change in my life, marks but a slight deflection in the established trajectory of this great institution. My deepest goal as president is to maintain the essence of Caltech while helping it adapt to a changing world.

As I have gathered knowledge about Caltech, questions have occurred to me whose answers can provide perspective for setting priorities. That is the position I'm in now—many questions, few answers. Thus, I thought I would frame this address around the questions. It is an open invitation to the many constituencies on the campus to participate in a dialogue—the Board of Trustees, faculty, administrators, students, staff, alumni, and the various friends of Caltech who provide support. Thus, I will in this talk pose a number of questions, explain why I raise them, and draw out some of their implications.

The first of my questions is whether Caltech is truly immune from the winds blowing through American academic life. I raise this because the last decade has been a stormy one for academia, with many questioning the very basis of scholarship in both the humanities and the sciences. The question might be whether by focusing on science and technology, Caltech hews to eternal truths, or whether the self-criticism that the intellectual world has embraced in the last decades has spilled over into our bastion of rationality. The answer I suspect most would give here is that while the culture wars and the science wars have been furiously engaged on the streets of Berkeley, New Haven, Cambridge, and Paris, in Pasadena the progress of science continues quietly and unabated. Not that we don't reflect on our activities or even have our participants in the wars; we have all of

that. It's just that we have absolutes in which we believe. We have absolute zero on the temperature scale; we know that nothing exceeds the speed of light.

It is interesting to contemplate what would happen if our astronomers measured a redshift indicating that a galaxy was receding from us faster than the speed of light. Or if we somehow recorded a temperature of absolute zero, or made a perpetual motion machine. In these situations, the experiment would receive the deepest scrutiny, and only in the unlikely case that it survived would theory come into question. Remember cold fusion. But we are willing to question our absolutes. Our absolutes are not so absolute—they await an experiment that contradicts them. They are tentative absolutes, and we are comfortable with them, needing no daily reminder of the threat that each experiment poses to our comfort. That is the culture of science, and it is a special culture that we live with, we teach, and we believe in



Students watch their new president undergo initiation rites.

almost as a religion. It is a culture that is incomprehensible to those who have not manipulated the concepts of science. It insulates us from many of the self-doubts of the larger intellectual world and allows us to move forward.

However, we should not be too complacent. Major changes are coursing through academia. They are not the intellectual challenges from which our culture immunizes us; they are technologic developments and an increasingly market-driven

approach to education. We are already responding to these new pressures, incorporating technology and looking carefully at our costs and price. We are in a favorable position economically because of our relatively low dependence on tuition. In fact, we are already rated the best buy in education. Furthermore, we have a special product, and right now the world wants to buy it—applications are up some 20 percent again this year. The world realizes how well we prepare young people to be scientists and engineers—the honor code and the small number of students makes learning a shared experience of great intensity, while our laboratories provide the hands-on experience that is the essence of science. However, we cannot be complacent; we need to rethink our values and our value continually in the context of other opportunities available to students and other modes of education.

Let me turn from an abstract question to a concrete one. Is Caltech making a sufficient contribution to the economic life of America and especially of Pasadena? Years ago, Caltech was the scientific and technologic engine that drove the development of the aeronautics industry in Southern California. There is much new energy in Caltech that could repeat this success. The opportunity level is particularly high at JPL, where necessity breeds invention on a monumental scale. We have begun to release our energy of innovation to benefit the local community and the

Might the Caltech undergraduate experience improve with more time and opportunity for the students to grow as human beings?

Let me turn to the direction of the students. Here I have wondered, "Does Caltech sufficiently develop those aspects of the lives of its 20-year-old undergraduates that will allow them to become thoughtful, balanced, productive members of society?" It is a question that I ask as I visit the houses and meet with student leaders. It is a question that I hear from alumni, many of whom seem to feel that they endured their undergraduate days rather than enjoying them. It is a deep question about value systems. Each Caltech professor feels that his or her area of teaching is critically important to the development of students and that leaving out any of the glory of the field is a crime. For the students it becomes a life of trying to keep up academically with little time for personal development. We encourage sports, and have great facilities. But we do less than other schools, even small ones, to encourage the creative arts as extracurricular activities.

The Caltech education concentrates on the products of rational thought. We skimp on the other aspects of society, the ones like art and literature where the emotional and personal content is higher. We might seem to overlook those elements, but that's not really the message we are sending, because that's not the faculty I have come to know. We are collectors of art, devotees of music, readers of literature. Many of us consult outside Caltech and understand the multiple strains that contribute to modern life. Maybe we could do more to bring that understanding to our students. It is not an issue of teaching more art or literature. My experience has been that you do not learn about the role of art or literature in classes, because the classroom is intrinsically an analytic framework—you learn how to look at art, how to listen to music, how to understand the structure and history of literature. But the real reason for the arts, as a reflection of the complexity of life with its intricate mixture of rationality, passion, and history, is not taught but rather learned by experience in the world—often through intense interactions with others. Might the Caltech undergraduate experience, as wonderful as



to support basic science. Remarkably, the tone of Washington has changed recently, and congressmen are vying for who can promise more to the National Science Foundation, the National Institutes of Health, and other agencies. Although the overall NASA budget is being reduced, space science remains strong. America has certainly become more materialistic: more students are going into business, admission to law schools is very competitive, and science and even engineering are not drawing interest among young Americans the way they did in the decades following World War II. However, as we become a richer and more powerful nation, the importance of science as the driver of commerce and the generator of good health has become increasingly evident, and thus science is receiving unprecedented support.

While taking advantage of the government's newly found interest in science, we need to remember and to reassert the values that have driven most of us into science. It is the rush of discovery, the excitement of being the first to uncover a new secret of nature, the satisfaction of seeing messy complexity resolve into elegant simplicity that drives most of the research activity on this campus. Luckily, basic science feeds the needs of industry, justifying its support. But it serves a higher function, that of demystifying the world, providing an orderly understanding of natural processes. When *Time* magazine features a scientific story on its cover, its newsstand sales soar—science serves the need of people to understand the world around them, and that understanding is one of our finest products.

Although science is doing well now and has great public support, there are major issues to be faced. Congressmen can support science today because of the extraordinary strength of the economy and the possibility of a windfall from the tobacco industry. That could be ephemeral. Also, to take advantage of the available federal funds, we need to make major investments on the campus in space, facilities, and people. Thus, our dependence on private philanthropy remains as great as ever. We are lucky that Caltech has so many fine friends who are as

committed as the faculty to Caltech's greatness.

I have said a lot about what I have learned about Caltech, but little about myself. Let me end on a more personal note. I deeply believe in the power, beauty, and comfort that come from a rational outlook on the world. In my younger years, I hankered after a world in which rationality would conquer emotion and bring peace. It was reinforced in my early schooling—remember that I was in school in the post-World War II era, when the country was still basking in the glory of having defeated the irrationality of the Nazis and when the science and technology that had won the war for us were seen as the key to the future. Even the philosophy that then opposed America's, the Communist philosophy, seemed to come from a rational analysis of society, and seemed a humane alternative to America's capitalist society, which was so hard on those who were unable to cope with its demands.

When you grow up with a worldview like that, there is a central aspect of society that makes no sense: politics. For years, I simply could not comprehend what the word meant. When people said that in making decisions, you need to consider both the rational elements of an issue and the political ones, I did not understand what they meant—why wasn't rationality enough? So my whole life since I left my parents' nest has been an education in irrationality. I've had to learn that you cannot deny the passions of people, you must

In the five months that I have been here, and in the preceding five months when I was in the wings, I have come to love Caltech. Its values are ones in which I deeply believe: honesty, clear thinking, hard work, a striving for elegance and novelty. Caltech does this as a community, not the loose-knit set of empires found elsewhere. The community is a rich one, including humanities, social sciences, mathematics, and engineering, as well as the remarkable basic sciences. It is a rare one in the degree of excellence and commitment found at all levels, from the faculty to those who maintain the beautiful grounds. Part of this community is the Jet Propulsion Laboratory, a unique organization that adds a special dimension to the activities of Caltech. It is an honor and the deepest of responsibilities to accept the helm of this institution. Thank you so much for making my family a part of yours. Let us move ever forward, surmounting obstacles, increasing our reach and our influence, holding to our values and keeping Caltech the jewel of academia.

The complete text of President Baltimore's speech may be found on Caltech's website at www.Caltech.edu/~media/highlights/inaugad.html

The Baltimore Years: Day One ... from page 3

Albert Carnesale, chancellor of UCLA, and Jon Strauss, president of Harvey Mudd, inaugural attendees and members of the procession included seven of Baltimore's fellow Nobel laureates: Paul Berg (chemistry, 1980); Renato Dulbecco (the corecipient of the prize in physiology or medicine that Baltimore shared in 1975); Caltech biology professor Ed Lewis, PhD '42 (physiology or medicine, 1995); George Olah (chemistry, 1994); Caltech alumnus Douglas Osheroff '67 (physics, 1996); Richard Taylor (physics, 1990); and Caltech chemistry professor Rudy Marcus (chemistry, 1992). Also, two Crafoord Prize recipients from Caltech were in attendance: Gerald Wasserburg (1986, geochemistry) and Caltech neuroscientist Seymour Benzer (1993, biosciences).

it is, improve with more time and opportunity for the students to grow as human beings? I need to hear more from the various constituencies on the campus about this issue. The alumni can be particularly helpful here.

Turning to the research side of Caltech, I have asked: How can we justify our activities in a world that is becoming increasingly materialistic? Caltech is a great undergraduate college and a superb graduate school, but the largest part of its activities are focused on research. And even though we have an engineering and

Thank you so much for making my family a part of yours.

applied science division, most of the research is at the most basic end of the spectrum. Our big instruments, like Palomar, Keck, and LIGO, are all attempts to answer very basic questions, such as the age of the universe or its very nature. JPL is more practically oriented towards the mechanics of exploring space, but its justification is space science, answering questions such as whether life ever evolved independently of that on Earth. A few years ago, pure science seemed under very strong attack, and the cancellation of the Superconducting Supercollider seemed the proof that America was no longer willing



Alumni join in the procession as Baltimore joins a distinguished line of Caltech leaders.

accommodate them; that you cannot deny history, you must accommodate it. I think this is a perspective that all scientists who are willing to work within the larger society have to learn, and it is what sometimes limits the effectiveness of scientists when they do venture outside of their laboratories and institutions.

Baltimore Interview . . . from page 9

sciences—there's also a lot of involvement from other disciplines. Physicists are contributing new ways of looking at issues in biology, mathematicians are developing new analytical approaches, and chemists are providing a structural basis for biological phenomena. Engineering is playing a large role too. That's where the systems-level thinking is embedded—the whole notion of control theory and how it fits into an understanding of how biological systems maintain both their information transfer and their stability.

Shortly after you accepted the presidency of Caltech you were quoted in an article to the effect that, "If there is any place in the world that you're going to make an impact on the public understanding of science, it would be in the Los Angeles area." Can you expand a bit on this statement?

Where do you find these things!? But, yes, it's true. The entertainment industry is here. People spend a lot of time focused on its products. To the extent that we can provide scientific understanding through this medium, I think we're better off.

Beyond the usual approaches, such as programs like "Nova" and "Discovery," how would you do this?

Various people have tried different things. There's even been an effort to put together sitcoms. My wife was part of a group of scientists led by the physicist Leon Lederman that had an interest in trying to create a science-oriented sitcom. It was called "The Dean", and she was kind of a model for the title character, since she was the dean of science at New York University at the time. As far as I know, that project's in abeyance but it's an interesting idea, because it would be an opportunity to bring these kinds of issues into a format where people would be paying attention.

Have you personally been in touch with any Hollywood types about the idea of using the entertainment industry to promote awareness and understanding of science?

Not since I've been at Caltech, but in past years, yes. I was the chair of an organization called the Science Institute for Public Information, and we did make contact with people in Hollywood and talk with them. There were people who were really interested, but it never came to the point of anything actually happening. Of course, it takes quite a bit of money for something to happen.

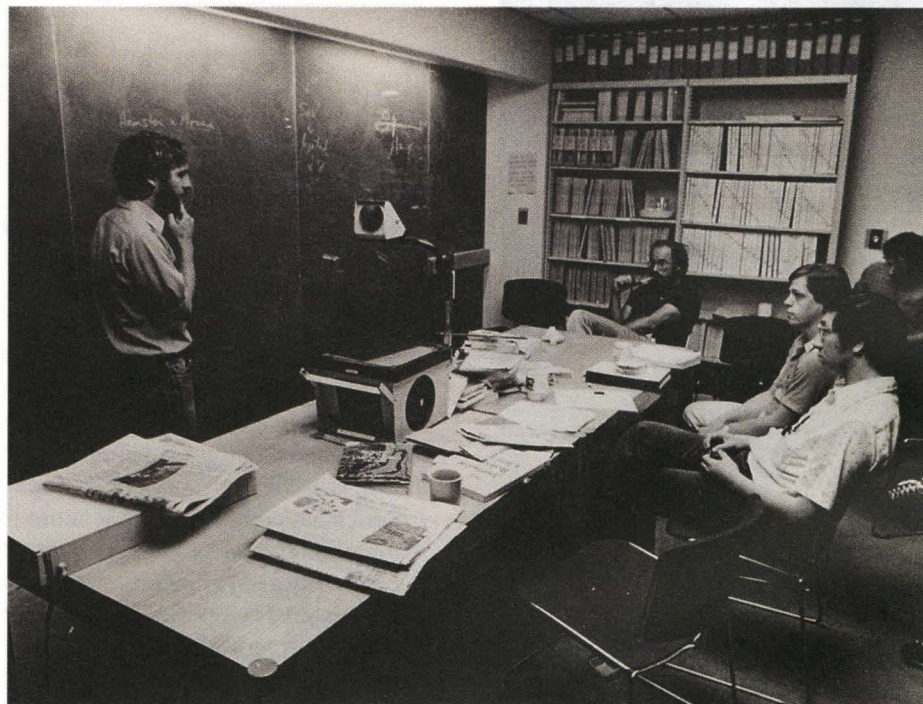
What do you consider the Institute's key challenges over the next ten years? What, currently, are your highest priorities?

The key challenge facing Caltech is increasingly one of maintaining a balance. We've got to decide how much we want to participate in what is looking almost like a renaissance in the public support for basic science. I think our ability to

I think it's very important that an administrator not be divorced from the creative and substantive activities of the rest of life.

take advantage of that is going to be limited only by how much advantage we want to take. For instance, do we want to grow significantly larger in one area or another; and do we want to do that by increasing staff but not increasing faculty? That's one clear trend. You might say that the Beckman Institute is a harbinger of how we might move in that direction—extending our technical range without taking on large numbers of new faculty or students. But, do we want to move in a different direction, or do we not want to grow at all? I think that's our major challenge, and a lot of our priorities will flow from how we decide to deal with this particular issue. The intellectual opportunities today are extraordinary—in earth sciences, the climate and environmental sciences, the biological sciences, chemistry. The list just goes on and on. We have new capabilities, new machines, and numerous new levels at which we can analyze problems. I think our challenge is not to allow ourselves to be driven by external circumstances but rather to thoughtfully make internal decisions and then carry them out.

There's also an enormous challenge that comes from the outside, and that is the growth of Caltech's peer universities in the United States—Stanford, Berkeley, Harvard, MIT, and others. These are our major competitors in terms of both students and faculty. They are larger, they command more resources, and they can provide a faculty member with more opportunities and with a larger network of colleagues. There are also challenges coming from Europe. So, how do we maintain the excellence of Caltech in the face of those competing opportunities that are continually dangled in front of our faculty? A week doesn't go by that I don't hear about one or another eminent member of the faculty being wooed by another institution. Wooed, as often as not, unsuccessfully, but each overture requires careful consideration and an administrative response.



Baltimore (shown here with students at MIT in the 1970s) joined the MIT faculty in 1968 and was named full professor in 1972. He left MIT in 1990 to become president of Rockefeller University and after returning to MIT in 1994 was named Institute Professor in 1995. He remained at MIT until last year when he was tapped for the Caltech job.

In accepting the presidency of Caltech, you have set an agenda for yourself as a working scientist, head of a national research initiative on AIDS, leader of a major scientific institution, and national scientific spokesperson. Can one person effectively integrate and fulfill all these roles?

There's no question that I have bitten off a lot—or should I say, taken a number of bites in different directions, and they make quite a mouthful. I'm learning how to balance them, but I'm going to have to make some choices. For the moment, I think I'm able to contribute to the various elements that I care about—science, the AIDS vaccine program, Caltech. I'm unwinding a number of other things that were responsibilities of mine—my laboratory at MIT and consulting activities that I've needed to wrap up. At the same time, I think it's very important that an administrator not be divorced from the creative and substantive activities of the rest of life. This is certainly not a new idea at Caltech—Millikan maintained a research laboratory here, and Ed Stone, who runs JPL, continues his scientific involvement in space science. Our provost, Steve Koonin, clearly does the provost's job with tremendous devotion, but he's also involved in a variety of scientific issues.

Beyond Caltech, I think we're seeing that same outlook increasingly among senior administrators. Hal [Harold] Varmus, who runs a \$13 billion operation as head of the National Institutes of Health, oversees a research laboratory. So do the heads of both the National Cancer Institute and the Allergy Institute, although they run enterprises that at least in terms of dollars are larger than Caltech. So, I don't think there's any contradiction there. It's a matter of managing your time, understanding your values, and setting your priorities. I have to say, though, that in this context Don Delillo will probably continue to have a hard time.

Honors and awards . . . from page 7

Osdol Professor of Planetary Science, has been selected to receive the 1998 Harry H. Hess Medal of the American Geophysical Union, which is awarded for outstanding achievements in research into the constitution and evolution of Earth and her sister planets. The medal is presented each year at the union's spring meeting.

Associate Professor of Astronomy Charles Steidel, PhD '90, has been awarded a \$500,000 David and Lucile Packard Foundation fellowship. Steidel's research interests lie in the areas of galaxy formation and evolution; he will use the award largely for instruments to be fitted onto Palomar's 200-inch telescope, to aid him in his search for galaxies as they appeared when the universe was less than 15 percent of its current age.

Edward Stone, the David Morrisroe Professor of Physics and director of JPL, received an honorary degree of Doctor of Science from the University of Southern California at that school's commencement exercises on May 8.

Thomas Tombrello, the William R. Kenan, Jr., Professor and professor of physics, and a graduate of Rice University, has been selected by the Association of Rice Alumni to receive one of its 1998 Distinguished Alumni Awards, awarded on May 9 in Houston. The award is the highest honor bestowed by the association for "excellence in one's chosen field."

Gerald Wasserburg, Crafoord laureate and the John D. MacArthur Professor of Geology and Geophysics, will receive the title of *Docteur Honoris Causa* from Rennes 1 University, France, at an official ceremony on June 30.

Professor Jason Saleeby, foreground right, a veteran of 19 years of field work in the region, acquaints students with a geologic map and the rocks of Duke Island. Photo by Laura Wasylenki.



This seal pup was one of many different species the group observed, including sea otters, bears, bighorn sheep, orcas, bald eagles, and dolphins. Photo by Julia Goreva.



Living off the land was not a hardship for Tim Melbourne, left, a graduate student in geophysics, and Rob Brady, a graduate student in geology, shown here enjoying locally caught crab. In fact the students fished for their dinner often and also dined on salmon and halibut. Photo by Julia Goreva.

GEOLGY STUDENTS HEAR CALL OF THE WILD

Alaska was the destination for 17 lucky students from Geological and Planetary Sciences, who participated in a special field trip last summer. Led by Professor of Geology Jason Saleeby, the trip was sponsored by physics alumnus Michael Scott '65, who also participated in the trip. The group spent eight days cruising the inland waters of Alaska—living on board two research vessels—and flying over the area to study the geology.

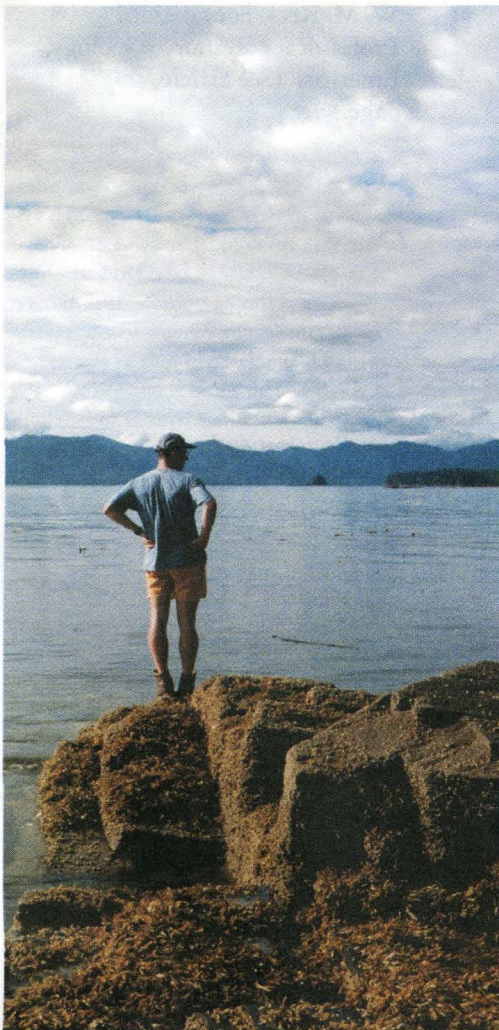
The students looked at glacial deposits, the orogenic geology of the bedrock, and the ecological systems of the local temperate rain forest and the marine environment. According to Saleeby, who has conducted geological field studies in the area for 19 years, the geologic focus of the field trip was a feature called the Insular Suture Zone. "Pre-Cretaceous rocks in the area contain a series of oceanic island arcs, composed of volcanic rocks, interspersed with oceanic plateau sedimentary rocks. Evidence indicates that these arcs formed far from their current location and were swept into the Insular Suture Zone as the result of the subduction of the intervening Pacific Ocean floor beneath North America."

The students crossed the suture zone, at first looking at nondeformed exposures on Prince of Wales Island and Duke Island. Near Revillagigedo Channel they looked at "spectacular fold and thrust fault structures of the suture zone, and the transition zone between oceanic arc rocks and North American Plate rocks." Traveling farther east, the group saw, in the deep fjords of the Coast Mountains, deep exposures of the coastal batholith.

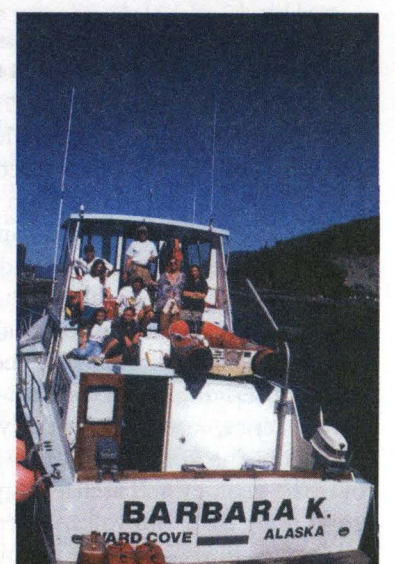
But life on the field trip went beyond rocks, says Saleeby. "I thought it was very important," he says, "for the students to also experience the deep green magic of the temperate rain forest."



Boat captain Rick Matthews lined everyone up for this commemorative photograph. Trip sponsor Mike Scott '65, in the left rear with the backpack, joined fellow participants Jason Saleeby, Inyo Saleeby, Neena Baschir, Margaret Belska, Robert Brady, Mihai Ducea, Dave Evans, Julia Goreva, Elizabeth Holt, John Holt, Bill Keller, Ronit Kessel, Rowena Lohman, Tim Melbourne, Greg Okin, Alexei Pankine, Jim Spotila, Slawomir Tulaczyk, Laura Wasylenki.



Tim Melbourne checks out the bobbing heads of seals (the small oceanic "dots"), or are they checking him out? Photo by Elizabeth Holt.



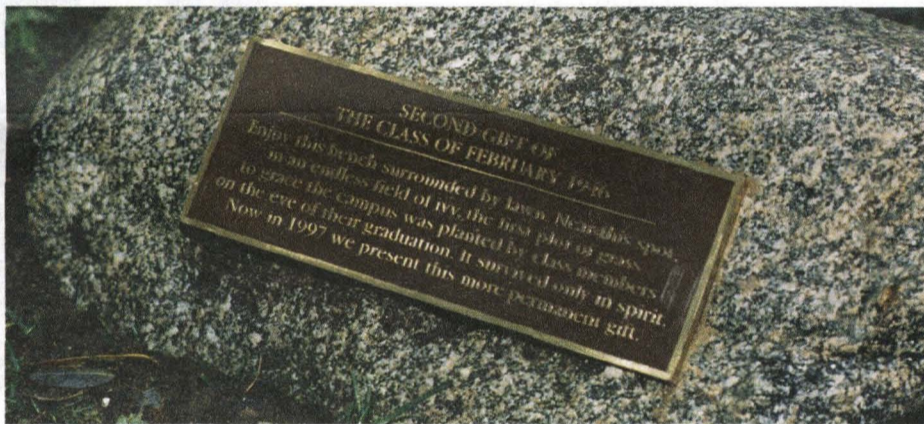
"What's amazing," said Saleeby, "is that after 20 people spent eight days living aboard the two boats, at the end of the trip, we all still got along great." Photo by Neena Baschir.

Kayaks and inflatable Zodiac boats provided up-close access to shoreline geologic features—and the opportunity for some recreational fun. Photo by Inyo Saleeby.

Alumni
Update



GRASS OF '46 GIFT PLANTED ANEW
In the spring of 1946, as a testament to their desire for a grassy lawn—instead of the ivy and ice-plant that dominated the campus—members of the class of February '46 planted a 60-square-foot sample plot of grass (above, with a kneeling Willard Ross), in front of the recently constructed Thomas Engineering Building (currently Thomas Laboratory). Unfortunately, the midnight prank, which also doubled as the official senior-class gift, survives only in memory; the Building and Grounds Committee removed the grass a few weeks later. While visiting the campus last year, however, some February '46 alumni noticed that the class was still lacking in an official gift, and decided to remedy the problem. Last fall, the class donated a teak bench—along with a plaque (bottom, right) that invokes the memory of the grass plot—located at the edge of the now-grassy lawn at the southeast corner of Thomas Laboratory. At the dedication in February (above, right), umbrella-wielding class members united once again, this time protecting their second gift from being swept away by El Niño, which had turned out in full force for the ceremony. Guarding the bench are, clockwise from back left: Robert Pool, Ross, David Nielsen, Robert Sensibaugh, Louis Jensen, Roger Clapp, Edward Neale, and John Taber.



Alumni
Activities

JUNE 19–20
Alumni College, on the Caltech campus.

AUGUST 22–SEPTEMBER 5
Peru Expedition Travel/Study Program, led by William Schaefer, senior research associate, emeritus, chemistry. (Please call 626/395-6594 for information.)

OCTOBER 16–20
Canyons and Craters of the Coconino Travel/Study Program, led by Robert Sharp '34, MS '35, the Robert P. Sharp Professor of Geology, Emeritus; and Leon Silver, PhD '55, the W. M. Keck Foundation Professor for Resource Geology, Emeritus. (See article, this page.)

ALUMNI TO CANVASS CANYONS AND CRATERS OF THE COCONINO PLATEAU

The Caltech Alumni Association is offering a geology field trip that will focus on the natural history and archaeology of the part of the Arizona Coconino Plateau that is easily accessible from Flagstaff. Dramatic autumn weather and the seasonal golden foliage will enhance the tour, which has been designed to provide an interesting geology travel/study program at moderate cost.

The first day will highlight the geology of the south wall of the Grand Canyon as seen from vantage points along the southern rim. The tour will progress from the ancient metamorphic rocks nearly 2 billion years old, at the bottom, into the overlying tilted, but not greatly altered, sedimentary strata of the Grand Canyon series, into the essentially horizontal Paleozoic sedimentary formations composing the uppermost 4,000 feet of the canyon wall. The second day will cover the geology and archaeology of the vast San Francisco volcanic field, which boasts more than 200 volcanic centers—including the very young Sunset Crater and its lava flows—and the pueblos of Wupatki National Monument. The third day will focus on Meteor Crater and the startling exposure of the south rim of the plateau as seen from Sedona. The group will be housed in Flagstaff and guided by Robert Sharp '34, MS '35, and Leon Silver, PhD '55, of Caltech's Division of Geological and Planetary Sciences.

The total cost of the trip is \$825 per person (double occupancy) or \$1025 per person (single occupancy), and includes all meals, accommodations, and tips, as well as travel by motor coach departing from and returning to Flagstaff. There will be a cancellation fee of \$50 per person for cancellations made before August 10, 1998. Reimbursement for cancellations after that date will be in the amount of monies recovered.

All Caltech alumni are welcome to participate, *although priority will be given to Alumni Association members through July 15, 1998.* To reserve space for the trip, please fill out the adjacent form and return it with a deposit of \$100 per person. This is very likely to be a popular program, so please get your reservation in as soon as possible.

If you have questions regarding the trip, please contact Arlana Bostrom at 626/395-8363 or arlana@alumni.caltech.edu.

Canyons and Craters of the Coconino Registration Form
Caltech Alumni Association, October 16–18, 1998

I/we wish to participate in the Alumni Association's travel/study program to the Coconino Plateau of Arizona. Enclosed is my deposit of \$ _____ (\$100 per person) representing _____ participants.

Name: _____

Class year: _____

Spouse/Guest: _____

Home Address: _____

Daytime Phone: _____

____ I'm traveling alone, but am interested in sharing a room with another participant. Smoking____Nonsmoking____ (subject to availability)

____ Please arrange a single room for me (subject to availability).

Please make check payable to the Caltech Alumni Association and mail with this form to: The Coconino Plateau, Caltech Alumni Association, 1-97, Pasadena, CA 91125

C l a s s N o t e s

1945

Don Tillman
10605 Argents Hill Drive
Las Vegas, NV 89134
541/997-6513

Volunteering to find volunteers, I ended the brief search by accepting the title of '45 class agent myself. The mailing to our 159 active classmates brought a deluge of postcards (36 percent return) to our summer location in Florence, Oregon. They were forwarded from the Sun City Summerlin address in Las Vegas, where we dry out for the winter.

Others leading a double life are **Dale Austin**, who joins the trek of snowbirds from Amagansett, New York, to Tequesta, Florida, and **Burton Mendelson**, a traveler between Mahwah, New Jersey, and Boynton Beach, Florida.

My summer last year was spent recovering, with wife Dorie's help, from a replacement of my hip replacement. Before finding a capable surgeon in Eugene, Oregon, I sought advice from **Duane McRuer** and his wife, Betty, in Manhattan Beach, California. She had struggled through similar "revisions" and was now following Mac around on his mountaineering avocation. They created the most unique retirement challenge of any of us—to climb the high points in each of the contiguous United States plus Hawaii. On August 30, they climbed Granite Peak (12,799 feet) in Montana, their last state. Since 1992, when he began a retirement retreat from the presidency of Systems Technology after 35 years, he has become the MIT Hunsaker Professor of Aeronautics and Astronautics. Then he took his expertise to numerous NRC and NASA advisory groups to aid in space-station redesign, aviation safety, and new-aircraft consulting.

Perhaps he should check out **Al Fulton**, of Redlands, who is building and flying sailplanes in Hemet, California. He is a four-year veteran of heart bypass surgery. Which came first, Al, the coronary or the sailplanes? There are regular trips to New Jersey now, the origin of his new bride, Judith Kohlback.

Also traveling to the East Coast, to visit his brother and fall colors, was **George Wilhelm**. His wife and he needed a rest after spending most of the year buying, fixing, and leasing an office building near his home in Boise, Idaho.

Retirement for some has focused on travel, as with **Harry Brough** since leaving Shell in 1982 and living in Houston, Texas. **Jim Hadley** writes from Livermore that he retired from Lawrence Livermore National Lab in October 1991. He and his wife recently took a trip to "Amazon Rain Forest, Machu Picchu, and Galapagos Islands. Keeping very busy with home upkeep, woodworking, and community organizations."

A similar report comes from **Bob Jenkins** in Palo Alto, where he retired in 1988 after 31 years with Lockheed Missiles and Space Company. In addition to travel, volunteering, and work around home, he schedules in golf three times a week.

Mel Wilson of La Cañada, California, has "been busy traveling and playing" ever since leaving JPL over three years ago. Another retiree who has checked in favoring golf is **Bruce Vernier**, who lives outside Austin in Lago Vista, Texas. And somewhere near Huntsville, **Bob Schmoker** has been in a "recreational-residential community for the past twenty-five years."

William Burns has retired to Green Valley, Arizona, with Betsy, his wife of 53 years. After 33 years **Dick Neerken** finally stopped a tough commute from his 40-year home in Westchester, California, to Parsons in Pasadena. He and his wife, Eleanor, have three children and six grandchildren.

From Santa Rosa, California, **Richard Dean** reports on using his retirement years for tennis, travel, watercolors, and mathematics. **Bob Bennett** has resided in Eugene, Oregon, for a few decades and serves us well as class chairman for the Alumni Fund. Thanks, Bob.

From Long Beach, California, **Jack Cardall** advises that he is still working, although he admits to playing golf with **Halcyon Ball** part time.

There are others out there not fully retired: **Bob Trout** from Altadena, California, is a centrifugal pump consultant; **Dick Jasper** left home in Alhambra, California, early one morning recently to "(tension) low chord cables on three bowstring trusses" in Century City; **George Howe** continues his weather interest in Wilmot, New Hampshire, and reports on temperature and snow to a Manchester TV station; **Burt Freeman** is a seven-days-per-week project senior scientist but squeezes in early-morning tennis three times weekly in La Jolla (married Elizabeth in February 1946 and then raised seven children).

In Bozeman, Montana, **Bob Leo** retired as EE professor at Montana State University and still consults on electrical accidents and fires. He is active in amateur radio as W7LA, travels a lot, and enjoys best times with four grandchildren. If you're in Aspen, Colorado, look for **Clive Jackson** where he operates a fireplace store. His home is on a 20-acre fruit farm in Paonia, Colorado. Earlier this year, a trip that followed the Mormon Battalion Trail into Southern California included a visit with **Lin Burzell** in Vista and **John Stern** in West L.A.

This past summer **Wayne Roberts** pioneered a cabin in Alaska "north of Cottonwood Lake between Wasilla and Palmer—on a paved road." This seems like a summer invitation because he winters in Seattle.

There are book writers in our ranks. One is **Bill Myers**, who finished a career in aerospace in 1984, then taught until 1995. For two years a book, *No Understanding Without Science*, which targets the college sophomore level, has been under way. Work was interrupted by a trip to Thailand, home fixing, and fishing.

Warren Hunt writes from Calgary, Canada, that he has a Web site, Polar Publishing, which describes his books. Also, **Don Swanson**, in Chicago, has provided e-mail addresses for his current interests and activities.

Listing all the e-mail/Web-site contacts that have been received isn't possible herein. Perhaps Caltech will find a way to publish these for future communication.

Photographers may want to check with **Lee Auslender**. He entered his creations in an October art show in Los Angeles. **Merle Waugh**, in Millersville, Maryland, had a recent visit from his daughter Carolyn Mariano. She is an aerospace engineer working on space shuttle operations at the Kennedy Space Center.

Former track-team hurdler **John F. Nichols**, now in San Clemente, California, has established an all-time record for loyalty to Caltech. He writes, "My granddaughter, **Rowena Lohman**, is a senior with a Merit Scholarship in geology at Tech. She appears in *Glamour* magazine with the other top ten college winners for 1997. Her father, **Ric**, was class of '70. I'm also proud to say my late brother, **Morris**, was class of '36, making our Tech family span seven decades."

If you want to join the "Over the Hill Gang—L.A. Chapter," contact **Dick Knudsen** in Glendale, California. His activities cover a broad diversity, including skiing, bicycling, the Descanso Bonsai Society Board, and serving as the science advisor to Caltech's Project SEED. His volunteer service I like best is as the Water Garden Project Leader and docent at the Japanese Garden and Water Reclamation Plant in the San Fernando Valley (Van Nuys). Visit the Garden and save a trip to Japan; ask for Docent Dick and receive a guided tour.

Finally, **Al Hibbs** is still in Pasadena, and he brought up the somber question of life expectancy. Of our 190 classmates, 14 percent are gone. As I looked at those in the deceased list I was saddened by the visits not made, or not seeing them at reunions. Each individual obituary would fill this column with major accomplishments.

If you have that project, hobby, trip, or visit that you have saved for retirement—just do it.

WILL YOU JOIN A CLASS ACT?

As the curtain continues to rise on the Caltech Class Notes, the following 25 undergraduate classes find themselves seeking representation: '35, '36, '39, '40, '41, '43, '46, '47, '50, '51, '52, '53, '65, '67, '68, '69, '71, '72, '83, '84, '85, '89, '90, '92, '97. If you would like to act as an agent for your class year, or would like more details about what is involved, please contact **Karen Carlson**, of the Caltech Alumni Association, at 626/395-6593. Or e-mail her at kcarlson@dar.caltech.edu.

1956

Bob Herzog
5902 Ironwood Street
Rancho Palos Verdes, CA 90275-1764.
mrherzog@earthlink.net

It was exceedingly gratifying to hear from so many classmates. Of the 111 active classmates, I received cards from 26. Of these, 80 percent provided e-mail addresses (even the old slide-rule crowd is really with it!) and 40 percent had new addresses. As a class we seem to be having a heck of a wonderful time in many new and varied endeavors. As usual I still overcommit my availability in supporting Caltech, but therein lies the challenge to get these notes out in a timely manner.

Background—**Bob Herzog**—After graduation I started out in the Air Force as a pilot. I held positions as flight-line maintenance officer, instructor pilot, and academic instructor. The Air Force sent me back to Tech in 1962–64, where I received an aeronautical engineer's degree and wrote a GALCIT report. After that I had many challenging jobs in the Systems Command and was selected for screening as mission astronaut. Went to work for TRW in 1966 and ended up supporting the Air Force in the development of several land-based ballistic missile systems. Helped SAC plan, conduct, and evaluate Minuteman II and III operational tests launched from Vandenberg to Kwajalein. Also was involved in Fleet ballistic missile testing, NAVSEA surface-to-air weapon-system development, several SDIO initiatives, and small space launch-vehicle studies and proposal efforts for DARPA. With the end of the cold war and a major cutback in contracted government research I elected to leave TRW and strike out on my own. Founded Globe Tek and have been engaged in all sorts of challenging ventures of a personal, commercial, and investment nature. These include a new grandson, teaching computer resources classes to grades 1–12, and building a new homestead in the high-desert area near Pahrump, Nevada; as well as acting as the class agent for these notes and as longtime Alumni Fund representative.

I solicit suggestions on how to make contact with as many classmates as possible, preferably by electronic means. I would like to send out class letters from time to time and would like to receive ideas on an attention-getting logo for the envelope. Also, if anyone would like to set up a Web page or bulletin board for the class on the alumni server I would certainly appreciate some help. I would like the class notes to focus on interesting things you are doing, including volunteer activities, avocations you are pursuing, and what you really have fun doing. Most of all I would like to make the class notes and their related communications channels an interesting way of staying in contact with old friends and making new contacts where there is mutual interest.

From afar—**Bob Jetter** writes from Japan that he and his wife, Betty, are thoroughly enjoying the new culture and beautiful country during Bob's tour as an International Fellow for the Power Reactor and Nuclear Fuel Development Corp. He is assigned to the Monju reactor site in Tsuruga on the west coast of Japan (e-mail bjetter@compuserve.com). In July '98 he and his wife plan to



Traveling with his wife, Susan, on a Caribbean cruise to view the solar eclipse that took place on February 26, Gene Barnes '56 was at sea in the Guadeloupe Passage when he captured this image of the sun at total eclipse. Gene, who is professor of physics, emeritus, at Cal State Sacramento, and Susan, an editor with McGraw-Hill, live in Monterey, California.

relocate to Pebble Beach.

Ed Hershberger writes from China that he is a consultant for Harz2 Engineering, working on the Ertan Dam, a 2240-meter-high dam across the Yalong river in western Sichuan Province. First phase operation is scheduled for the fall of '98, at which time he plans to return to Idaho.

Still at it—Joe Gibbs is still VP & GM at Kavlico Corp., an aerospace, automotive, and industrial-applications manufacturer. Robert Kausen is still coaching executives on human factors and addressing culture shifts in the workplace. His next book, *Meeting in the Zone: The Inside Track to Better, Shorter and Fewer Meetings*, is due out this year. Sam Phillips has relocated in the Bay Area, where, in addition to consulting, he is teaching materials and process in the product-design curriculum at the Academy of Art College in San Francisco. Tom Slinger was recently selected as an SRI Fellow, which provides a three-month sabbatical and travel funds.

Leaving the corporate and academic world—Hugh Dubb has retired from the intellectual-properties law firm he cofounded, to a more leisurely life. He is still heavily involved with Caltech, being on both the Alumni Association and the Associates board of directors. He also serves on the American Chemical Society's Patents & Related Matters Committee. He and his wife are spending more time engaged in physical fitness, genealogy, bridge, and travel. Son Steve Dubb (Ricketts '91) is studying for his doctorate in genetics at the University of Washington.

Chuck Bodeen relocated to the Oregon coast in '82 to open his own consulting business and help out the U.S. EPA. Says he "retired" again in '97, but is still working about half time with the EPA. Dan Chilton writes from his boat anchored in Maryland that he sold his business six years ago and really looks forward to getting back in touch with his classmates and Caltech activities. Frank Schroeter writes that he retired in 1990 and moved to the Flathead Lake area in NW Montana. Is having a wonderful time hiking, fishing, cross-country skiing, and foraging for berries, mushrooms, and ferns, and thoroughly enjoys puttering around the garden and making home improvements.

Don Lewis retired from Chevron in 1996, where he had been the chief corporate geologist for the last six years. Currently enjoys working on advisory committees for various geological societies, playing with a new computer, and other activities. R. A. (Dick) Johnson retired from Rockwell in 1995 after trying to bring nuclear power to the world. Moved to Depoe Bay on the Oregon Coast, and is enjoying traveling and working with various volunteer activities. Tom Lovejoy writes that he has escaped to the lovely mountain community of Idyllwild, where he has been the general manager of the Idyllwild Water District since 1993. Directors of the district include Harry Sigworth (class of '44) and Chuck Miller (class of '44).

James Lloyd writes from Houston that he retired in '96 after 31 years working on the design of offshore platforms. Has more time for playing tennis, has taken up golf, and enjoys more time with his wife, Ann; his two married daughters; and one granddaughter. Jan Arps writes that he has moved to Greensboro last year, where he established the Center of Advanced Trading Technologies, a company devoted to development and marketing of technical analysis tools for futures and stock traders.

John Nairn writes from Sun Lakes, near Banning, that he has retired from engineering, taught math for eight years, and is now working in the travel business with his wife, Elaine, whom he met at Tech. Steve Mager writes from Hermosa Beach that he has retired from the Aerospace Corp. in 1994 and now enjoys competitive running, duplicate bridge, and "messing around on my MAC." Jim Higgins writes from San Clemente that he is enjoying the good life and is now treasurer of the local garden club.

Again I would like to thank all of my classmates for their wonderful response and solicit their help in contacting other classmates. If you know of any classmates who haven't been contacted or wish to get back in touch, please have them get in touch via mail or e-mail at the address noted above.

1977

Ed Rea
230 Wilton Avenue
Palo Alto, CA 94306
Ed_Rea@cohr.com.

I'm still recovering from the shock associated with our 20th class reunion in May of last year. Nothing particularly traumatic occurred during the event itself (and thanks again to all those who were able to attend), but I must admit that I continue to struggle with the forced realization that 20 years had elapsed since our class graduated from Caltech. Those intervening years seem to have gone by remarkably fast, and my life seems to have become incredibly busy. Following graduation I spent four years working for TRW in Redondo Beach, California, primarily doing experimental work with chemical laser systems. This experience provided good preparation for my subsequent graduate studies at Stanford, where my dissertation emphasized the development of novel laser-based diagnostic techniques for studying high-temperature reacting flows. My preoccupation with lasers has continued to keep me employed and living in the San Francisco Bay Area continuously since then, working first for Hoya Optics, then Continuum, and now with Coherent, where I currently manage the Applications Laboratory of our Commercial Business Unit. This position is a bit of a switch for me in that the job involves a fair amount of travel, which for now at least remains fun rather than a chore.

My wife, Becky '78, and I find everyday life to be a bit of a juggling act, dominated by

the schedules of our six very active children. Our oldest, Susan, is 19 years old and a student at Princeton University who plays both soccer and basketball in the Ivy League. (Just a warning to my classmates with children: any sense of disorientation that you may find accompanies an event like a class reunion is nothing compared to what you will experience when you send your first off to college. Wow.) Anthony, our 15-year-old, is much more serious about his baseball than his academics (he made varsity as a freshman, and you can imagine the ego boost that gave him). Jennifer, 13, is the family artist, while Elizabeth, 8, is full of the boundless excitement about school I've come to associate with first- and second-graders. Our youngest two, Jonathan, 6, and Christopher, 3, are all boy and think an afternoon spent playing in our neighborhood park is about the best possible thing anyone can do. They may just be right.

Now for a few notes forwarded to me in my capacity as the "class agent" for the Alumni Association:

David Forgeron, now living in Camarillo, California, writes with a suggestion that *Caltech News* join the Information Age and go on-line or set up an electronic bulletin board to allow classmates to exchange personal updates in a "convenient, useful, and entertaining" environment. (It's a good idea, and, although I'm told the current Alumni Association computer system lacks the capability of keeping e-mail addresses, a new system should be in place within the year to support this kind of forum.) He reports that he has "retired" from Vitesse Semiconductor, and since then has been doing some traveling and trying to figure out the stock market.

John Gustafson described his work at the Ames Lab in Iowa involving the completion of "an exact, working replica of the 1939 Atanasoff-Berry Computer (ABC) that was the first electronic digital computer (the original no longer exists)." John goes on to say that "working with relays and vacuum tubes has certainly increased my appreciation for VLSI! It's no speed demon, either; it takes almost an hour to solve five equations in five unknowns."

Don Hamasaki now resides in Berkeley, California. He and his wife, Joanie, have two children, Matthew (nine years old) and Tiffany (six years old). He has been employed at International Civil Engineering Consultants, Inc., for the past seven years.

John Loo has discovered that Caltech's traditional finals' week wake-up call of an ultra-high-decibel rendition of Wagner's "Ride of the Valkyries" shares certain similarities with the sounds recently broadcast at 3:00 a.m. from the speakers of his baby monitor. He suggests this may just be a side effect of sleep deprivation, but I think this is a good counterargument to our old concerns that a Caltech education didn't really prepare us for life in the real world. John and his wife, Carolyn, were granted their obligatory 15 minutes of fame in May '97 with the birth of twins Joseph Cameron and Joel Christopher—one of five sets of twins born at Scripps Hospital La Jolla on the same weekend. Maybe you saw them on CNN or San Diego area local TV? Congratulations, John; with luck you'll have a couple of new fishin' buddies in the near future.

John Manley seems to have found career guidance from another well-documented aspect of life at Caltech: sleeping through boring lectures. He is now a practicing anesthesiologist at Meriden-Wellingford Hospital in Meriden, Connecticut. He and his wife, Beth, have been married since 1983

and have four children: Kyle (13), Ryan (11), Scot (7), and Lora (4).

Karen Maples '76 and husband, Greg Gibson, report that they continue to enjoy living in Manhattan Beach, California. Karen is still practicing OB-GYN at Kaiser Bellflower and serving as a consultant to the FDA OB-GYN Devices Panel. Greg remains a computer programmer at TRW in Redondo Beach.

In the market for a "cool new vehicle"? That's how Michael Saari describes a streamlined scooter/bicycle called "Electric Freedom" he has developed in Palo Alto. Michael writes, "It is excellent for bypassing traffic jams and for all-around use. I plan to sell bunches in the next few years and help get rid of some stinky cars. All inquiries welcome!"

Al Vasquez has traded in the smog of Pasadena for the beaches of sunny Florida. He wanted to know how my tennis game was coming along, and I had to admit it's been a couple of years since I last picked up a racquet. One of our old playing partners who is now a neighbor of mine here in Palo Alto is in a similar situation. I see a lot more of Joe Alonis on the Little League diamond than on the tennis courts. Joe coaches his two sons and also serves on the Palo Alto Little League Board of Directors; you'll find him down at Middlefield Park every weekend pretty much year round. He's been with Lightwave Electronics for several years now, having fun with the electrical engineering aspects of diode-pumped solid-state lasers.

Gregory White, now in San Jose, California, wanted to acknowledge his parents' 50th wedding anniversary this past fall. He and his wife, Emma, traveled back east to join them as they renewed their wedding vows in his hometown of Baltimore, Maryland.

1979

Stan Cohn
8033 Tripp Ave.
Skokie, IL 60076-3247
scohn@condor.depaul.edu

Thanks to everyone for sending me a note with their updated e-mail addresses. I hope to compile the list of addresses soon, so if any of you want the e-mail list just let me know. You can reach me by e-mail (address above) or access my home page at <http://condor.depaul.edu/~scohn>.

A special info thank you goes to Ed Hamrick, who informs me he is now living in England with his wife and three children in a small town (Cobham) outside London.

Also of note, Tod Lauer and his wife, Bea Müller, are proud to announce the birth of their daughter, Sandra Michelle Müller. Thanks again to everyone who responded, and keep in touch. All the best.

"WHERE THE LOFTY MOUNTAIN
PEAKS LOOK OUT TO LANDS BEYOND"

Once the inaugural accoutrements were cleared from Beckman Mall, the campus took on an air of quiet contemplation, leaving Mother Nature to stage her own celebration. Our back-page poster shows the campus in the wake of an April visit from El Niño.

1993

Debi Tuttle
1152 Huntington Dr., #4
South Pasadena, CA 91030
debit@alumni.caltech.edu
213/255-1851

Hi everyone! To start off our first class notes, I'll let you know what I've been doing. I spent the first two years after graduation living and working in Japan as an assistant language teacher with the Japan Exchange and Teaching (JET) Program, which was a wonderful experience. Upon my return to the United States, I settled in the Pasadena area and worked for one year, first as a Webmaster and then as a freelance Web-site designer. After some soul-searching, I decided to go to graduate school, and I'm now in my second year at Cal State Long Beach, working on an MS in counseling with a specialization in student development in higher education. I also work part time at Caltech in the admissions office and the Career Development Center. If you want to contact me for any reason (for example, you have news for the next class notes), please check out the many ways to reach me (above).

Who'da Think It?

What better way to start than with the happy news of weddings and additions to the family? The first person who wrote to me was **John Krowas**, who married fellow Techer **Nina Cardoza '94** shortly after graduation. While Nina finished her degree, John took classes at UCLA; after Nina graduated they moved to Rhode Island while Nina went to Brown. John worked for a small company that did software safety for the U.S. Navy's submarine-launched nuclear Tomahawk program, along with T. J. Creath '95. On September 7, 1995, John and Nina had a son, Harrison Casey, who I would guess is the first baby of our class! After Nina finished her master's at Brown, the family moved to Brookline, Massachusetts, where John now works for a four-person financial database software company, and Nina works at Dana-Farber Cancer Institute in research and grant administration. John writes, "We spend most of our time chasing Harrison around, exploring Boston with him leading the way." Congratulations John and Nina!

I had the pleasure of seeing **Jessie** and **Jason Macleod** in Japan a few weeks after they were married on June 14, 1995. They were married on a cruise ship in Astwood Park, Bermuda; the ceremony was small and "very beautiful." Classmates **Brian Donning**, **Amy Hansen**, **Jeff Martin '94**, and **Geoff Wiersema** were in attendance. The Macleods now live in Santa Barbara, where Jessie is a research chemist working on silicones for NuSil Technologies, and Jason works as a technical director for Santa Barbara Studios, where he's worked on computer effects for *Spawn*, *American Werewolf in Paris*, the opening sequence of *Star Trek Voyager*, and the IMAX film *Cosmic Voyage*.

Although they didn't announce it to me, I have deduced that **Erika Moilanen** has married **Steven Anderson**, since her name is now Erika Anderson and she shares a home in Minneapolis with Steve. To wrap up this weddings and births section, **Yvonne Liu** writes that she and her husband, **Alex Ip**, MS '89, had their first son on October 28, 1997. Jeremy Ip weighed in at 6 lb. 11 oz., and Yvonne and Alex are "both very proud of him." As you should be! Congratulations.

Out in the Real World

Melinda Au graduated from UCSF School of Dentistry this past June and is now working as a general dentist in Newark, California. **Jennifer Dooley** has finished her PhD at Carnegie Mellon and now has a postdoc at Caltech and JPL. Jennifer is interested in working in forensics and is looking for a position. From what I know, **Matt Durasoff** and **Dan Frumin** are still working in Redmond, Washington, for you-know-who. There are even more Techers there, but I haven't heard from them. Write to me! I know you have e-mail . . .

Scot Fagerland is in his second year as a community college math instructor in San Diego County, and is also singing with "a local struggling rock band." Since graduation, **Alan Kulawik** has been designing chips for Myricom, a local company that was started by former Caltech professor Chuck Seitz.

Jennifer Jungkuntz has been living in Huntington Beach for the last three and a half years, working for Delta Environmental Consultants doing environmental cleanup.

After getting his BS and MS from Caltech, **Andrew Lundsten** followed in my footsteps to Japan via the JET Program. Not satisfied with one year, Drew first got a job in Tokyo with Mitsubishi and has recently accepted a position in Japan with TEMIC Semiconductors, to "develop the Japanese market" for their power management ICs and infrared data communications products.

Rohan Mahadevan has finished his PhD at Harvard and will soon be going to Cambridge, England, to assume a postdoctoral position.

Ken Wiberg continues to live with his sister in Pasadena and work in Placentia, California, for the Douglas Energy Company. He writes, "We have been installing a biphasic power plant at Cerro Prieto, Mexico, so I have been spending much of my time across the border. Hasta la vista!"

Julius Yang now works as a technical director for Rhythm and Hues, a digital effects house that has done work for *Speed 2*, *Batman and Robin*, *Babe*, *Kazaam*, *The Nutty Professor*, *Ace Ventura 2*, and *Mouse Hunt*. "I still live in L.A.," says Julius, "but it's much nicer out by the beach than in Pasadena. I play lead guitar in a band of Ricketts alumni and have bought a house." In the band of which Julius speaks, **Steve Sobelman** plays drums, I play bass guitar, and **Jon Hartzburg '86** joins us occasionally as rhythm guitar. Steve has gone into business for himself (consulting) and has been successful enough to buy a house in Los Angeles.

Still Plugging Away

Many of our classmates are still in varying states of progress toward a degree. Here are those I heard from.

Albert Lee just graduated from Harvard Law School with a JD and is now pursuing a PhD in law at Cambridge (Trinity College) on a 1997 British Marshall Scholarship. Albert, you and Rohan should get together sometime! **Erik Edelberg** writes simply that he is still trying to get his PhD in Santa Barbara.

Jennie Johnson has just started her first year in the veterinary medicine program at UC Davis. **Mike Nassir** writes, "I'm an astronomy grad student at University of Hawaii. I got my MS in astronomy in summer '96, and I'm working on my PhD dissertation in star formation. I've been doing a lot of teaching, and I love it!"

DAVID SHOTWELL WOOD, 1920-1998

David Shotwell Wood '41, PhD '49, professor of materials science, emeritus, died March 12. He was 77.

A native of Akron, Ohio, Wood joined the Caltech faculty in 1949 as a lecturer in mechanical engineering. He rose through the academic ranks to become a professor in 1961, and remained on the faculty until his retirement in 1988.

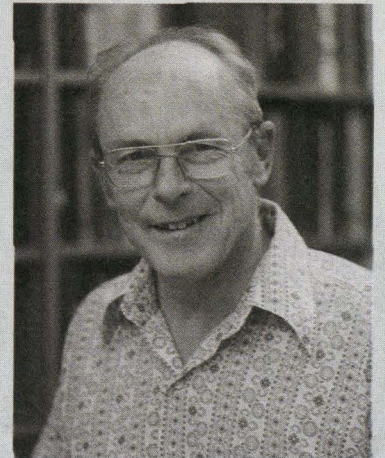
Wood served during World War II at the Los Alamos Laboratory, performing mechanical design development work for the atomic bomb. Before relocating to New Mexico in 1944 for the Manhattan Project, he also worked on campus on a defense research project involving the propagation of plastic waves in metals.

As a Caltech professor, Wood continued his work on plastic-wave propagation in solids, and was especially interested in the plastic strain waves produced by impact and explosive loading. He also worked on the mobility and density of dislocations in metallic crystals, and on fractures in metals.

In addition to his academic work, Wood served as a consultant for a number of companies, including Standard Oil Company, Electro Optical Systems Corporation, and Sandia Corporation. He was a member of the American Institute of Mining, the Metallurgical and Petroleum Engineers, the American Society of Mechanical Engineers, the American Society for Metals, the

Society of Sigma Xi, and the American Association for the Advancement of Science. In 1950, he was awarded the Richard L. Templin Award of the American Society for Testing Materials.

His campus service included chairmanships of the Graduate Student House Committee, the



David Wood

Convocations Committee, and the Faculty Committee on the ASCIT Research Project. He also served as associate dean of students, and as a member of the Freshman Admissions Committee and the Curriculum Committee.

A longtime resident of Sierra Madre, he was a former mayor and city councilman. He also served on the Sierra Madre City Planning Commission and as director of the San Gabriel Valley Municipal Water District. He was also director of the Pasadena Symphony Association.

Wood is survived by his wife, Constance, and a daughter, Alison.

Mark Savellano says that he is trying to finish his PhD through the bioengineering department of the University of Michigan. He's received a Whitaker Foundation Graduate Fellowship in biomedical engineering to do research in the field of photodynamic therapy. Meanwhile, in the nation's capital, **Rich Baltzersen** is completing an MS program in forensic science, hoping to eventually work in law enforcement.

Winston Chamberlain writes, "Greetings to all you guys. I hope you're all making more money than me. I am an MD/PhD student at the University of Colorado, in my fourth year of study. I'm having a great time with it. Give me a call if you're ever in the Mile-High City."

Huh?

A number of people sent postcards back to me without saying anything. I can deduce a little bit from address clues and e-mail address domains, but I can't be 100 percent sure. These are my best guesses: **Glenn Ammons** is in the CS department at the University of Wisconsin, **Greg Dudey** is working for Adaptive Media Technologies, **Yan Fernandez** is with the Department of Astronomy at the University of Maryland, **Korhan Gürkan** is at Stanford, **Neena**

Imam is at Georgia Tech, **Areez Mody** is at Harvard, **Katy Quinn** is at MIT, **Matt Tucker** is at the University of Colorado, and **Diane Wong** is at UCSE. I also received postcards from the following people with Caltech or alumni accounts, so all I know is that they're alive and where they live: **Snehal Adodra** (Fremont, California), **Matt Ashton** (Pasadena, California), **John Brodoff** (Boston, Massachusetts), **Francisco "Paquito" Gomez** (Ithaca, New York), **James Low** (Upland, California), **Jessica Nichols** (Marietta, Georgia), and **Mark Son** (Flushing, New York).

In Closing

I hope that you've enjoyed reading this issue's class notes. However, I have put all my eggs in one basket and included everyone who wrote to me. That means that, as of right now, I have no news to put in the next issue. So I hope that you will be inspired to put pen to paper (or fingers to keyboard) and drop me a line. Until next time!

The Personals and Obituaries will return in the next issue of Caltech News.

