An interview with Arati Prabhakar

By Colleen Chien

When Arati (pronounced Ar-thee) Prabhakar accepted her PhD from then-Caltech President Muph Goldberger in the spring of 1985, she became the first woman at the Institute to earn a doctorate in applied physics from Caltech. Accepting another distinction in the spring of 1993, this time from President Clinton, Prabhakar again made history when she was appointed Director of the National Institute of Standards and Technology (NIST), the Department of Commerce agency whose primary mission is working with industry on civilian technology for economic growth.

Although the Congressional hearings she went through as a presidential appointee were somewhat less grueling than her five years as a Caltech graduate student, Prabhakar, 35, has broken ground in this position too. Her appointment makes her the youngest appointee were somewhat less grueling than her five years as a Caltech graduate student, Prabhakar, 35, has broken ground in this position too. Her appointment makes her the youngest student, and earned her BS and MS, both in electrical engineering, from Texas Tech University before coming to Caltech. She entered Caltech planning to do "exactly the normal thing," which she envisioned as getting a PhD and eventually moving into academia. But during the next five years, Prabhakar became disillusioned with the narrow focus of scientific research and with aspects of the research environment. She persisted through her graduate program, however, and completed a thesis on deep-level semiconductor defects, with the encouragement of her adviser and mentor Thomas McGill (now Caltech's Fletcher Jones Professor of Applied Physics), who stressed the multifaceted value of a PhD.

Upon receiving her degree from Caltech, Prabhakar made a "deliberate departure" from the academic route, heading for Washington, D.C., to work for the Office of Technology Assessment, an arm of Congress that specializes in analyzing technology policy. Her two years at OTA made her an expert on the microelectronics industry and federal R&D policy, just the background needed for her next job at DARPA—the Defense Advanced Research Projects Agency (now known as ARPA). At DARPA, Prabhakar had the opportunity to address some of the problems she had analyzed while at OTA, managing advanced electronics research for the agency, and overseeing programs such as SEMATECH, the highly routed consortium of the semiconductor industry.

Although she demonstrated her abilities and capacity for leadership at DARPA, Prabhakar remembers "feeling completely shocked" when the White House called on her to become the 10th director of NIST. Her appointment is part of a major reorientation in vision and goals that has been under way at the 92-year old agency. To implement these new objectives, which include the forging of innovative and potentially far-reaching collaborations between government and industry, Prabhakar will take

"NIST is the first federal agency in the United States whose focus is on developing technology to promote economic growth," says Arati Prabhakar, PhD '85, who in 1993 at the age of 34 became the first woman and youngest person ever to head the National Institute of Standards and Technology. As NIST director, Prabhakar oversees a diverse portfolio of innovative programs designed to foster new relationships between government and industry.
Campus Update

Alumnus Steven Koonin becomes Caltech's 7th provost

In 1972, as he prepared to graduate from Caltech with honors in physics, Steven Elliot Koonin was awarded the Institute's prestigious George W. Green Memorial Award, annually presented "to the undergraduate who in the opinion of the Division Chairmen, has shown outstanding ability and achievement in the field of creative scholarship." Now, nearly 23 years later, Koonin, a member of Caltech's Institute once again.

The contributions that Caltech has made in these arenas should be well known to Koonin, who has spent almost his entire academic and professional career on campus. After receiving his BS from Caltech, he went on to MIT to earn his PhD in 1975. He joined Caltech's faculty that year as assistant professor of theoretical physics and became a full professor in 1981. Koonin served as chair of the faculty from 1989 to 1991, and was elected twice to the faculty committee on academic freedom and tenure, which he also chaired for two terms. Fellow of the American Physical Society, the American Association for the Advancement of Science, and the American Academy of Arts and Sciences, Koonin has also served on numerous professional-society committees.

"Steve is an excellent scientist and a wonderful person," says Faculty Chair John Hopfield, the Roscoe G. Dickinson Professor of Chemistry and Biology and head of the provost search committee that sought out Koonin. "I'm certain he will attack this new job with the intelligence, care, and enthusiasm for which he is known in the diverse roles he has earlier played both on and off campus."

Koonin's wide range of research interests includes theoretical nuclear physics and nuclear astrophysics, quantum many-body physics, and computational physics. He achieved some popular renown ("my 15 minutes of fame," he later called it) in 1989, when he joined forces with fellow Caltech physicist Charles Barnes and fellow Caltech alum and (electrochemist) Nate Lewis '77 to decisively refute the claims of cold fusion before a session of the American Physical Society. Lately, he has revived his 65-year-old method of measuring earthshine—the glow from the dark region of a crescent moon—to study long-term changes in the earth's reflectivity, which can influence global climate.

As he steps down from the provost's position, Paul Jennings, an internationally known authority in earthquake engineering, is capping 10 successive years in academic administration, four of them spent chairing the Institute's Division of Engineering and Applied Science, from 1985 to 1989. Nor will Jennings be entirely relinquishing this career path. Effective February 20, he became Caltech's acting vice president for business and finance, succeeding David Morrisroe, who after a quarter of a century in the job had asked to step down for health reasons. Morrisroe will continue as vice president and treasurer of the Institute; a trustee committee headed by Board Chair Emeritus Ruben Mezrich will seek a permanent replacement for the business and finance position.

Faculty and alumni named to NAE

Allan Acosta, the Richard L. and Dorothy M. Hayman Professor of Mechanical Engineering, Emeritus, and Professor of Computer Science K. Mani Chandy have been elected to the National Academy of Engineering, one of the highest honors that can be accorded a U.S. engineer. They are among 77 researchers named to the Academy for 1995, and their election brings to 28 the number of Institute faculty who are NAE members. Acosta, who received both his BS and PhD from the Institute, has been on Caltech's faculty since 1956. He was named to the NAE for his "contribution to the understanding of turbomachinery, particularly cavitation and rotordynamics." Chandy, a graduate of the Indian Institute of Technology and MIT, was cited for "contributions to computer performance modeling, parallel discrete-event simulation and systematic development of concurrent programs." He first came to Caltech as a visiting professor and Fairchild Scholar in 1988 and joined the faculty in 1989. Also elected to the NAE this year are alumni George Leal, MS '58; Jarold Meyer '60, MS '61; and Carl Savit '42, MS '43. Leal, the chairman of the engineering firm Dames and Moore, was elected for "leadership in the development of innovative multi-disciplinary technology for resolving conflicts between engineering development and environmental concerns." Meyer, retired senior vice president of Western Geophysical Company, was recognized for "advancing the technology of geophysical exploration and providing leadership within the larger social and environmental context."

Henry McCoy (left), Distinguished Professor of Chemistry at Morehouse College. In Atlanta, was honored this past fall at Caltech by faculty, staff, and former students—several of whom are now on campus or at JPL—for his "unique contribution in teaching and the world of chemistry" over a 50-year career. While on campus, McCoy, 80, who continues to teach at Morehouse and is the 1995 recipient of the American Chemical Society's Award for Encouraging Disadvantaged Students Into Careers in the Chemical Sciences, also put in some research time with one of his current collaborators, Senior Research Associate in Chemistry, Emeritus, Bill Scheeler. Using the Beckman Institute's X-ray diffractometer, the two were able to collect data later used to determine the structures of two compounds related to McCoy's current research on molecular hydrogen bonding.
Alumni invited to attend science and media symposium

A group of nationally recognized print journalists and radio and television correspondents will visit Caltech on April 20, to take part in a symposium, "Reporting Science: Fact, Skepticism, and Controversy." The seven panelists, along with moderator Jess Madsen, veteran reporter for the Los Angeles Times, will start at 8:30 a.m., with welcoming remarks at no charge and the Athenaeum lunch for the discounted price of $70. For further information or to make reservations, contact Susan Pitts at 818/395-3257 by April 12. Seating for the luncheon is limited.

Registration for the symposium will start at 8:30 a.m., with welcoming remarks at 9:15 by Caltech's new president, Steven Koonin. Panelists are Pulitzer Prize—winner Deborah Blum, author of The Unknown War and science reporter for the Sacramento Bee; Los Angeles Times science journalist K. C. Cole; Caltech physicist and vice provost David Goodstein, creator of the PBS series The Mechanical Universe; and Larry Mantle, news and program director for National Public Radio affiliate KPCC, and host of the nightly interview program AirTalk, which once a month devotes a show to research at Caltech. Also participating as panelists are J. Madison Nash, science correspondent for Time magazine; physician Art Uline, chair of the USC/Norris Cancer Center board of trustees; and Jonathan Waid, a producer of several science series for the Discovery Channel.

"It is especially appropriate that Caltech is hosting this symposium," says President Tom Emertart, who will introduce luncheon speaker Jess Madsen. "We think it's in our interest as an educational institution and in the public interest to help citizens see science and technology as making valuable contributions to society.

And note this date!

On May 31, Caltech will host a program entitled "Alzheimer's Disease: Causes and Effects." The panel discussion will bring researchers from Caltech, USC, and San Diego together to discuss their work on the causes and treatment of Alzheimer's. A caregiver's perspective will be presented by actress Nancy Tolbert-Falatech, whose mother suffered from the illness. The free, public forum begins at 7:30 p.m. in Beckman Auditorium. For more information, contact Alma Robles, at 818/395-6228.

JPL gets high marks from NASA

In a turnaround for the Institute, Caltech recently found itself on the receiving end of grades—A's, B's, and C's—instead of giving them out. Last year, JPL, which Caltech manages for NASA, was judged by a NASA task force on its technical capabilities and business practices in order online how large a management fee NASA would pay to Caltech. JPL's grades were very good, and Caltech was awarded a fee of $16.5 million—out of a potential total of $18 million—which was $3 million more than the Institute received the previous year.

The increased fee is due to the change, initiated by NASA, from a flat-fee contract to a performance-based one. Under the terms of the new contract, which will be in effect for five years, all of the fees above a $6 million base rate are contingent on performance. According to Caltech's Director of Government Relations and Community Affairs, Hall Daily, the new NASA-Caltech arrangement is the first such contract in the nation for a federally funded research laboratory.

Although the performance-based contract is new, the management fee is almost as old as JPL itself—Caltech has been paid such a fee by NASA for more than 50 years. In order to determine the fee for 1994, a NASA task force conducted a review and evaluated Lab procedures in three areas: scientific and engineering programs, which in the weighted grading system accounted for 65 percent of the total grade; institutional management, 25 percent of the total; and outreach programs to educational institutions and small businesses, 10 percent. The grades of the evaluation were expressed on a percentage basis for each area: 91 to 100 percent being considered excellent; 81 to 90 percent very good; and 71 to 80 good.

The Lab's report for this past year showed that scientific and engineering programs received a grade of 91 percent; institutional management scored 79 percent; and outreach programs were awarded 87 percent. Using the weighting factors, the Lab received a total score of 87.6 percent, on which the performance-based part of the management fee was calculated.

While the overall grade of 87.6 percent placed JPL in the very good range, JPL's Director Edward Stone thinks that the lab should strive for an "excellent" rating. "We should expect to receive scores in the high 90s across the board. We should do that for the nation the best value for the dollar."

According to JPL Deputy Director Larry Dumas, the area most needing improvement is JPL business management practices, particularly in financial-management systems. "A common theme in the review," says Dumas, "is that we have good business practices on paper, but we don't follow our own rules. A specific example cited was property management."

In its evaluation, NASA criticized JPL for the Lab's now-discontinued practice of letting employees take computer home in order to do work. Stone says, "Even though the practice made sense—they were working at home—that is not the way NASA wants it done. Working at home with NASA property is contrary to NASA policy."

In order to improve JPL's performance next year, Dumas said NASA has designated particular areas of emphasis for 1995. They include continuing JPL's participation in NASA reviews that focus on improving government programs, continued emphasis on designing and engineering smaller and more cost-efficient flight projects, and improved compliance with JPL's own policies and procedures. Internal and external technology transfers, increased cultural and gender diversity in senior management, and effective social and educational outreach programs will also be given special attention.

In order to help meet these challenges, Stone has set up a $1 million director's discretionary fund from the fee, which he will use to "invest in preparing the Lab to deal with a future where not only what we produce for the government will be evaluated, but also how we do it."

Adds Dumas, "We're still in the same business, science exploration and discovery. But we need to recognize that how we do things is as important as what we do."

New director of libraries appointed

Anne Buck, formerly the university librarian at the New Jersey Institute of Technology, has been appointed Caltech's new director of libraries, succeeding Glenn Brudvig, who has retired after 11 years at the Institute.

Buck has worked for 17 years in corporate research and academic environments. Since 1991, she has been employed at the New Jersey Institute of Technology (NJIT), where she directed the activities of the Van Houten Library. In 1992 she was honored by the New Jersey Institute of Technology (NJIT) for her work on Van Houten Library. She has also been an active member of the NJIT faculty and students.

Previously, Buck served in several positions at Bellcore, a telecommunications research and development consortium. She was director of human resources planning from 1989 to 1991, and director of the Bellcore library network from 1984 to 1989. Buck came to Bellcore from AT&T Laboratories, where she had worked since 1977. Buck started her library science career in 1974 as the director of the Dunbar Public Library in West Virginia. A graduate of the University of Kentucky and Wellesley College, Buck has taught library science at the University of Wisconsin–Madison and Rutgers University. She is a member of the American Library Association, the Special Libraries Association, and the American Society for Engineering Education. She is currently serving on the board of directors of Engineering Information, Inc., and is treasurer of the American Society for Information Science. In 1992 she was honored by the United Way of Morris County, New Jersey, for outstanding community service.

Campus Update continued on page 6
Prabhakar

Continued from page 1

their impact, I think that Congress will see a very powerful story unfold." The 104th Congress isn't the only entity scrutinizing Prabhakar; her alma mater has also been keeping an eye on her activities. She was recently named a 1995 recipient of Caltech's highest honor, the Distinguished Alumni Award, which will be presented to her and four other recipients at the Alumni Association's 58th Annual Seminar Day this May.

Prabhakar was interviewed by Stanford University student Colleen Chien, who spent part of the summer of 1994 as an intern in Caltech's public relations office before going to Washington, D.C., as one of 14 students nationwide selected to receive a science policy internship from the Washington Interns of Students of Engineering program. Chien, who took a year off from her studies to, among other things work at JPL, is pursuing a self-designed major in energy systems engineering within Stanford's honors program in Science, Technology, and Society, and will receive her bachelor's degree next year.

Colleen Chien: What can you tell us about NIST?

Arati Prabhakar: You hear a lot about NIST these days—in my view, you hear about it a little bit out of proportion to what it does. The big news has to do with the percentage of change in our budget, the federal R&D investment. We're still a very small part of the big picture in many other parts of the world, but to do it deliberately and publicly is the idea in many other parts of the world, including as that kind of industrial and technological engine in their countries. All of a sudden, it mattered that they needed to support the measurement infrastructure in their countries. All of a sudden, it mattered that measurements conform to uniform standards. So NBS was created to function as that kind of industrial and technical resource, and it is still the fundamental reason that our labs exist. We perform a much richer and more technology complex job today, but I think that our fundamental mission remains the same: we are here to support industry.

What is new at NIST is that when Congress changed our name in 1988, it also created some significant new programs, in particular the Advanced Technology Program (ATP), the Manufacturing Extension Partnership (MEP), and the Malcolm Baldrige Quality Award.

CC: What kind of factors are driving NIST's expanded budget and focus?

AP: In a sense, our current mission is the culmination of a long-term trend. As far back as the Johnson and Nixon administrations, the idea has kept bubbling up that maybe government should play a more direct role in working with industry on issues that matter for economic and competitiveness reasons. So, the concept's not new, but a lot of things have come to a head in the last few years. During the Bush administration, Congress made a fairly substantial push to enlarge and expand our role. They changed the agency's name, and added the ATP and MEP programs. With President Clinton's election, we not only had bipartisan support in Congress for these kinds of initiatives, but also an administration that endorsed the concept wholehearted and viewed technology as a major part of its economic plan. And certainly many industry groups had been strongly advocating these kinds of programs for years.

CC: What are the basic aims of the ATP and MEP programs?

AP: The purpose of ATP is to fund high-risk, enabling technology projects on a cost-shared basis in companies—an approach that allows us to tackle together the promising efforts that are beyond the reach of private investment. The program's not about product development, or marketing, or manufacturing products; it's about overcoming the early R&D barriers before commercialization. Its critical goals are to establish very close links with industry and to develop effective mechanisms for hearing and responding to industry's needs and objectives. These aims are coupled with the idea of a very competitive process, one that is free of political influence, even by Congress or the Administration.

Those are the key themes driving ATP and the key reasons why the pro-

Based in Boulder, Colorado, NIST-7 is the seventh generation of atomic clocks at the National Institute of Standards and Technology. Placed in operation in April 1963, the clock keeps time to an accuracy of one second in one million years.
gram is on successful footing today. What we're doing now is bringing a substantial number of nifty new technologies coming from government labs to solve problems. To date, the MEP's inputs about which areas of technology are most likely to benefit substantially from NIST support includes:

CC: And MEP?

AP: MEP is also about listening to industry, but in this case we're dealing with small- and medium-sized companies, whose needs are often quite different from those of large corporations. There are more than 350,000 such companies in the United States, and together they make up about 95 percent of all American manufacturers. The program has a strong regional flavor, with an emphasis on how identifying and meeting regional needs can contribute to the overall strength of the nationwide manufacturing base. When MEP was in its start-up phase, I think the initial vision may have been of all sorts of nifty new technologies coming out of government labs to solve problems. The reality has turned out to be quite different. For the small manufacturers, in particular, the issues that matter most are often very practical things—for instance, trying to determine which inventory system would really improve the quality and efficiency of a particular company's operations. That sort of nitpicky thing may not sound very exciting, but it goes a long way in terms of impact and effectiveness.

CC: What exactly do MEP centers do?

AP: Their jobs may vary quite a bit, depending on what part of the country they're in and on the needs of the local manufacturers. Again, we have adopted, and want to maintain, a very flexible approach. The overall purpose of an MEP center is to serve as a resource to local small manufacturers and to benefit from the assistance and expertise of experienced manufacturing engineers. Ideally, these are engineers who have come from larger, more sophisticated companies where they have learned in a very practical, hands-on way what kinds of practices really make manufacturing efficient. As MEP consultants, they spend most of their time going out into the community and working with individual smaller-sized companies in such areas as identifying cost-cutting measures and enhancing productivity.

CC: How far along are both these programs?

AP: What we're really trying to do in this administration is to ramp both MEP and ATP up to the national scale. With MEP, that means developing a capability that can reach our entire small- and medium-sized manufacturing base of more than 350,000 companies. We're working toward a national capability of a hundred MEP centers, so as you can imagine, we're doing a dramatic scale-up. This year we have 7 centers; this year we have 35; and by the end of summer '95, we'll have 64. Our goal with ATP is to reach an investment level of about $750 million, where I think we can start to really see the national impact of these R&D investments.

As I see it, the political challenge now is to keep the momentum going and build on our base of support. The nature of federal research investment is that it's long-term—in a lot of our programs, you really can't tell what kind of difference you've made in ten years. But within that time frame, I would view success as having created a conviction on the part of industry and manufacturing that these are important programs, that they're on the right track, and that they are, in fact, positioned to deliver real economic value in a 10-year span. Whether industry does indeed feel that way, and is vocal about it, I think will determine if we go on.

CC: Who works at NIST?

AP: NIST today employs 3,200 people, of whom 3,100 work in the laboratory. Many of our scientists and engineers have come up through the traditional academic path of getting a PhD and coming here on a postdoc, but people also come to our labs from industry. And we have a lot of guest researchers. We have about 30 people each managing ATP and MEP. Those numbers will eventually grow to a hundred for each program, but relative to, say, ATP's total projected budget of $750 million, that's a minuscule staff. Neither of these programs is designed to become personnel-intensive; the funding is intended to go out to industry, where the work is being done. It's a very lean model in both cases.

The key personnel in ATP are technical program managers—people whose job is to work with industry to define and execute programs, while managing a budget of $20 to $30 million. Ideally, we recruit individuals with a professional education and some industry experience in a particular area. What we're really looking for are people with excellent professional and technical credentials, who also have the ability to listen to and work with many groups and constituencies and to synthesize and communicate a vision. Those skills are rare, and are very different from the ones you acquire from typical technical training and they are not necessarily correlated with who wrote the best PhD thesis. But they are the sort of skills I learned and had the opportunity to hone during my seven years at DARPA.

AP: I don't do science policy: I don't do science, and I don't do policy. I do technology and I implement programs. That role is obviously very closely related to setting policy directions, but my job is really implementation, rather than conceptualization. There's a fine line there—obviously a lot of what constitutes policy happens when you're implementing programs. I certainly didn't make a conscious choice to move in this direction when I graduated from Caltech. The most I knew was, I surely wasn't going to do that stuff anymore.

CC: That stuff?

AP: Well, when I received my BS from Texas Tech, my plan was to do research, probably go on to be a professor, the whole nine yards. Caltech was really useful for me. I mean if the worst thing that happens in school is that you find out about what you like to do and what you don't like to do and what your strengths and weaknesses are, that's pretty good. That's actually more important than, you know, making all A's and so forth.

CC: Speaking of all A's, what was it like for you at Caltech?

AP: The worst five years of my life, thank you very much. I was about halfway through my degree program, when it really became clear to me that I was no longer interested in doing the things for which a PhD was required. I finished in part because I wanted to complete what I had already started, but it was not a happy time, to say the least. But those five years were also among the most valuable I ever spent. Caltech was the crucible that formed me—professionally—in an essential way. I recently found some old notes I'd made while a graduate student, and I saw that it was during that time that I discovered what it was I really cared about—technology that makes a real difference rather than disconnected science; the big picture and a systems perspective that captures the connections among domains rather than a deep, narrow view of a specific area; and—for my own work—communicating and building those connections rather than doing the detailed technical work itself. Part of completing a thesis is learning how much effort it takes to do that detailed, technical work—that's been valuable, too! It really struck me that the ideas and patterns I was seeing in myself back then were the blueprint for what I've done since graduating. In a fundamental sense, I think your professional life is a search for the place where your talents and interests best fit—the place where you can make the greatest difference in the world. My Caltech years helped me find the right direction.

Another aspect of struggle is that I think it strengthens you as a person. I know people who've sailed1

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Letters to the editor

Dear Editor:

I read with interest the well-written article on music and mathematics (February '94 Caltech News). I wonder if some comments of mine will prove of interest.

Mathematics and music are similar in that they are both abstract systems that do not require extensive general practical experience in the world before creative ideas can be developed. In other words, given the foundation operations, each is an autonomic creative ‘world.’ In my view this explains the proclivity of both fields to produce prodigies. It also suggests why those with ability in one might have interest in the other.

However, the idea that they are actually authentic original creators almost certainly not true. Howard Gardner, in Frames of Mind, reviews the evidence for separate functional intelligences with reasonable credibility and finds that music and mathematics are in fact separate intelligences. My own anecdotal experience from teaching music and science for over 20 years is that musical ability does not correlate well with other abilities. Very few really musical students have any bent towards mathematical thinking. And in reverse, some mathematicians are good at music, but in my experience, they only very rarely have the capacity for vivid and accurate internal hearing that would enable them to become authentic original musical creators. There is also experimental work showing that the correlation between musical aptitude and IQ is poor, as long as IQ is above a threshold of about 90. I’d guess—but I don’t know this literature—that this isn’t true for mathematical ability.

By the way, the article in Science about Mozart sonatas boosting IQ has serious design flaws in my view, and should be discounted.

In the interests of historical accuracy (not nitpicking or personal aggrandizement) I must offer a correction to the “Freshman Camp Milestones” that appeared with the Frosh Camp article published in the last issue of Caltech News. It was 1956, not 1957 as the “Milestones” state, when the first talent show was produced at Frosh Camp on Caltech. My recollection has it that I was the juggler in that show.

John Bradt, professor of chemistry, has been elected to fellowship in the American Physical Society. The honor recognizes Bradt’s contributions to the fundamental understanding of transport processes in heterogeneous media.

John Carlstrom, associate professor of astronomy, has won a Fellowship in Science and Engineering from the David and Lucile Packard Foundation to support his research into the development of instrumentation for millimeter and submillimeter astronomy. The award of $100,000 annually for five years is one of the largest research awards in science and is given annually to 20 of the brightest young scientists in America.

Charles Elachi, PhD ’71, lecturer in electrical engineering and planetary science, and director of JPL’s Space and Earth Science Programs, has been selected to receive the 1995 Nevada Medal for his leadership role in the nation’s space program. As the recipient of this award, which is sponsored by the Nevada Bell company, Elachi will visit University of Nevada campuses, the Desert Research Institute in Reno, and government officials in Carson City.

Robert Grubbs, the Victor and Elizabeth Atkins Professor of Chemistry, has been named a recipient of the 1995 American Chemical Society Award in Polymer Chemistry, which is sponsored by Mobil Chemical Company.

Paul Jennings, PhD ’53, acting vice president for business and finance, and professor of civil engineering and applied mechanics, has been selected by Colorado State University to give the first William O. Eddy Lecture under the auspices of the university’s College of Liberal Arts.

Matthew Johnson, a fifth-year graduate student in chemistry, has received a Fulbright Award to spend one year at the University of Lund in Lund, Sweden, studying ozone depletion in the atmosphere. The Fulbright program was established by Congress in 1946 to foster mutual understanding among nations through educational and cultural exchanges.

Jeff Kipple, professor of physics, has been named a Distinguished Traveling Lecturer by the Laser Topical Group of the American Physical Society. As part of the award, Kipple will speak at selected academic institutions and meet with students and faculty, helping to convey the excitement of laser science to undergraduates in particular.

Mark Koenisch, Bing Professor of Behavioral Biology, has been honored with the Acoustical Society of America’s Science Writing Award for a professional in acoustics. Koenisch’s winning article, “Listening with Two Ears,” appeared in the April 1993 issue of Scientific American.

Ralph Landau, Senior Trustee of Caltech, has received the 1994 Honors and awards spring forth

Thomas Ahrens, MS ’58, professor of geophysics, will receive the 1995 Shock Compression Science Award this August from the American Physical Society’s Topical Group on Shock Compression of Condensed Matter. The award citation states that Ahrens’ ‘outstanding contributions’ in this area have benefited the field of planetary physics.

Jim Blinn, associate director of Project MATHEMATICS!, will receive a honorary doctor of fine arts degree May 2, awarded by the Pantheon division of the New School of Social Research in New York City.

Felix Bodeh, the William L. Valentine Professor of Physics, has been awarded the 1994 Tom W. Bonner Prize in Nuclear Physics in recognition of his research into the question of whether neutrinos, subatomic particles with no electrical charge, possess mass.

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Friends

Kresa flies on board
Kent Kresa, chairman of the board, and president and chief executive officer of the aircraft manufacturer Northrop Grumman Corporation, has been elected to Caltech's Board of Trustees.

Named president in 1987 and CEO and chairman in 1990, Kresa oversees the design, system integration, and manufacture of bomber, fighter, and surveillance aircraft. Northrop also designs commercial and military space/aeronautical vehicles. Six years ago, he co-founded the eponymous Kresa Aerospace, which develops and manufactures unmanned aerial vehicles. In 1990, Kresa received the National Academy of Engineering Award for his contributions to the theory of numerical analysis.

Bill Gross named Caltech’s first Young Alumnus Trustee
William (Bill) Gross '81 has been elected to Caltech’s Board of Trustees as the Institute’s first Young Alumnus Trustee. Gross is the founder, chairman, and CEO of Knowledge Adventure, the company that develops and markets interactive educational software for children, including “Dinosaur Adventure” and “Isaac Newton’s Science Adventure.” The company made headlines this past year for its new product, a virtual reality headset designed to bring history to life.

June with the announcement that it would be developing multimedia software products in collaboration with producers-directors Steven Spielberg and DreamWorks, who also own an equity interest in the company.

Gross is a member of MIT’s visiting committee for the department of aeronautics and astronautics and is a fellow of the American Institute of Aeronautics and Astronautics. He serves on the boards of the Aerospace Industries Association, Chrysler Corporation, and ARCO, and the CEO Board of Advisors of USC’s School of Business Administration. In the community affairs, he serves on the boards of the John Tracy Clinic, the Los Angeles World Affairs Council, and the Los Angeles Music Center.

Gifts by will
Trusts and bequests provide welcome support for Caltech’s operating and endowed funds. One recent bequest to establish an endowed fellowship fund in astronomy was a gift from Helen Holloway, a lady who truly loved the Institute.

Helen Holloway served on the Caltech staff from 1952 to 1954 and again from 1960 to 1985, when she retired. She was a consummate hostess who understood and appreciated the varied tastes of her guests. She was an avid stamp collector and a member of the JPL Stamp Club. She was also a committed philanthropist who contributed generously to the University of California, where she served on the Board of Regents for many years.

She left her gift to the University of California, which will be used to support education and research in astronomy.
Caltech Associates go bicoastal

Caltech has received $250,000 from the Fletcher Jones Foundation of Los Angeles to refurbish three undergraduate biology laboratories. The renovation is part of a major effort to serve the growing number of biology majors at the Institute by upgrading all undergraduate biology teaching laboratories.

Since 1990 the number of biology majors at Caltech has doubled and currently totals 81. This rapid growth is due in part to a general increase of interest in biology among all students, as technological developments open up exciting new areas of research, and in part to Caltech’s success in attracting more female students, who now make up 26 percent of undergraduates.

The growing number of biology majors means that the three groups of laboratories used for teaching undergraduate biology can no longer accommodate all the students who are interested in lab courses. The Fletcher Jones award will make it possible to expand the currently existing space by about 50 percent, including new lab benches and work areas to handle the influx of new students. The renovations will affect the cellular and molecular biology laboratories, the genetics and organismic biology laboratories, and the neuroscience laboratories.

Caltech’s programs in molecular biology and genetics, and biology and biochemistry, were ranked among the top ten such programs in the nation last year by Science Watch. The newsletter, which tracks trends and performance in basic research, also rated the Institute, along with the Salk Institute, as one of the nation’s top two centers for neuroscience research.

The Fletcher Jones Foundation was founded in 1969 by Fletcher Jones, the cofounder of Computer Science Corporation.
Sloan Foundation grant will establish new biology center

Caltech has received $1.4 million from the Alfred P. Sloan Foundation to establish the Center for Theoretical Neurobiology. The center, which will be located in the Beckman Institute, will study the senses of sight, hearing, and smell; examine how sensory input to the brain is transformed into eye and body movements; and investigate the physical processes involved in learning and memory.

Theoretical neurobiology is a newly developing field that aims to discover fundamental, theoretical principles of brain function,” explained Richard Andersen, the James G. Boswell Professor of Neuroscience, and the principal investigator for the center. “We plan to develop a center in which students, postdoctoral fellows, and faculty can benefit from the cross-pollination of ideas in both experimental and theoretical neuroscience.

The beginnings of such a center already exist in Caltech’s Computation and Neural Systems (CNS) program, in which researchers design and develop computers whose performance mimics that of biological systems. Graduate students in CNS typically choose either a theoretical or experimental track, but the Sloan Center will provide a third track in which students will receive training in both areas. The center will also introduce a new postdoctoral program in theoretical neurobiology, where postdoctoral fellows will have the opportunity to pursue several years of uninterrupted, focused research. And the center will provide support for a new, tenure-track faculty position. The assistant professorship will be filled by a psychophysicist—a researcher who studies the limits of human perceptual and motor abilities.

“We believe the study of the brain has reached the point where experimentalists and theorists must rely on each other for the field to move forward,” Andersen said. “Experimental studies will progress rapidly only when they adddress theoretically defined issues, and theoreticians can make important contributions only after thoroughly immersing themselves in the knowledge and techniques of neuroscience. The Sloan Center will be dedicated to advancing brain research through combined experimental/theoretical investigations.”

The Alfred P. Sloan Foundation, of New York City, was founded in 1934 by Alfred P. Sloan, Jr., who was chief executive officer of General Motors for 23 years. The foundation makes grants for higher education and research in the fields of science, technology, economics, and public policy.

Prabhakar

Continued from page 5

I did it in oder to take a very purposeful step in an orthogonal direction, but at the time I still expected that I’d go into industry afterward.

CC: What was your OTA experience like?

AP: For me, it was a chance to interact with a really wide swath of the semiconductor industry, and to learn their perspectives. My job was to translate their views and the relevant technical issues into something presentable for Capitol Hill. It was actually the fact that I was out knocking on gazillions of doors that created the next step. That environment was very important in identifying my strengths and what I enjoyed. And when I left OTA for DARPA, I felt like I had landed in exactly the right place, because there I was doing what I really wanted to do—working across a very wide canvas and building linkages among a broad range of projects involving both industries and universities. You also had to understand the technical issues in some depth, so for me that environment was just about perfect.

CC: Was McGill right about the usefulness of your Caltech degree?

AP: It’s been useful in many interesting ways. Obviously, deep-level defects in semiconductors are no longer a major part of my life, but what you learn doing that kind of research is crucial in terms of technical judgement for so many other areas. It provides a grounding that in many ways has been absolutely vital for what I do. You really have to have, almost in your bones, a sense of technical judgement, and I think gaining that experience was essential.

But overall, my feelings are mixed. On the one hand, I can’t help looking at the Caltech degree as a piece of paper that I think is often perceived to have a value way out of proportion to its actual worth. On the other hand, it has turned out to be very valuable in opening doors that I didn’t even realize existed during the time I was at Caltech. I couldn’t do the things I now do without my degree. I literally couldn’t have gotten most of these job opportunities, but I would never have set out in this direction on purpose.

CC: Any thoughts on being the first woman to become director of NIST?

AP: When I was first named to this job and was getting a lot of attention as the first woman to hold it, I felt under incredible pressure to deliver. I think that for earlier generations of women, the problem was with people saying things like, “It’s unnatural for a woman to pursue this kind of career.” The challenges facing my generation aren’t nearly as blatant—no one has come up to me and said, “You don’t belong where you are.” But, as a woman in an atypical field, you can still find yourself carrying quite a bit of unwelcome baggage. I don’t want to overstate the case, but I have found there’s a tendency on the part of some people to assume that a woman in a position like mine got there because of gender. New ethnicity’s becoming a part of it too.

At the time I was appointed, I found this to be a great irritant. Starting with my nomination hearing, which was a very public occasion, there was this sense that I had to do a perfect job at every single public appearance. It’s simply the feeling that there’s no margin for error. It actually took less time than I imagined, for people to get past the perception that I’d gotten this job for nonprofessional reasons. But it is added pressure—and baggage that you’re rather not to have to lug around.

CC: You’ve been quoted a number of times about what an important person your mother was in your life. In what way was she a particularly strong influence?

AP: My mom was very important. I remember we went to plays about scientists, and I read biographies of Marie Curie, and so on; but it wasn’t so much that as instilling a sense of self-confidence, and a feeling that there was something you could possibly do that would be as remarkable as what she’s done for the family.

CC: Can you describe your management style?

AP: For me, the endpoint has to be making a decision and taking action. I really believe in getting stuff done, rather than allowing issues to drift on forever and ever, but I also think you can’t capriciously make decisions.

What I like is a very efficient process that pulls people together, and gets all the people involved who have good ideas, at the table, and then trying to move fairly quickly to a conclusion and implementing it. The traditional lab culture relies more on direction from the top than I really would like to see, so at NIST we’re trying to move toward greater empowerment and toward driving the decision process down the chain. Our approach in general has been pretty streamlined toward getting things done, rather than building a lot of bureaucracy, and I like that. That’s not a new idea at NIST—the practice here has been to listen to and work with industry, rather than tellingindustry what to do. That’s always been an important cultural element, and it’s something that’s central to the success of our programs.

CC: What’s in store for you in the future? Any plans?

AP: I’ve been on my way to industry for ten years. You can see how effective that’s been. I don’t know what’s going to happen next. I have this theory that planning is really good for entertainment value, but that you shouldn’t kid yourself. I mean, you have to have plans, to know where you’re going. Just don’t be upset if you don’t get there. In the end you may find that you’ve landed somewhere a lot more interesting.

Diamond tool-turning and grinding machines are the same of precension manufacuring tools, capable of turning high-precision optical finishes while grinding. NIST researchers and their industrial partners are working to develop improved methods of monitoring and controlling such machines, with the aim of enhancing the precision and production of highly efficient optics, such as this copper mirror for a laser system.
Although he has been absent from the Caltech campus for over three decades, Professor Eric Temple Bell is well remembered even now as a very colorful character. By the time he joined the Caltech faculty in 1926, he had already established his reputation as a mathematician. He had won the prestigious Bôcher prize of the American Mathematical Society, had been on the University of Washington faculty for 14 years, taught during summers at the University of Chicago, and had turned down offers from both the University of Chicago and Columbia. But during his subsequent 35 or so years at Caltech, it was not just his mathematical ability that stood out. Former Caltech colleagues and students, as well as faculty wives, have anecdotes and precise impressions of him at their fingertips. They call Bell (at the least) an individualist, a distinctive personality, caustic, caustic, sometimes cruel, coarse, acerbic, charming, witty, very intelligent, exceptionally imaginative. In whatever terms they describe him, no one ever says he was dull. And he had a diversity of interests. In addition to being a full-time mathematician—and professor—he was also a successful science-fiction writer, a playwright, an ambitious poet, and a watercolorist of desert scene. It seems, though, that his most lasting reputation was made in writing about the history of mathematics. All along the route of his venerated career, he managed to leave a trail of stories behind him that some of his fellow Caltechers still savor.

Bell, they say, was a complex person, many-sided, taciturn, and notoriously unpredictable. One student, before introducing Dr. Bell to his mother, cautioned her not to be upset by his professor's rather rough language. After leaving Dr. Bell, the mother said to her son, "Why, what did you mean? He talked like a perfect gentleman." The female librarians at Caltech also had a favorable opinion of Professor Bell. He likely to come and talk with them, and each Christmas he and his wife brought them a box of candy. "He treated us as people, rather than as menials, and that made a big impression on me," Grace Merritt (later the wife of Caltech chemistry professor Jurge Water) said. "And," she adds, "he had a great sense of humor." Miehm DiIworth, the wife of Caltech mathematician Robert DiIworth, remembered his penetrating blue eyes, his bushy eyebrows, his slender build, and his wit. She found him to be good company. So did Eleanor Bohnenblust, another longtime Caltech mathematics wife, who added, "You could respect him, and love him, and yet be furious with him for the provokingly prepos­ terous statements that he made. But above all, he was a very charming person, no one ever says he was dull.

Although Bell could be charming and sociable, he could also ruin a faculty wife's evening by making an un­ tactful comment. He seemed unwilling to refrain from "puncturing somebody's balloon" if he thought that person was being pompous or was exaggerating. At social events, or at lunch with his colleagues at the Athenaeum, or at faculty meetings, he unashamedly spoke his mind. Some of the young faculty and graduate students thought "he was like a refreshing breeze. We enjoyed him. He stirred things up." Others thought his practice of denouncing his colleagues' ideas was need­ lessly abusive. Some took offense and others let it pass. They could chuckle about it now and shake their heads.

Whether they appreciated his personality or not, his colleagues recognized his intelligence and talents. Born in Edinburgh in 1883, Bell, who re­ ceived degrees from Stanford, the University of Washington, and Columbia University, established his reputation as a productive number theorist with (ultimately over 200 papers to his credit) early in his career. In the woods of the late Lee DuBridge, Caltech's president from 1946 to 1969, "Bell was an outstanding mathematician—one of the most highly regarded in this part of the country. He was elected to the National Academy of Sciences in 1927, a year after coming to Caltech. Later he became president of the Mathematical Association of America and a member of the Council of the American Math­ ematical Society. In 1937 he received the Gold Medal of the Commonwealth Club of California for "the best contribu­ tion to published scholarship for the year by a Californian." Beginning in 1937 his prestige was greatly enhanced by the publication of Men of Mathematics. He became widely recognized as a gifted writer about influential mathematicians of the past. Caltech students still read Bell's classic today, as did students at previous years, who were introduced to it by their teachers or sometimes by happenstance. One 55-year-old American boy, now a chemistry professor at Case Western Reserve University, came across it while his family was living for a year in Africa. At the time he was perusing a math book out to seem to have considered the book an especially appropriate adjunct to romance. Olga Taussky Todd and John Todd, both now Caltech mathematics professors, emeriti, were given the book as a wedding gift by one of John Todd's math professors in Ireland; and Eleanor Bohnenblust recalls that her husband, H. F. Bohnenblust, read portions of it to her on their honeymoon! (Bohen­
While seated next to Bell at an Athenaeum dinner, he learned that it was the result of Bell's friendship with Caltech paleontologist Chester Stock. After exploring with Stock the subject of radioactivity and genetic forms found in certain areas, Bell had then planted the theme in *The Forbidden Garden* plot. Probably very few mathematicians have had a play produced. One of Bell's science-fiction books, *Green Fire*, became a play that was staged at the Pasadena Playhouse in May 1951. The Pasadena Post headlined its review of the production with: "Green Fire Dazzles Throng at Playhouse; Brilliant Cast, Pantomime Stage Settings." A number of Caltech people attended.

More than a dozen years later, the same newspaper carried an announcement of another Bell escapade that certain Caltech students considered even more dramatic. Bell, who was known as an outspoken agnostic, had been asked by the Caltech Y to debate a local minister on "The Existence of God." The public was invited to attend the exchange, which was held in Caltech's large, high-ceilinged Bridge Lecture Hall. Several students planned to participate in the event in an unannounced way. As Al Hibbs, then a Caltech undergraduate, today a retired JPL senior scientist, recalls the incident, a trapdoor situated above the lecture platform was essential to the scheme. Dressed in white, Hibbs was supposed to be let down through the trapdoor by his fellow students and to ask, "Dr. Bell, if I am not God, who am I?" But the plan did not work out. Instead, the plotters had to send a light—presumably representing the Heavily Present—down on a long cord, and Hibbs called out the question in what he hoped was a suitably divine voice—deep and booming. "Dr. Bell was taken by surprise but quickly recovered and acted as if he'd been struck by lightning. The audience burst into laughter," Hibbs delightedly recalled.

A related story that Bell's colleagues still chuckle over is about the cross on the church steeple. As Caltech Professor of Engineering Science, Emeritus, Harold Wayland related the incident, Bell was out walking one day with his son, Taine, when the boy looked up and asked, "Dad, what is the plus sign doing on top of that building?"

"The Bells may not have given their only child any religious instruction, but while attending Bell's lectures as a Caltech student, Wayland became impressed by his professor's extensive knowledge of the Bible and his ability to quote it under practically any circumstances. "He had a pungent sense of humor, too," Wayland said. "Very informal."

Bell's humorous bent was certainly in evidence in the title of a lecture he gave at Caltech in the early '50s. A huge audience turned out to hear him talk about "The World's Oldest Profession." However, the profession he was referring to was mathematics. Tom Apostol, professor of mathematics, emeritus, recalled Bell's saying on that occasion, "Well, that's the way to get an audience under false pretenses."

Added Apostol, "It was a good talk, though, lively, with a lot of anecdotes—just the way he wrote." As a teacher, Bell got decidedly mixed reviews. Some of his students liked his approach, while others thought he showed too little preparation and organization and therefore wasted class time. Like many teachers, Bell was better prepared in certain topics than in others. For example, his course in logic got high marks, but one he taught in modern algebra did not. Of course, in his field—number theory—he was considered an expert.

Of Bell's teaching style, the late physics Nobel laureate and Caltech graduate and physics professor Carl Anderson recalled, "He was an interesting person. He didn't prepare for his courses. He would sometimes ask the class what was under discussion at that time, and the students would tell him what we were supposed to be studying. But in spite of that it was a very good course, because he was who he was."

Another student and subsequent faculty member who had a chance to study Dr. Bell at close range for about 25 years was the late Robert Dilworth. Dilworth received his BS in 1936 and his PhD in mathematics in 1939 from Caltech, and left his position at Yale in 1943 to join the Caltech mathematics faculty. According to his recollection, when he arrived the department consisted of Professor Harry Bateman, E. T. Bell, A. D. Michal, and Morgan Ward. (Dilworth served on the faculty until his retirement in 1982.) In addition to provoking "lively disagreement" within the department, Dilworth said, Bell carried on controversies with prominent mathematicians at other institutions who were working in his field. "It was typical of Bell that he could be strong in his opinions in regard to somebody else—and to their point of view—and yet it didn't keep him from having sociable relations with them and accomplishing something at the same time. Basically, he was really a very caring sort of person. It was just that he was an eccentric, and loved to tease, and liked to get a rise out of people."

Apparently, he met his match when he married. Jessie Brown was an attractive, red-headed young widow who met Bell when they were both teaching at Siskiyous County High School in Yreka, a small, Northern California community. They married in 1910, and in 1911 they went to Columbia University for E. T. to secure a PhD in mathematics, and for Jessie to get a fine arts degree at Teachers' College. Thereafter they lived in Seattle while Bell taught at the University of Washington until he was hired away by Caltech.

Jessie Bell was considered as vivid a personality as her husband, according to acquaintances. Just as outspoken as he, she kept her reputation as an individualist until her death in 1940. E. T. had nicknames for practically everybody he knew. Many times they were unflattering and he did not divulge them to the people involved, but his wife became universally known as "Toby." Bell thought her wistful expression reminded him of the dog Toby depicted on the covers of Puss. She called him "Dog Romps," and "Romps" henceforth became his name to her, to their son, Taine, and to their friends.

Jessie Bell is credited with "drawing E. T. out and bolstering him up, showing her faith in him, and getting him to do what he wanted to do. They had great fun together. She drove him out of people."
Chapter news

'Twas the season .....

It was a bookshop get-together this past December for the Caltech and MIT alumni and family members who took part in a reading of multicultural holiday tales at the Los Angeles Public Library, followed by a tour of the recently renovated historic building. Professional storyteller Elaine MacCloud presented winter tales from cultures and traditions around the globe.

Now you see it, learns the Seattle/Puget Sound chapter

Using space-age technology to decipher ancient manuscripts was the subject of a talk at JPL's Gregory Bearman recently gave to the Seattle/Puget Sound chapter. Spacecraft have long carried imaging spectrometers that take hundreds of images of the same scene using a slightly different wavelength each time. Recently, JPL produced a compact and portable version, which carried imaging spectrometers that take dozens of images of the same scene each time. Recently, the dinner and lecture.

The Washington, D.C., chapter sees beyond first light

The W. M. Keck Telescope, the world's largest and most powerful optical telescope at 10 meters in diameter, was tested for the first time (see first light) in November 1990. After several years of testing, the telescope has now been brought into routine operation. Members of the Washington, D.C., chapter learned about the suite of instruments on the Keck from Professor of Physics Thomas Soifer '68. He described some of the research being done to probe the most distant regions of the universe.

Bull's-eye

The Tri-State chapter enjoyed a lecture by JPL's John Trauger about the Wide-Field and Planetary Camera 2, which was installed on the Hubble Space Telescope in December 1993 in order to correct the Hubble mirror's spherical aberration. Trauger, principal investigator for WFPC2, recounted the story of the aberration and its optical correction, along with highlights from early Hubble science programs, ranging from the first images the Hubble provided to the detailed photos of the comet impact on Jupiter.

It's a bird, it's a snake, it's a robot!

Thirty-seven members of the Orange County chapter learned about "Robotic Machines that Crawl, Walk, and Slither," from Joel Burdick, associate professor of mechanical engineering. Burdick described Caltech research efforts to develop highly dexterous robotic machines for unusual and nonindustrial applications, such as space exploration, toxic waste cleanup, and minimally invasive medical technologies.

MIT and Caltech alums hear about the end of Comet Shoemaker-Levy 9

Jupiter was cruising for a bruising last summer when it went head to head with Comet Shoemaker-Levy 9. Jupiter won, sort of. The pieces of the comet left huge impact zones—some as large as Jupiter's Great Red Spot. At a joint meeting with MIT alums, Caltech alums heard JPL scientists John Chodas and Glenn Orton, PhD '75, describe how the times of impact of the comet's 21 fragments were predicted, and the latest scientific data resulting from the spectacular phenomenon. Sixty-five Caltech and MIT alums and their guests attended the event.

Alumni Relations Task Force, led by Ron Linde, begins landmark study

President Tom Everhart has called for a 14-member task force to assess the relationship between the Institute and its alumni, and he has appointed Caltech Trustee Ron Linde, MS '62, PhD '64, to chair the committee. Vice President for Institute Relations Tom Anderson explains the philosophy underlying the task force's mission. "Every so often it's important to stop the world and ask fundamental questions about how the Institute interacts with its alumni: What are the expectations on both sides of the relationship, and how do we ensure a two-way communication?"

Without delay, the task force was headed for its first meeting on March 13, as Caltech News went to press. Four more meetings are scheduled, but Linde says that, to enhance efficiency, the number may decrease if task force members accomplish as much as he hopes through frequent informal interactions between meetings. The plan is to have a report on President Everhart's desk by the end of 1995.

With the help of a survey, the task force will solicit the views of alumni—not only members of the Alumni Association, but also nonmembers who may have had little or no interaction with Caltech since graduation; students who attended but didn't graduate from Caltech; and postdoctoral fellows. The charge of the task force is to consider alumni views on the strengths and weaknesses of Caltech's alumni-relations program, to "seek guidance on the characteristics of an improved relationship" between Caltech and both alumni and the Alumni Association, and to make recommendations to President Everhart on the "attributes of an alumni-relations program that would carry the Institute and its alumni into the 21st Century."

Anderson says, "The seriousness with which we are taking the task force is evident by its membership. And from the beginning, we've wanted it to be national, diverse, and representative of all alumni."

In addition to Linde, the members of the task force are as follows:

- Tom Anderson;
- Bill Davidson, Ex '62, general partner of Mohr, Davidson Ventures;
- Hugh Dubb '56, founding partner and patent attorney at Fieeler Dubb Meyer & Lovejoy, and a member of the board of directors of the Caltech Alumni Association;
- Kent Frewing '61, member of technical staff at JPL, and chairman of the Alumni Fund;
- Roger Goodspeed '72, managing director of Lehman Brothers, Inc.;
- Bill Hutchinson, MS '57, PhD '60, manager of lab operations at Rockwell International Corporation;
- Ed Lambert '82, managing director of Meridian Ventures, Inc., and treasurer of the Alumni Association;
- Pete Mason '51, MS '52, PhD '62, senior scientist at JPL, and president of the Alumni Association;
- Jerry Nussbaum, assistant vice president and director of development and alumni relations at Caltech;
- Madeline Sheps '77, assistant professor in the University of Iowa's College of Medicine;
- Wally Weissman, former chairman and CEO of American Medical International, Inc., a member of Caltech's Board of Trustees, and chairman of the Trustee's Institute Relations Committee;
- Bill Whitney '51, a technologist at JPL, and past president of the Alumni Association; and
- Henry Yu, PhD '73, chief executive of Gemstar Development Corporation.

Advisory members are Judy Amis, executive director of the Alumni Association, and Meredith Roche, director of foundation relations.

Chair Ron Linde says, "We feel fortunate that we have been able to bring together an outstanding group of people to comprise the task force, and I'm gratified that these people, who are already very busy, have agreed to devote time and effort to achieve our important goals. The study certainly looks at a fundamental aspect of the Institute's mission and its base of support."

The Alumni Association last conducted its own comprehensive study in 1964—a review that, among other things, led to the hiring of a full-time executive director and to the creation of the alumni newspaper, Caltech News. Since then, says Anderson, "the Institute has come a long way in its alumni relations. Recently we shifted the Association from the Office of Public Relations on page 13
Gray Jennings tends to Houston Chapter

In the fall of 1965, Caltech sophomore Gray Jennings '67 had an opportunity to attend a party in honor of Caltech's newest Nobel laureate, Richard Feynman. As the guests poured in to meet Feynman, Jennings did a bit of pouring himself—with classmate Bob Piccioni, whose father was hosting the event, he did the bartending honors as people flitted around the physicist. Now Jennings has moved from tending the bar to tending the chapter—he was recently elected president of Caltech's alumni branch in Houston.

"Well-timed talks on interesting technical topics" is how this trained mathematician sums up his vision for future alumni gatherings. By well-timed, he means in part "never in April, when you just can't compete with Little League." As for the other half of the formula, this past fall, the Institute and MIT alumni chapters co-hosted JPL chief technologist Terry Cole, PhD '58, who spoke on the Lab's use of supercomputers to transform space data into motion-picture images. It was the first time that Team Caltech and Team MIT had cosponsored an event in Houston, a partnership Jennings hopes to continue, even as he looks forward to luring more Caltech alumni to the meetings.

There are about 200 Caltech graduates in the Houston area, and our aim is to put together a roster of events they will find appealing," says Jennings. "We'd especially like to reach out to younger alumni and encourage a larger number of them to become involved in chapter activities."

Working the numbers—alumni and otherwise—has been Jennings' stock in trade for many years. Since 1976 he has been a tax attorney with the Houston firm of Baker & Botts, a position that reflects his BS and PhD degrees in mathematics, and the law degree he earned in 1976 from the University of Texas after a detour into the military prompted him to rethink his career path.

In 1969 Jennings was exploring mathematical mysteries at New York University when the draft board presented him with a number whose meaning was only too clear. He enlisted in the Marines and was able to finish his dissertation statewide before being sent to Japan with the First Marine Air Wing. He rose to the rank of first lieutenant and with his PhD out of the way, was assigned to managing the rotation of Marines home at the end of their 12-month tour of duty.

"At the time I arrived they were still handling the process manually, amid some confusion as combat units rotated out of Vietnam," says Jennings, adding that "you could say that the environment there was a little like MASH." He eventually eliminated three typists and "a fair amount of confusion" by sorting punch cards and generating alphabetical lists by unit on an IBM printer. Meanwhile, his temporary rotation out of academia had left its own imprint on his thinking. "I did a postdoc at NYU, where I had done my graduate work, but I realized that I might want to do something else."

For a lapsed mathematician, tax law seemed a logical choice. "I found I liked the precision of tax analysis and the issues that it raised," says Jennings, who now designs transactions and handles litigation for a large roster of primarily corporate clients. Asked about less taxing pursuits, he mentions his wife, Arbolina, a professor of English at Texas Southern University, and their three children, and, with a little more encouragement, tennis, golf, and coaching his son and two daughters one-on-one in a variety of sports.

Jennings' coaching seems to have succeeded on a number of levels since his oldest daughter, now a high school senior in the process of deciding where to attend college, is planning to major in science. "Her SAT scores are certainly high enough for Caltech," says her proud father. He adds that he's trying not to interfere too much in her selection process, but has "mentioned some of the possible advantages of attending his alma mater, which might or might not include tending bar for Nobel laureates.

Association president elaborates on new task force By Pete Mason '51, PhD '62

The officers and directors of the Alumni Association establish directions and policies, set budgets, select board members and the executive director, maintain good relations with important constituencies, and represent the interests of association members.

The first three responsibilities are well-handled. While we have had a wide range review under the guidance of Presidents Stupian (1991–92), Lund (1992–93), and Whitney (1993–94). We are generally satisfied with the results. We have adequate funds from life membership endowments, annual membership fees, and Caltech to support our current activities and meet our budgets. We have a large and capable pool of alumni to draw upon for our board, and we have an exceptionally capable staff.

It is the last two issues that I address in this column. We have two important constituencies: the Institute and our members, and, more broadly, all Caltech alumni. To address the relationship between the Institute and its alumni, President Everhart has asked Tom Anderson, vice president for Institute Relations, and Bill Whitney, my predecessor as president, to form an Alumni Relations Task Force. As reported in an accompanying article in this issue of Caltech News (page 12), President Everhart has appointed Ron Linde, PhD '64, as chair. A 14-member committee has been selected, and the first meeting takes place this month.

The aim of the task force will be to examine the relationships between Caltech and its alumni and to make recommendations for the next decade. An important part of its charter will be to determine the best way of reaching all alumni, whether or not they are members of the Association. Its recommendations may affect the Association in as fundamental a way as the review in 1968, which resulted in the appointment of a professional director.

Both Bill Whitney and I will be on the task force, representing the Association. Other task force members will represent a wide range of interests, including those of members who were undergraduates and graduates, and those of alumni who are not members of the Association.

Bill and I will look for advice from many sources. The current board will play an active role in advising and eventually approving our positions. We also expect to consult with other alumni associations, such as MIT's. Past members of the board of directors and past presidents will be consulted. While we understand that the task force will be conducting a survey of all alumni, we also wish to bear directly from Association members. We need extended comments from all alumni who are willing to take the time to give thoughtful input.

My main purpose in this column is to encourage feedback from all Caltech alumni, both Alumni Association members and those who are not, in representing their interests. Are we providing services that are important to them? Is the current organization the best one, or is there another model? If alumni are not members, why not? What ideas do alumni have for improved services?

As we see the direction task force takes, I will ask more specific questions. But if you have views, I would like to hear from you now. Please offer suggestions by any of the following means: by e-mail to pmason@alumni.caltech.edu; by letter to Peter V. Mason, Caltech Alumni Association, 1-97, Pasadena, CA 91125; or by phone at 818/354-2300 (daytime) or 818/794-2200 (evenings); or by fax at 818/795-8736. I look forward to receiving your thoughts.

Task Force

Continued from page 12

Relations to the newly titled Office of Development and Alumni Relations. As we evaluate these changing relationships, we also want to address the issue of how to interact with people who choose not to be members of the Alumni Association.

Discussing the leadership of the task force, Anderson says, "I can't think of a better person than Ron to chair the committee. He's certainly an involved, active, and engaged trustee and alumnus." Linde has a place in the annals of alumni history as the first person to earn a doctorate in materials science from Caltech. He ultimately went on to found Chicago-based Envirotech Industries, Inc., and built it into a worldwide leader in the development and manufacture of food-packaging materials and systems. "One thing that I've enjoyed being heavily involved in was working with institutional partners to improve their service and operations," he says. "We're an organization of alumni to support the Institute. I think it's meaningful work and something we can do well."
Alumni Association to explore geology, history, and culture of the Rio Grande

The Alumni Association invites you to participate in Rio Grande del Norte: Geology and Culture of the Rio Grande, a travel/study program that follows the geology of the upper Rio Grande as it courses through Colorado and northern New Mexico. Led by Leon Silver, PhD '53, Caltech's W. M. Keck Foundation Professor for Resource Geology, the trip is scheduled for September 22–October 1, 1995.

In New Mexico, Silver and the participants will explore the beautiful high country (7,000–12,000 feet elevations), valleys, volcanoes, and other major structures that define the Rio Grande rift, and will follow the river to its source. The program will begin and end in Santa Fe, with stops in Española, Chama, Monte Vista, Creede, and Taos, and with opportunities to visit Native American pueblos and Hispanic villages and churches, as well as some of Georgia O'Keefe's favorite countryside. A day will be spent exploring the spectacular Cumbres and Toltec Scenic Narrow-gauge Railway line from Chama, New Mexico, to Antonito, Colorado. Early fall is a time of major waterfowl migration along the Rio Grande flyway, and we will travel through two major wildlife refuges that are home to Rocks of sandhill crane and their rare traveling companions, whooping cranes.

Accommodations will range from deluxe to rustic and will be characteristic of the locales. Professor Silver has selected some of his favorite dining spots for evenings in Santa Fe and Taos. The pleasant September weather and beautiful fall colors for which New Mexico and Colorado are known will make this trip particularly enjoyable. The price per person—$41,463 for double occupancy and $1950 for single occupancy—includes all accommodations, transportation, and meals while with the group. The cost of transportation to and from Santa Fe, New Mexico, is not included.

To take advantage of this special opportunity to explore the rich and varied natural beauties, culture, and history along the Rio Grande, please complete and return this form by April 21. Detailed information will be sent to you upon receipt of your reservation form with deposit. Space is limited to 40 participants. If you have questions, please call Judy Amis, 818/395-6594.

The War Years Reunion wants YOU

Dinner, dancing, renewing old acquaintances, and an address by former JPL director and space-age pioneer William Pickering '32, PhD '36, will highlight the Alumni Association’s first-ever War Years Reunion, to be held Friday, May 12, as part of the Seminar/Reunion Weekend. The event will commemorate all students who attended Caltech during World War II—many of whom took a break from their education to serve the services—and returned to the Institute to receive their degrees in the late 1940s. All alumni who attended Caltech from 1940 through 1949, as well as participants in the CAVU (Ceiling and Visibility Unlimited) meteorology program, are invited to attend.

The event will be held at the Ritz-Carlton Hotel, formerly the Huntington Hotel, the site of many Caltech student dances in the ‘40s. The evening will begin with no-host cocktails, with areas designated for each of the Blair Student Houses, for the Throop Club, and for CAVU, followed by welcoming remarks by President Tom Everhart, the event chair Dr. Pickering, and dinner in the ballroom.

For further information on the reunion, please contact the Alumni Association’s Patsy Gousse at 818/395-8366.

Task Force

Continued from page 13

by combining technology with business enterprises,” says Linde, scrutinizing the surface of a career that has taken him from research in the laboratories of Litton Industries, Inc., and the Stanford Research Institute to the building of a diverse array of companies.

Most recently, Linde has turned his attention to providing financial advisory services to major U.S. corporations, teaming up with his wife, Maxine, and others to establish the Titan Financial Group. He is also chairman of the board of the Ronald and Maxine Linde Foundation. The couple has endowed the Ronald and Maxine Linde Professorship at Caltech, held by physicist Barry Barish, and the Ronald and Maxine Linde Venture Fund, which supports faculty research.

The Lindes’ personal and financial support of higher education extends to Stanford, where they have served on several of the law school’s advisory councils, and Harvey Mudd College, where Ron Linde is vice chair of the board of trustees. He has been a Caltech trustee since 1989, and both Lindes are members of the Associates.

Linde sees this latest project as a continuation of the close relationship he has had with Caltech over many years. “I believe the Institute really is a unique place,” he says, “and the people who are members of The Associates represent a remarkable body of talent, so it’s an exhilarating experience to be involved. I also feel that the Institute’s mission and activities are a vital part of building the future of the country in a dynamically changing environment.”

Association makes board nominations

At their January 1995 meeting the Alumni Association accepted the proposals of the nominating committees for officers of the Association board of directors and members of the board. The term of office for directors and officers will begin at the close of the annual meeting in June 1995.

Nominations for officers are: president, Frank Dryden ’54, MS ’57; vice president, Ed Lamberts ’82; treasurer, Tom Tyson ’54, PhD ’67; and secretary, Lisa Anderson ’74, PhD ’82. Association President for 1994–95 Pete Mason ’51, PhD ’62, will become official past president for 1995–96 when the new terms begin this summer.

The following were nominated for the board: Fred H. Eisen ’51 (Seminar Committee Chair); Michael L. Peri, MS ’91; Frank E. Des, PhD ’72; Gaven N. Miyata ’59, MS ’70, Eng ’72; Michael S. Stefanco ’70, all for three-year terms. Named to serve a one-year term as chapter representative were Blais A. Poleson, PhD ’74, president of the Orange County Chapter.

Section 3.01 of the Association by-laws provides that members of the Alumni Association may make additional nominations for directors or officers by petition, signed by at least 50 members in good standing, providing the petition is received by the secretary no later than April 15. In accordance with section 3.02 of the by-laws, if no additional nominations are received by April 15, the secretary casts a unanimous vote of all regular members of the Association for the election of the candidates nominated by the board. Otherwise a letter ballot is required.
Bell

Continued from page 11

to the desert, which he loved, and "they made small paintings of desert scenes," according to the Bohrenblusts. Several of the Bell's pictures are now owned by their friends.

"They were devoted to each other, and after 30 years of marriage, E. T. was lost when she died," Robert Dilworth said. She had always tried to curb Bell's appetite for liquor, but when left to himself, he set his own limits. His housekeeper, Mrs. Frances Lemons, who worked for him for over 12 years, remembered his daily potion was a bottle of bourbon. When visitors came, he was reluctant to share his beverage, suggesting that his guests opt for a beer or something else instead. Efforts by friends to dilute his drink did not succeed.

Since he lived close to campus, Bell did not need a car to go to work. (It is said that he flunked the state driving test three times before giving up.) His wife drove a roadster (which some people remember as yellow and some as red, but which Bell biographer Constance Reid reports in The Search for E. T. Bell, was black with red wheels and had a convertible top). Bell always liked to sit in the back seat.

After Mrs. Bell's death, when Mrs. Lemons became his housekeeper, he bought a car for her to use for errands and to drive him wherever he needed to go, if he did not go with a friend. Mariette Fay, the wife of Caltech history professor Peter Fay and daughter of Caltech mathematical physicist H. P. "Bob" Robertson, remembered that as a teenager she drove Bell to his bank to clip coupons. And Luddye Michal recalled that she sometimes used coupons and dividend checks as bookmarks.

Among her other recollections of Bell, Mrs. Lemons said he paid her $45 other immediately. When he learned that Bell was having trouble shaving himself, he started going over with his electric razor to perform that task for him. One day while visiting Bell, Apostol was appalled to learn that Bell had burned his collection of correspondence, which would have been valuable archival material.

However, Bell did give some of his library to Caltech, including books he had rescued from the fires following San Francisco's 1906 earthquake. Today those books form the nucleus of the mathematics department's research library. To honor Bell, Caltech's Division of Physics, Mathematics and Astronomy established the Eric Temple Bell Undergraduate Mathematics Research Prize in 1965.

While writing a number of his own books, E. T. Bell made use of a small, solitary, polygonal room located in his garden. It was his creative refuge. Many in the Caltech community knew about the retreat but eventually they could only see it or even his house by penetrating the forest of overgrown foliage that had come to surround his home. While the property had always been amply planted, "it became a jungle as the years went by," according to a number of observers. That's the way the professor liked it.

His house and garden are now gone, the area having been redesigned to be part of the Caltech campus. He was no longer living in Pasadena at the time of his death in 1960, but in the Watsonville, California, hospital where his son, Taine, and daughter-in-law, Janet, were doctors.

They knew what his wishes were: for them to take his ashes up to the hill outside Yreka where he had to proposed to Toby and where he had scattered her ashes 20 years before.

They did as he requested.

Four ordained

Four is a number that resonates readily in the popular imagination. The four seasons. The Four Tops. The four corners of the globe. The Four Tops. The four seasons. The Four Tops.

Four is a number that resonates readily in the popular imagination. The four seasons. The Four Tops. The four corners of the globe. The Four Tops. The four seasons. The Four Tops.
ASSOCIATES HONOR ROLL

The Associates of Caltech take this opportunity to thank the many members of the Associates' President's Circle and Provost's Circle who have supported the Institute's programs for the year October 1993 through December 1994. We are pleased to acknowledge the following donors.

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ALUMNI ASSOCIATION FINANCIAL STATEMENT
CALIFORNIA INSTITUTE OF TECHNOLOGY
Pasadena, California

PROVOST'S CIRCLE

Statement of Income, Expenses, and Surplus
For the Year Ended September 30, 1994

INCOME

STATEMENT OF INCOME, EXPENSES, AND SURPLUS
For the Year Ended September 30, 1994

TOTAL Income

EXPENSES

INCOME OVER (UNDER) (UNITS)

S UK

Balances, September 30, 1994

EXCESS ALUMNI ASSOCIATION

Statement of Income, Expenses, and Surplus
For the Year Ended September 30, 1994

INCOME

INCOME OVER (UNDER) (UNITS)

S UK

Balances, September 30, 1994

EXCESS

Auditor's Report

Balance Sheet

ASSETS

LIABILITIES, RESERVES, AND SURPLUS

STREET, PASADENA, CALIFORNIA

INCOME

EXPENSES

INCOME OVER (UNDER) (UNITS)

S UK

Balances, September 30, 1994

EXCESS
1951 DALLAS L. PECK, M.S. ’53, former director of the U.S. Geological Survey, was presented the late Campbell Medal, the most prestigious award of the American Geological Institute (AGI), on October 24, 1994, at the Geological Society of America’s annual meeting in Seattle; he was being honored for 43 years of “outstanding service to the American geoscience community as both research scientist and national policy leader.” He began his tenure with the USGS in 1951, shortly after receiving his BS from Caltech. He earned his PhD in geology from Harvard. His field experience includes a geologic mapping of volcanic complexes in western Oregon’s Cascade Range, studying volcanic processes at the Mount St. Helens Observatory, and mapping the geologic base ment terrain of the Innompna National Battlefield.

1958 RICHARD L. VAN KIRK has been appointed president and chief executive officer of the California Special Olympics by its board of directors. Holder of a master’s degree in business economics from Claremont Graduate School, he is currently a management consulting partner of Ernst & Young LLP in Los Angeles. Previously, he held positions with Procter & Gamble and the Riverside Cement Company, and he also served as associate director of development at Caltech. He was the Los Angeles Olympic Organizing Committee vice president for technology, and he has provided consulting services to World Cup Soccer and to cities holding for the Olympic Games. He is coauthor of The Complete Guide to Special Event Management, published by J. Wiley & Sons. While at Caltech he received awards in football and track and field, and after graduating he competed in track and field as a member of the Southern California Briders.

1965 VIRGINIA TRIMBULL, MS, PHD ’68, has been elected vice president of the International Astronautical Union and president of its Commission on Galaxies for the period 1994–97.

1972 JEFFREY OCHSNER, Es, has edited and authored a new book, Shaping Seattle Architecture: A Historical Guide to the Architecture, which was published in September by the University of Washington Press. The book, he writes, “includes 68 illustrated essays by more than twenty writers on significant architects and firms in Seattle’s history, an introductory overview of the city’s architectural heritage, and several appendices providing additional information and references. The book has been published as part of the 1994 celebration of the 100th anniversary of Seattle and Washington State.” Ochsner continues to teach design, architectural history, preservation, and urban design in the School of Washington’s department of architecture.

1973 JEAN F. SAINT-MARCOUX, MS, of Paris, was appointed engineering department manager at ETPM in 1992; the company is a Paris-based offshore contractor for oil and gas platforms. His wife—the couple met while at Caltech—is teaching Japanese. Their daughter, Cecille, 16, and their son, Antoine, 15, both speak French and Japanese fluently and play the piano, and Antoine is a dedicated chess player.

1985 TIMOTHY WHITE, of Rockford, Illinois, writes, “After two years in Kenya with the Peace Corps, my Dutch electronics fellowship began; my second year I am in my second year of study at the University of Illinois College of Medicine.” He also received his MD from Harvard in 1985.

1986 SCOTT CHOU, of Stanford, California, received master’s degrees from both Harvard and Stanford after graduating from Caltech. “I now work for IBM,” he writes, “and just received an IBM Systems Division Outstanding Technical Achievement Award for my work in system reliability for the RAMAC Storage Array product family. My fiancée, Tami, and I will be getting married at the Stanford Memorial Church this coming May. I would like to invite old friends who might be in the area at the time to contact me at (408) 461-0991.”

1987 BRIAN TOBY, PhD, of Fortville, Pennsylvania, and his wife, Diane Fire Toby, announce that their son, Jason, Mark, was born on May 22, 1994. The couple met when they were both working at the University of Pennsylvania, he as a lecturer at the Laboratory for Research on the Structure of Matter, she as a staff psychologist in the Child Guidance Center. They met through an off-campus Israeli folk dance club. Toby spent two years at Union College, immediately following his graduation from Caltech. “In 1991,” he adds, “I joined Air Products as a Principal Research Chemist to begin a research program in cryocrystalgraphy. In 1992 we moved to the Allentown area from Philadelphia. In 1993 I was promoted to Senior Unoccupied Research Chemist. Also in 1993, Diane and I started teaching an Israeli folk dance class in Allentown.” He has a great appointment at the university and synthesizes at Broadlands and is “a frequent user of the NBSR reactor at NIST.” He is also the chair-elect of the material science section of the American Crystallographic Association and is a member of the Commission on CIF of the International Union of Crystallography.

1990 DAVID A. EDWARDS, PHD ’84, and JACQUELINE M. HOLMES ’91 (*were married on July 31, 1994, in Las Vegas, Nevada. Mr. Holmes will be employed as an attorney at the firm of Jones, Day, Reavis & Pogue in Washington, DC. Dr. Edwards will be employed as a Courser Instructor at the Courser Institute of Mathematical Sciences at New York University in Manhattan.

1991 EDWARD BROKE, PhD, and Patti Prie, assistant in Caltech’s director of government relations and community affairs, were married May 7, 1994. “Lots of Caltech friends and their families were in attendance to witness the event, which took place in the Beckman Institute Courtyard on the Caltech campus.” Couple resides at Delta Electronics in Kokomo, Indiana, from August 1 to November 17, 1994, for Hughes Research Labs in Malibu, California. The couple “will make their home in Pennsylvania and are looking forward to many happy years together.”

Kevin Condrelski, PhD ’94, instructs graduate student Shon Wong on how to get the best view of the campus. In the opinion of members of the Caltech Track and Field and the club (or Aereo Association of Caltech). Two introductory flight lessons, organized by graduate student Garrett Kissman, have made the opportunity available to more than 100 students. Aircraft can also take to the EI Monte/Pasadena skies (which can be quite clear) by calling Jim Kaufman, 610-383-1228.

1993 HOWARD (MS ’83) and CAROLYN (MS ’83) NOWLIN, of Aurora, Illinois, have been married since January 5, 1993. The couple met while working at Delco Electronics in Kokomo, Indiana, shortly after receiving their bachelor’s degrees from the University of Illinois. The couple currently reside in Aurora, Illinois, and have a son named Jack, born on December 23, 1993. Mr. Nowlin currently works as a software engineer for an automotive manufacturer while Ms. Nowlin is an elementary school teacher. They are both active members of their local church and enjoy spending time together outdoors, especially hiking in the nearby forests.
OBITUARIES

1923
ROBERT J. SCHONDOORN, of San Luis Obispo, California, on October 14, 1994; he was 98. He had worked for 35 years as an electrical engineer for the L.A. Department of Water and Power. He was a member of San Luis Obispo's Grace Church. He is survived by his wife, Helen.

1929
DONALD D. MAGFARLANCE, of Pasadena, on June 30, 1994. Magfarlane was employed by Pacific Telephone for 35 years.

1930
ROBERT H. BUNGY JR., of Glendale, California, on November 10, 1994; he was 86. In 1939 he was a second lieutenant in the U.S. Coast Artillery Reserve, he joined Standard Oil at El Segundo. In 1935, he installed a refinery for Refineries, and a storage tank in Wyoming, the first refinery in the Persian Gulf to process Arabian crude oil. Then he built tank farms on facilities and storage tanks on Coysin (now El Sal) in 1939. In 1930 he served as San Francisco office, he negotiated contracts and scheduled construction. In 1940 he transferred to the U.S. Army Signal Corps, and worked with producer-director Daryl F. Zanuck preparing training films for the military. During World War II, he joined the Army Engineers, negotiating with BechtelMcCone-Pierce Company to design, construct, and operate a refinery in Alaska. Yulon Territory to supply high-octane aviation gasoline to the Pacific. Later, promoted to lieutenant colonel, he spent a year at the University of Montana and had been a Rhodes Scholar nominee from Montana. He was a Democratic Party candidate for Congress in the western Montana district in 1950 and 1952. He is survived by Louise, his wife of 47 years; three daughters, Mary Gaylord Patinrn, Mildred Susan Fitzgerald, and Margaret Piisswell; and six grandchildren.

1941
DANIEL S. HAMWAY, MS, of Atascadero, California, on October 1, 1994; he was 77. A veteran of World War II and a survivor of Pearl Harbor, he retired from the rank of major. He founded the Hamway Company, a manufacturer of industrial chemicals, and provided over it until 1979. After retiring, he volunteered to serve as business manager of Trinity Episcopal Parish, in Menlo Park, California. He is survived by his wife of 48 years, Ulte Carter, whom he had met in the Fiji Islands during the war; his children, Geoffrey, Pamela, Alison, Gregory, and Melinda; three sisters and two brothers; and three grandchildren.

1944
ROBERT H. LEWIS, CAVU, on July 11, 1994. He was a one of a group of students during World War II who received certification after completing an accelerated training course in meteorology, and then enlisted in his group as Ceiling and Visibility Unlimited. He is survived by a son, Dan.

1948
EDWARD G. WHEELER, Esq, of Bond, Oregon, on April 12, 1994. He is survived by his wife.

1951
THORNH J. BUTLER, of Las Vegas, on September 26, 1996; he was 60. He received his medical degree from Stanford in 1955, interning at the University of Iowa hospital, and completing his internship at the Massachusetts General Hospital in Boston. He served as a major in the Air Force Reserve from 1956 to 1966—he spent five years in Japan, where he directed a laboratory responsible for water pollution research. He is survived by his wife, Barbara; five children, Geoffrey, Mary Gaylord Patinrn, Mildred Susan Fitzgerald, and Margaret Piisswell; and six grandchildren.

1954
SAM HAMWAY, MS, of Lawrence, Kansas, on July 2, 1994; he was 78. He was a graduate of West Point, he received three years in the University theater, when he received two Baccalaureate; he held the rank of colonel when he enlisted in military service. In 1975 he took over management of Montana and had been a Rhodes Scholar nominee from Montana. He was a Democratic Party candidate for Congress in the western Montana district in 1950 and 1952. He is survived by Louise, his wife of 47 years; three daughters, Mary Gaylord Patinrn, Mildred Susan Fitzgerald, and Margaret Piisswell; and six grandchildren.

1962
ANNA HAGAN McCONE, of San Francisco, passed away January 12, 1994.

1966
ALAN SWEENEY, of Washington, D.C. Sweeney came to Caltech as a visiting professor in 1949, and joined the faculty in 1950. During the depression of the 1930s, Sweeney became interested in the role of population growth in the Keynesian theory of employment and income, and wrote several articles on the subject. In the late 1960s, he returned to the study of the economic and social implications of population, and began teaching a course at Caltech on population problems. Sweeney also served as the director of Caltech's population program from its beginning.

1970-1994
Alan S. Sweeney

1978
EDWARD G. WHEELER, Esq, of Bond, Oregon, on April 12, 1994. He is survived by his wife.

1980
A. (Willy) Fowler, of Las Vegas, Nevada, died on March 14 at the age of 83. He was admitted to the California Bar, and served as president from 1953 to 1971, when he retired. Von Hagen's ties to Caltech came initially through his father-in-law, Ralph Lloyd, a Caltech trustee from 1939 to 1952. Von Hagen joined the Caltech Associates in 1947 and was elected a Caltech trustee in 1955. He became a Contributing Life Associate in 1957, and a Life Trustee in 1991. Von Hagen was involved in a range of civic activities, serving a term on the California Institute of the Arts (CalArts) board of trustees. He was a director of the Endowment of the Claremont Colleges, a founding fellow of the Huntington Library, and a life member of the L.A. County Museum of Art.

1994
Richard R. Von Hagen, a member of the Caltech Board of Trustees since 1955 and a Contributing Life Member of the Caltech Associates, died on September 11, 1994. He was 83. Born in 1911, in Hendricks, Minnesota, Von Hagen earned his BA from UCLA in 1931. In 1946 he graduated master's degree in business administration, and he was admitted to the California Bar, and served as president from 1953 to 1971, when he retired. Von Hagen's ties to Caltech came initially through his father-in-law, Ralph Lloyd, a Caltech trustee from 1939 to 1952. Von Hagen joined the Caltech Associates in 1947 and was elected a Caltech trustee in 1955. He became a Contributing Life Associate in 1957, and a Life Trustee in 1991. Von Hagen was involved in a range of civic activities, serving a term on the California Institute of the Arts (CalArts) board of trustees. He was a director of the Endowment of the Claremont Colleges, a founding fellow of the Huntington Library, and a life member of the L.A. County Museum of Art.

In the business world, he served as president and a director of the Oil Producers Agency of California, and as a director of the Western Oil and Gas Association, the Independent Petroleum Association of America, the U.S. National Bank of Portland, Oregon, and the Security Pacific Corporation. In addition to the California Bar, Von Hagen was a member of the Los Angeles County Bar Association. In 1956, he married Lulu May Lloyd, daughter of Caltech trustee Ralph Lloyd. Lulu Von Hagen was the "Los Angeles Times" Woman of the Year in 1962. In 1975 she was elected CalArts' first trustee emeritus. The couple had two children: Ronald Lloyd Von Hagen and Theressa Lloyd Von Hagen Bucher.
In this issue

Arati Prabhakar, PhD '85, left Caltech determined not to do "that stuff" any more. So what's she doing as head of NIST?

A physicist who came in from Cold Fusion, Steven Koonin '72 is named the Institute's seventh provost.

Move over Steven Spielberg. For more than 30 years, Caltech had its own ET.

The newly appointed Alumni Relations Task Force gets down to work.

Page 2

Page 10

Pages 12 and 13