CALTECH NEWS

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Beckman Foundation contributes $5 million for lab devoted to chemical synthesis

Synthetic chemists' rapidly increasing power to tailor-make complex chemicals with great precision has led the Arnold and Mabel Beckman Foundation to contribute $5 million toward a new laboratory at Caltech, devoted to advancing chemical synthesis.

"Caltech is in the fortunate position of having some of the finest chemists in the world on its faculty, at a time when a remarkable renaissance in chemistry is under way," said President Marvin L. Goldberger. "This gift by Arnold and Mabel Beckman will enable our synthetic chemists to apply themselves wholeheartedly to this renaissance. The resulting advances should profoundly affect all of society."

New catalysts, microelectronics, drugs, and transport systems, and novel materials and tools for biological manipulations should be typical of the products of the research.

To be opened in the spring of 1985, the laboratory will house five research groups and provide instrumentation for other synthesis-oriented researchers in the Division of Chemistry and Chemical Engineering.

The goal will be to advance the science of constructing chemical compounds for use in the food, drug, and chemical industries, and in research laboratories. Some potential examples: molecules that can snip apart DNA at specific points for use

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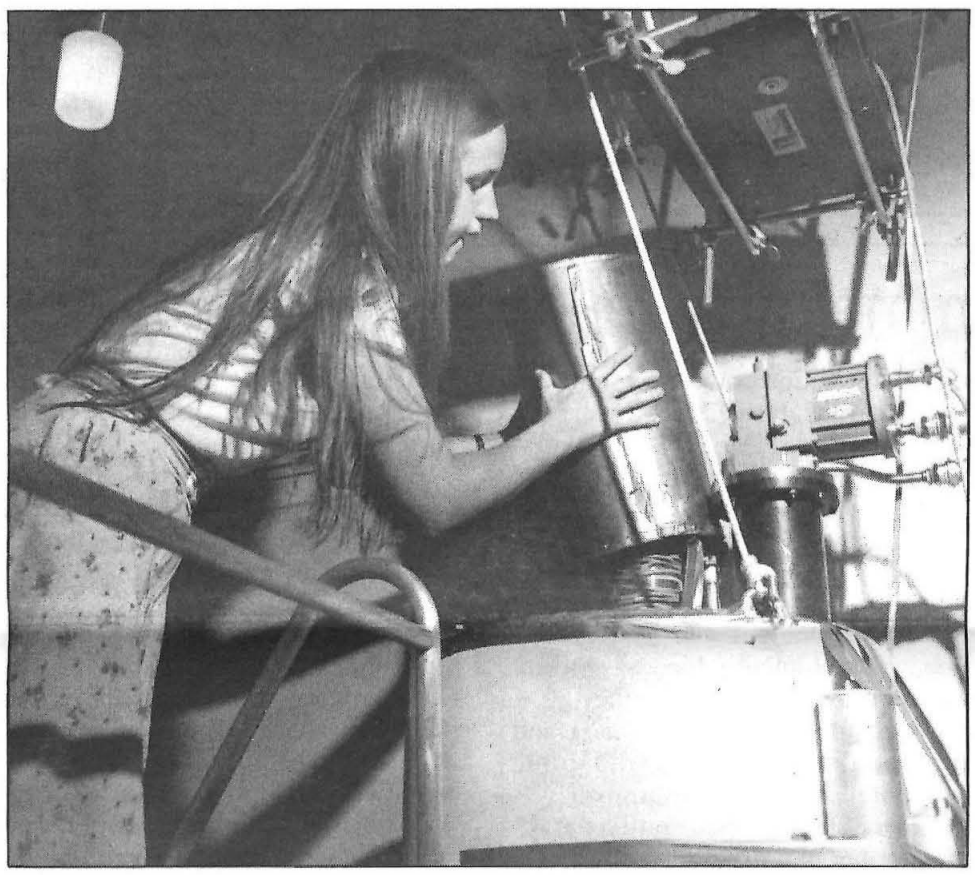

Karla Peterson, a Caltech senior, spent her summer on a SURF project aimed at learning more about the magnetic properties of the biologically precipitated iron oxide crystals that are found in the heads of many magnetically sensitive animals (monkeys, mice, pigs, and dolphins, for example), and also in humans. Here she assembles a computer-controlled demagnetization apparatus that is used with a biological superconducting magnetometer in Caltech's biomagnetic clean lab. Peterson helped to put this system together in order to examine the magnetic properties of the iron oxide crystals. Her goal: to extract and characterize the crystals in human tissues. She explains that this is a first step in understanding why humans synthesize and precipitate the crystals, and what implications they may have for long-term exposure to high magnetic fields.

SURF brings everyone to the winner's stand

By Winifred Veronda

A game where everybody wins could never have made the Olympics. But everyone connected with Caltech's SURF program was on the winner's stand: the Institute, its professors, and especially 107 undergraduates who spent the summer learning about the glories — and the traumas — of conducting independent research.

SURF, short for Summer Undergraduate Research Fellowships, completed its sixth season in August, as the students filed their final reports on ten weeks of research and prepared to present seminars on their findings.

Over the summer, they worked in labs under the guidance of faculty members who had endorsed their proposals and who provided lab space, computer time, and supplies. Some 25 percent of them would publish papers in scientific journals, several would continue their research after the summer's end, for credit or pay, and some might look back on work that triggered a grant, providing their professor with support for continuing investigation on the project that the student initiated.

The great majority (95 out of 107) worked in labs on the campus. But ten SURF fellows were at JPL this summer, one was at IBM, one at Woods Hole Marine Laboratory, and one participated in a program sponsored by the Harvard Medical School-MIT consortium.

Although it officially began in 1979, SURF has its roots in a tradition of independent research at the Institute that goes back to the 1920s. Shortly after his arrival as the first chairman of Caltech's Division of Chemistry, A. A. Noyes introduced undergraduate research into the curriculum for third-term chemistry students, with Nobel laureate Linus Pauling (PhD '25), then a student himself, directing them.

Undergraduate research surged again in the 1970s with National Science Foundation grants, but, as federal dollars dwindled and restrictions tightened in the 1970s, Caltech withdrew from the NSF-sponsored program and began SURF. The project was the brainchild of Fredrick H. Shair, professor of chemical engineering, and Harold Zirin, professor of astrophysics and director of the Big Bear Solar Observatory.

SURF continues under Shair's supervision and is designed to give students the closest possible parallel to what they will experience later in research laboratories.

This means submitting proposals for funding (this year, SURF students received stipends of $2,800 to support room, board, and personal expenses, and — for those on financial aid — a portion of their next year's tuition), working independently, and presenting seminars on their findings. In this endeavor, they receive help from Jeannie Cass, wife of assistant professor of environmental engineering Glen R. Cass, who has worked for the last two years

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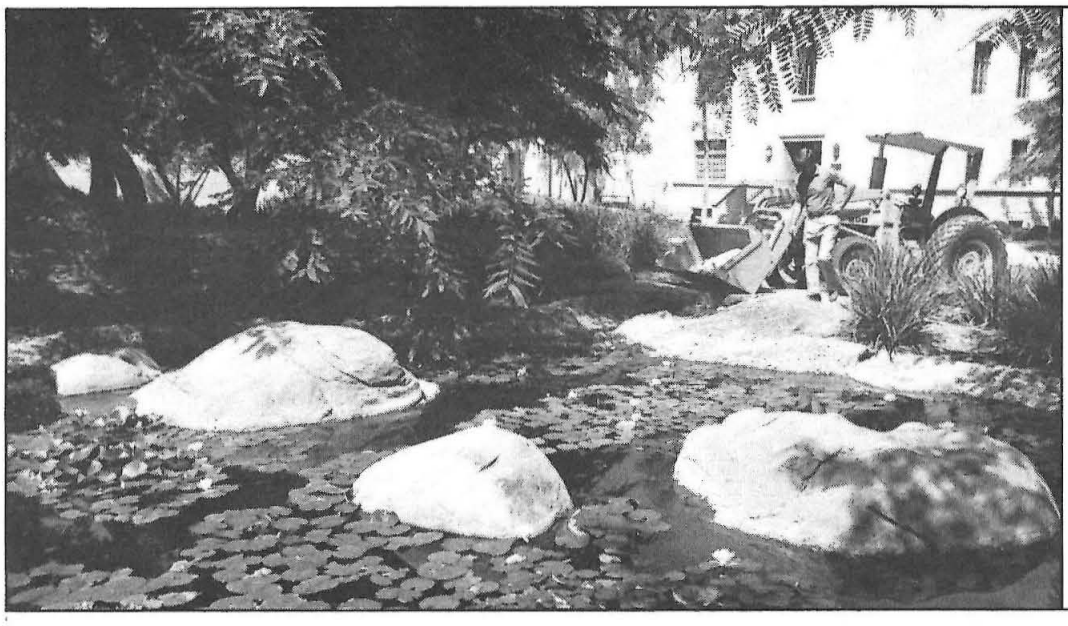
Real boulders are coming to the Throop site



These artificial rocks will remain, but most of the artificial stones at the Throop-site garden area will be replaced over the next several months by real boulders of geologic significance — some of them 1.6 billion years old and weighing up to 10 tons. The project is a cooperative one between Caltech geologists and the Institute's physical plant department.

SURFers savor summer of independent research

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with small groups of SURFers, counseling them on the presentation of technical information to a general audience.

This summer, SURF roundtables were a program innovation, as men and women from a variety of professions, some of them alumni, met with about 12 students weekly for lunch to share information. The general theme of the roundtables was "Personal Leadership in an Organization." Robert L. Shafer, a nationally known industrial consultant, was the first discussion leader.

Students could also take part in a noon seminar series, featuring topics ranging from Professor of Theoretical Physics Roger Blandford on neutron stars to Shirley Thomas, technical writer and consultant, on "The Written Report" or Thomas R. McDonough, lecturer in engineering, on "How to Give a Seminar."

In putting together a first-year budget of $36,000 in 1979, Shair garnered financial support from Samuel P. Krown, now chairman of the SURF board, that enabled the Institute to fund the research of 18 students. Then came contributions from Carnation Research Laboratory, Ford Motor Company, General Motors, IBM, the O.K. Earl Corporation, and several private donors. By 1984, the program, with a budget of almost $309,000, could support 107 students.

For the SURF fellows, (many of whom could have worked elsewhere for more money), the stipend means ten weeks of intense, focused work, with semi-weekly reports ("they hit the ground running," says Shair), and (in the words of a student who spent most of his day watching a small magnetic stirring device rattling at the bottom of a pyrex beaker) "discovering whether you want to sit in a lab for the rest of your life."

For faculty members, the program means the chance to probe a new research area that has interesting potential. This summer, 39 percent of the faculty in science and engineering worked with a SURF student. Says Shair, "The most difficult money for a faculty member to find is seed money without strings that can be used to test an untried problem. SURF helps the faculty member take a risk."

When a student decides to apply for a SURF, she or he generally approaches a faculty member about an area of mutual interest. The faculty member suggests a body of reading material, and the student returns with a specific idea, asking for the professor's endorsement.

Is there any danger that a faculty member, eager to explore a new area, might contribute too much to the proposal and thus curb student initiative?

No, says Shair. "For this program to work," he observes, "both faculty and student have to get excited about the project. Student motivation is the driving force. Student excitement is what keeps the program green."

As SURF has increased in popularity, the quality of student proposals has risen. "Faculty members are screening out bad proposals before they come to the SURF committee," says Shair. "They're looking for people with skills and drive. This year, we received 124 applications, we have 107 participants, and we turned away 10 proposals that were good enough to qualify if we had had the funding."

One of those accepted, Praveen Asthana, is working at IBM with a Caltech graduate on a project entitled "Acousto-Optic Experiments and Modulation with BSO Crystals."

His project sets a precedent for what Shair hopes might become an important part of SURF: Caltech students working in industry. Another extension of the program is represented by a student from Haverford College who spent the summer at Caltech as a SURFer. "An exchange network would give students from other universities an excellent opportunity to spend a summer here and to see how they would feel about doing graduate work at the Institute — and for Caltech students to have the same opportunity at other universities," says Shair.

Two who were able to take advantage of such an opportunity this year were James Dunn, who participated in a Harvard Medical School-MIT consortium for undergraduates that admits only one out of every 200 applicants, and Anirvan Ghosh, who worked at the Woods Hole Marine Laboratory.

Students who have spent a SURF summer agree that "this was an excellent way to get exposure to laboratory experience and to see how research people live." Said one, "One thing I learned is that their wives and husbands tend to complain that they don't spend enough time at home."

Noted another, "During the school year, people tell me what to do. During the summer, I thought about what I needed to do, and when I needed help, I asked for it from people more experienced than me. The pressures on me were self-created, rather than imposed by other people."

Said another, "The SURF program gave me the opportunity to work closely with a faculty member, and to be treated like a colleague," while a student observed that "research is fun, but it's frustrating sometimes. It goes slower than you think it should." One commented that "just as I would get comfortable with my information, I would walk into the lab and realize how little I knew."

As one faculty member points out, "We ask our undergraduates to do a lot of studying, and sometimes they don't see the point of it all. But when they actually get involved in research, then they understand." And, as Shair comments, "A tremendous integration of knowledge takes place in the students over the summer. They get a much better perspective of what their courses are all about. I hope that, eventually, we can make a SURF available to every sophomore and junior who has the initiative, and the capacity, to profit from one."

Chemical synthesis focus of new lab

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in genetic engineering; molecules that can home in on a specific tissue target in the body, carrying medicine or diagnostic substances; catalysts able to convert simple chemicals like carbon monoxide and hydrogen to more complex and valuable compounds; and enzymes specially engineered to possess useful properties not found in nature.

Creating the 33,000-square-foot facility will involve the linking up and modernizing of two existing buildings: the Crellin Laboratory and the Church Laboratory, at the west end of the campus.

The renovated structure will contain offices, laboratories, conference rooms, and an instrumentation center for the Institute's growing complement of sophisticated analytical equipment. Total cost, over the next five years, of establishing and operating the laboratory will be approximately $15 million.

The founder and chairman of Beckman Instruments and chairman emeritus of Caltech's Board of Trustees, Beckman launched his company in 1935 with the development of a pH meter, now an indispensable tool for analytical chemists. The firm went on to become a major international manufacturer of instruments and related products for medicine, science, industry, environmental technology, and many other fields. In 1982, the company merged with SmithKline Corporation to form SmithKline Beckman, one of the world's leading health care and life science companies.

Beckman received his BS and MS degrees from the University of Illinois and his PhD degree from Caltech in 1928. He was a member of the chemistry faculty at the Institute until 1940, when he left to devote full time to his firm.

In 1980, his friends endowed the Arnold O. Beckman Professorship of Chemistry at the Institute as "a continuing public tribute to his leadership." In May, the Institute conferred on him its highest honor, the Distinguished Alumnus Award.

Beckman married the former Mabel Meinzer of New York in 1925. Other Caltech buildings made possible by the Beckmans are Beckman Auditorium and the Mabel and Arnold Beckman Laboratories of Behavioral Biology.

Three Caltech faculty members elected to AAAS

Three Caltech faculty members have been elected fellows of the American Association for the Advancement of Science (AAAS), in recognition of "their distinguished efforts on behalf of the advancement of science or its applications."

They are Norman H. Brooks (PhD '54), the James Irvine Professor of Environmental and Civil Engineering and director of the Institute's Environmental Quality Laboratory; Andrew P. Ingersoll, professor of planetary science; and Hans W. Liepmann, the Theodore von Kármán Professor of Aeronautics and director of the Graduate Aeronautical Laboratories of Caltech (GALCIT).

Brooks has been director of EQL since 1974 and is responsible for developing many of the concepts used throughout the world for wastewater and cooling-water dispersal in the ocean.

Ingersoll, a member of the scientific team that managed the Voyager 1 and 2 rendezvous with Jupiter and Saturn, is using satellite data to study the atmospheric conditions of those planets, and to investigate the weather and climate of Mars and Venus. His analysis of data from the Voyager and Pioneer probes have revealed new information about the composition and evolution of Jupiter and Saturn and about their weather patterns.

Liepmann has conducted internationally recognized research in fluid mechanics and is one of the world's foremost contributors to the field of modern aviation. The Institute's executive officer for aeronautics, he was appointed director of GALCIT in 1972, named the Charles Lee Powell Professor of Fluid Mechanics and Thermodynamics in 1976, and the von Kármán Professor in 1983.

Charles Babcock appointed vice provost

Charles D. Babcock (MS '58, PhD '62) professor of aeronautics and applied mechanics at Caltech, has been named vice provost, President Marvin L. Goldberger has announced.

Babcock's research has concentrated on understanding the failure of structures and has been applied in the aeronautics, nuclear, marine, and civil engineering fields. He was named a research fellow in aeronautics in 1962 and an assistant professor in 1963. In 1968, he became an associate professor and, in 1974, a full professor.

He is currently vice chairman of the Caltech faculty and has served as president of the Caltech Employees' Federal Credit Union. He has handled many other administrative duties for the Institute, including service on committees on graduate and undergraduate academics and student life.

Babcock has been a visiting professor at the Technical University in Copenhagen, Denmark, and served as head of the Earthquake Hazards Mitigation Program with the National Science Foundation. He has worked extensively on committees of the American Institute of Aeronautics and Astronautics.

A train ride with Willy Fowler

Bay Area Associates Hiltgund and Walton Wickett with Caltech's Nobel laureate William A. Fowler in front of the Wicketts' compressed-air locomotive. The Wicketts hosted 127 Bay Area Associates at their home for cocktails and dinner on July 8. A highlight of the occasion was a ride on the locomotive in the Wicketts' back yard with railroad buff Fowler.

Caltech to develop portable scanning device for geologists

Thanks to a grant from the W. M. Keck Foundation, Caltech geologists of the future will carry portable scanners that will enable them to scan the spectra of rocks at wavelengths outside the spectral range of human vision. The computerized device will allow them to identify instantly the minerals in rock formations by calling up standard spectra from its memory for comparison.

The foundation has awarded a grant to Caltech to develop the device, which will draw on new technology to enhance the usefulness of remote-sensing satellites, such as the Landsat series.

"The system will represent a breakthrough in applying remote-sensing technology to geologic mapping and exploration for minerals," according to Arden L. Albee, professor of geology and a leader in developing the scanner.

"For the first time, geologists in the field will have a way to verify directly the interpretation of satellite remote-sensing data," Albee says.

Alexander F. H. Goetz of JPL is the other team leader. The instrument will be constructed at the lab over the next two years.

The device will scan wavelengths between 0.4 and 2.5 micrometers — the region spanning the ultraviolet, visible, and infrared — at which many minerals have characteristic spectra. A displayed spectrum can be identified by comparing it with standard spectra called up on the the screen from the microcomputer's memory.

Salary offers to Tech EE, CS grads: 7 percent above national norm

Caltech students graduating in June with BS degrees in electrical engineering and computer science received salary offers 7 percent higher than the national average for those fields ($28,680 compared with $26,500),according to Sally J. Asmundson, director of the Career Development Center. The highest offer, however — for $37,728 a year — was to a mathematics major who took a job in industry. Students trained in computer science and electrical engineering continued to be most in demand, in line with a trend across the country.

Of the 213 June BS degree recipients, 83 had accepted full-time career positions by August 1 and 100 were going on to graduate school, while 31 opted for a variety of other plans, including travel. Among the graduates, 11 had not reported their plans.

Two of the graduating seniors are spending a year abroad on Watson Fellowships — one studying mime in Paris and in Bali, Indonesia, and the other studying artistic traditions in Bali. Three graduates will attend medical school, and a fourth will enroll in medical school in 1985, after a year of research. One plans to enter a PhD program in clinical psychology.

Two are starting their own companies (one in software and another in computer products to support musicians). A physicist who wanted to live and work in another country has accepted a job in Sweden.

Up this year was the demand for chemical engineers, as nine graduates in this field reported nine job offers. Last year, three students graduating in chemical engineering reported four job offers.

Of the 147 students graduating with MS degrees, 88 (61 percent) went on to graduate school — most of them at Caltech. Thirty-nine (21 percent) took jobs, most of these in electrical engineering. The average salary offer to Caltech graduates with MS degrees in electrical engineering was $32,000 — 6 percent higher than the national average.

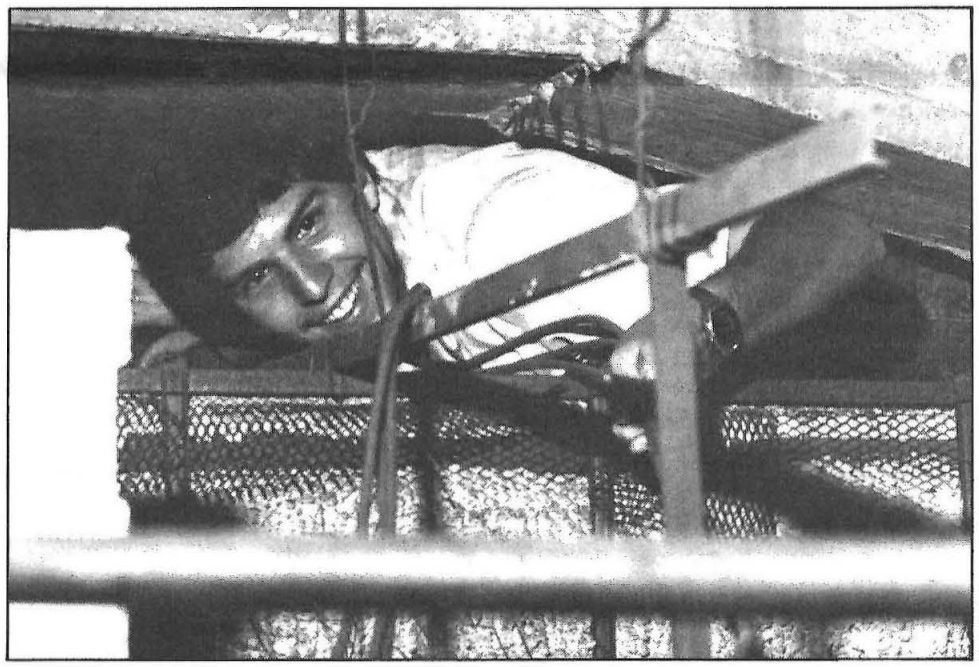
Of the 125 individuals graduating with PhD degrees, 42 (34 percent) took jobs in industry, and 75 (61 percent) accepted academic positions — 57 of these as postdoctoral fellows and 18 with professorial appointments in teaching or research. Several PhD candidates went into business for themselves.

PhD candidates entering industry could command salaries ranging from about $37,000 to more than $43,000, with the total number of offers up significantly from 1983. Those taking professorial appointments could anticipate annual salaries of around $36,000 a year, while those involved in postdoctoral research drew salaries ranging from $14,000 to $32,000, with most positions paying less than $20,000.

A record number of companies interviewed on campus this year (214 compared with 167 the previous year), raising the number of job offers to graduating students to a record high. Among these firms were 31 that had not recruited on campus before. Last year, 123 job offers were extended to students graduating with BS degrees; this year, BS-degree graduates reported 181 offers. For MS-degree recipients, there were 33 job offers last year compared to 56 this year, and for PhDs, there were 62 offers in 1983 compared with 99 in 1984.

Asmundson attributes the increase in offers to an improvement in the economy, to increasing efforts on the part of the Career Development Center to attract more firms to campus for interviews, and to efforts of the center to prepare students to embark on a job search with greater sophistication.

Students find selves in tight spot during summer project



Junior Greg Gallaugher explores a little-known nook of Ricketts House as he lays cable that will connect the house with the campus computer network, ETHERNET. Over the summer, the network was expanded to include the student houses, with students installing the cable and outlets.

Use of computers at Caltech has expanded dramatically over the past year. Some 250 new workstations or personal computers have been delivered, either for undergraduate use or for faculty members who are developing software to be used in classes.

A key to student use of the computers is the campus ETHERNET, which has been expanded to the student houses. For awhile, it seemed very difficult and expensive to lay cable in the houses — especially in the older ones, which were built when mammoth beams and thick walls were the rule.

But a solution soon became apparent: Use students. After all, over the years, they've explored all of the possible and most of the "impossible" crawl ways into the houses.

Thus two students per house were hired over the summer, and by the beginning of classes, almost all of the rooms had been given outlets to the network. These can be used either for a student-owned computer or for one of a pool of portable computers that the Institute has created. Explains Professor of Theoretical Physics Geoffrey Fox, who is dean for educational computing, "We view a portable computer like a book. You can check it out to do your homework and then return it."

Leroy Hood recipient of 3M Life Sciences Award

Leroy E. Hood is the 1984 recipient of the 3M Life Sciences Award, administered by the Federation of American Societies for Experimental Biology (FASEB). The award is presented annually to "an individual who has contributed to the welfare of mankind by conducting research in life sciences that has significantly increased scientific knowledge."

Hood is the Ethel Wilson Bowles and Robert Bowles Professor of Biology and chairman of the Division of Biology at Caltech. He is known for his studies of the vertebrate immune system and for the development of sensitive biological instrumentation.

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4Shooter system renders Hale telescope most powerful in world

Astronomer James Gunn adjusts the 4Shooter electronic imaging system before its installation in the 200-inch Hale Telescope.

The 200-inch Hale Telescope, the largest in the United States, has been rendered by far the most powerful astronomical instrument in the world by the addition of a new electronic imaging system.

The system, a new light detector called the 4Shooter, increases both the telescope's field of view and its sensitivity and has already enabled the instrument to see fainter objects than have ever been detected by a ground-based instrument.

In early tests of the detector, astronomers imaged objects of 26th magnitude, or roughly 200 million miles fainter than can be seen by the naked eye.

The 4Shooter began regular operation late this spring after four and a half years of development by its designer, Princeton University astronomer James E. Gunn, former professor of astronomy at Caltech.

The heart of the imaging system is four square arrays of electronic light-sensing components called charge-coupled devices, or CCDs. These change light energy into packets of electrical charge, which can be transformed into digital data that are stored on computer disks.

The CCD arrays used in the 4Shooter are each 800 by 800 units in size. They were manufactured by Texas Instruments for use in the Space Telescope Wide Field/Planetary Camera that is being built at Caltech, but were rejected because of minor flaws. Despite the flaws, and because such large CCD arrays will remain extremely rare, Gunn decided to take advantage of them for the new imaging system.

When the 4Shooter — a large, white cylinder weighing 1.5 tons — is installed at the Cassegrain focus of the Hale Telescope, the image that enters the instrument is split into four parts — each representing one-quarter of the telescope's field of view — by a four-faced pyramidal mirror.

The mirror reflects each of these parts into one of four cameras, which consist of an optical system that focuses the light onto one of the CCD arrays. The signals from these arrays are transformed into digital data, from which the astronomers can reconstruct the astronomical image, manipulating the information to enhance these images.

The 4Shooter cameras also feature a series of colored filters that can be rotated into place to allow atronomers to obtain images in the red, green, and infrared regions of the spectrum.

In contrast to previous detectors and photographic plates, which require considerable manual adjustment and handling, the 4Shooter can be operated totally from the control room of the Hale Telescope. Typically, images from the telescope are displayed on a television monitor as the astronomers conduct their observations.

Over the next year or so, the 4Shooter will become a "5Shooter," as Gunn designs another CCD unit that will be used to analyze the spectrum of light from astronomical objects. In this system, a special pyramid containing a small slit in one of its faces will be mounted in place of the solid pyramidal mirror.

To obtain a spectrum of a distant galaxy or star, astronomers will center the object's image on the slit and the light will pass through the slit and through a transmission grating underneath. Here the light will be separated into its spectrum of colors. The spectrum will be directed into the fifth CCD camera, mounted beneath the original 4Shooter.

Development of the instrument was funded by Caltech and NASA, and the 4Shooter was constructed in the shops of Caltech's Division of Geological and Planetary Sciences.

Carver Mead receives Pender Award

Carver A. Mead, the Gordon and Betty Moore Professor of Computer Science, is recipient of the Harold Pender Award of the Moore School of Electrical Engineering of the University of Pennsylvania.

The award is presented annually to an engineer who has achieved distinction through significant contributions to society.

Mead was chosen for "insight into the potential of VLSI (Very Large Scale Integration), his development of techniques for VLSI technology, and his contributions to the state of the art in this field."

Geneticist Scott Emr named Searle Scholar

Scott D. Emr, 30, microbiologist and geneticist, is one of 20 outstanding biomedical researchers throughout the country to be selected as a Searle Scholar. Assistant professor of biology at Caltech, Emr will receive a grant of $157,000 over three years to support his research on the dynamics of protein delivery and distribution within complex cells, called eukaryotes.

The normal functioning of eukaryotic cells depends on the efficient delivery of protein molecules (including enzymes) to specific subcellular compartments, called organelles. Using yeast cells as their laboratory subject, Emr and his research team will be investigating how certain proteins are sorted and then targeted for delivery to their correct organelle destinations. Their research is also aimed at understanding the causes of breakdown in the delivery system — a condition that characterizes a number of genetic disorders, including many that affect humans.

Morari honored by AIChE

Manfred Morari, professor of chemical engineering, is recipient of the 1984 Allan P. Colburn Award for Excellence in Publications by a Young Member of the Institute presented by the American Institute of Chemical Engineers (AIChE).

Morari was cited for his "pioneering research" in the design and automatic control of chemical processes — including development of a computer program for the design of flexible energy management systems. The program has been adopted for use by several companies.

Caltech welcomes a visiting alum: Iceland's prime minister

By Phyllis Brewster

The encounter was brief, but successful. The prime minister of Iceland, Steingrimur Hermannsson (MS '52), was on a fast-paced tour of Caltech — JPL and the campus — the campus he last saw in 1952 as a graduate student in electrical engineering.

Hermannsson and his family came to Pasadena on Monday, July 30, two mornings after they had watched Iceland's 34 participating athletes march into the Coliseum in the opening ceremonies of the Olympic games. Later that day, at a luncheon in his honor at the Athenaeum, Hermannsson graciously called his visit to campus the highlight of his trip — Olympic events notwithstanding.

The prime minister was accompanied on campus by his wife, Edda Hermannsson; their 20-year-old son, Hermann; 18-year-old daughter, Hlif; 10-year-old son, Gudmundur; and Icelandic friends Mr. and Mrs. J.B. Freymodsson.

Actually, Hermannsson's visit began with a minor disappointment. While orienting himself to the changes of 32 years, he learned that Throop Hall was no longer standing. He had been looking forward to visiting his old second-floor office there, one that he shared with Albert Jackson, Steve Pardee, and Tom Connolly when they were all working on their master's degrees in electrical engineering during 1951-52.

Being married at the time, Hermannsson had lived off-campus "on one of the little streets north of San Pasqual."

A smiling Hermannsson recalled with appreciation "the very, very nice atmosphere — casual and relaxed — of the campus, and the very open communication with the professors." It had been a contrast, he said, to the more formal atmosphere of Illinois Institute of Technology, where he did his undergraduate work.

Hermannsson's almost 30-year career in the Icelandic government has taken him on a quite different course from the engineering profession he started out in — a separation over which he admits he sometimes feels a tinge of regret.

In 1952, when he returned home to Iceland from Caltech, Hermannsson worked as an engineer for the State Electrical Power Works. After a year in that job, he went with the State Fertilizer Plant as engineer. In 1954, he accepted his first government assignment — officer of the defense, Division of Ministry for Foreign Affairs. In 1957 he became director of the National Research Council, a post he held for 21 years, until 1968, when he took on the duties of both minister of justice and ecclesiastical affairs and minister of agriculture.

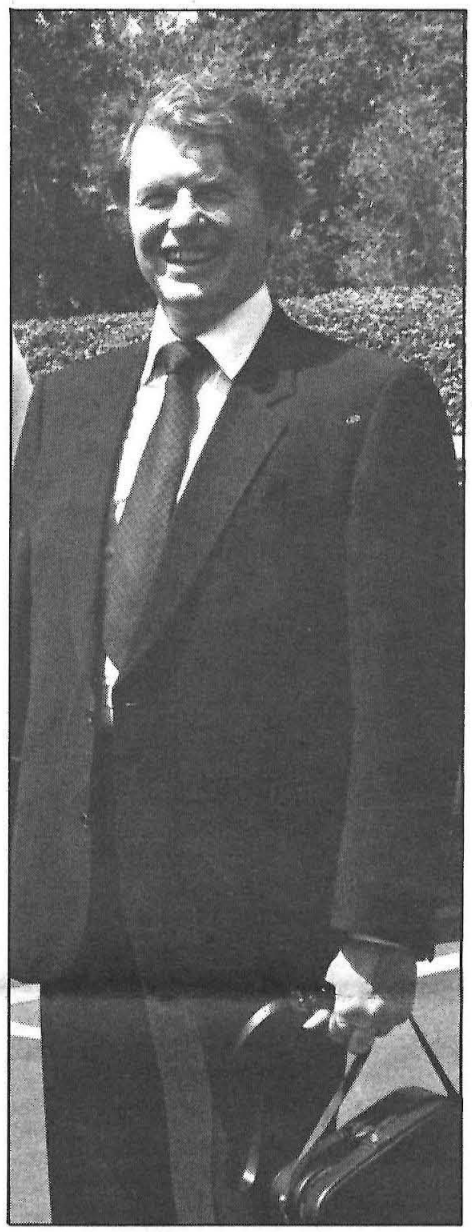
In 1980 Hermannsson was appointed minister of fisheries and minister of communications. Then, in May of last year, he was elected prime minister, heading a coalition government of the Progressive, Independence, People's Alliance (Communist), and Social Democratic parties.

The government Hermannsson heads is of a country slightly smaller than Kentucky, with a population of 234,000 — a constitutional republic with a parliament (the *Althing*) dating back to 930 AD.

Despite his heavy governmental responsibilities, he has kept time for athletics, a lifelong indulgence. A man obviously possessing, among other leadership assets, a great deal of charisma, he also appears to be in splendid physical condition, looking some ten years younger than his 55.

During his undergraduate years in Illinois, he participated in track and field, wrestling, and discus throwing. At Caltech, unable to be in intercollegiate team sports, he continued skiing (a national pastime in Iceland) and he learned a sport new to him: tennis.

Superbly at home on skis, Hermannsson sometimes went with Caltech friends to the local mountains. Officemate Jackson recalls that while the rest of them waited in line for the chair lift, Hermannsson "just took off *up* that steep slope on his downhill skis."



Iceland Prime Minister Steingrimur Hermannsson returns to the Caltech campus for a visit—his first since he completed his graduate work in 1952.

Hermannsson never stopped skiing, but after Caltech, he didn't play tennis again until last year, when he once more took to the court. "I am not expert in tennis," he says modestly.

A highlight of the prime minister's campus tour was a visit to Watson Labs, where Caltech graduate students Mark Cronin-Golomb, Steve Smith, and Kerry Vahala briefed the party on the optics and electronics research of Professor Amnon Yariv. With understandable governmental concern, Hermannsson several times asked his hosts, "What practical application does this have?"

The prime minister occasionally translated for his family, particularly for his 20-year old son, Hermann, who is studying engineering in Iceland. (An older son attended MIT, resulting in, Hermannsson says, ongoing father-son debates about which is *the* best school.)

Although the Hermannssons speak English (it is required in Icelandic schools beginning in the seventh grade), their native language is Icelandic, the closest of the Nordic languages to the Old Norse, and relatively unchanged since the 12th century. Danish is also an academic requirement in Iceland schools, beginning with the fifth grade. The country's literacy rate — 99.9 percent — is the highest in the world.

The touring Hermannssons were enthusiastic photographers on campus, but it was on the Throop site that they paused the longest, Hermannsson describing to them the building on that spot where he had spent most of a year becoming a Caltech alumnus.

In response to a question about tourism in Iceland, the prime minister said it was a growing part of the economy, now accounting for about 5 percent of the income total. Currently fish products make up about 75 percent of all exports, engaging about 13 percent of the population in fishing and fish processing. About 9 percent depend on agriculture — chiefly sheep-raising — for a livelihood, and about 28 percent on manufacturing and construction.

With a climate similar to that of the U.S. northwest, with rugged landscape, geysers and hot springs, hundreds of waterfalls streaming from glaciers and volcanic fields, and with Thingvellir National Park, historic site of the world's first parliament, Iceland might well be considered the next destination for a Caltech alumni traveling group. Where else could they have a prime minister to brief them on the basics of his fascinating country?

On the cover

SURFer Susanna Chan, a Caltech senior, examines an autoradiogram showing bands of RNA that she has synthesized. Her next step will be to introduce the synthesized RNA (through microinjection and ornithine transvection) into living cells, and to see whether the RNA will be translated into protein. If this procedure is successful, she will move on to her main objective: to introduce oncogene RNA (believed to play a major role in causing cancer) into lymphocytes (a type of white blood cell) and to study the effects.

Only at Caltech: Students create integrated circuits in freshman lab

Caltech freshmen have traditionally finished their initial year with a strong core knowledge of basic physics, mathematics, and chemistry. Now, many of them are adding to this information a sophisticated insight into microfabrication technology — including how to make an integrated circuit.

They acquire this capacity in Applied Physics 9, a lab taken by some 90 Caltech undergraduates — most of them freshmen. About half of the freshman class enrolls in one of the lab's 11 sections.

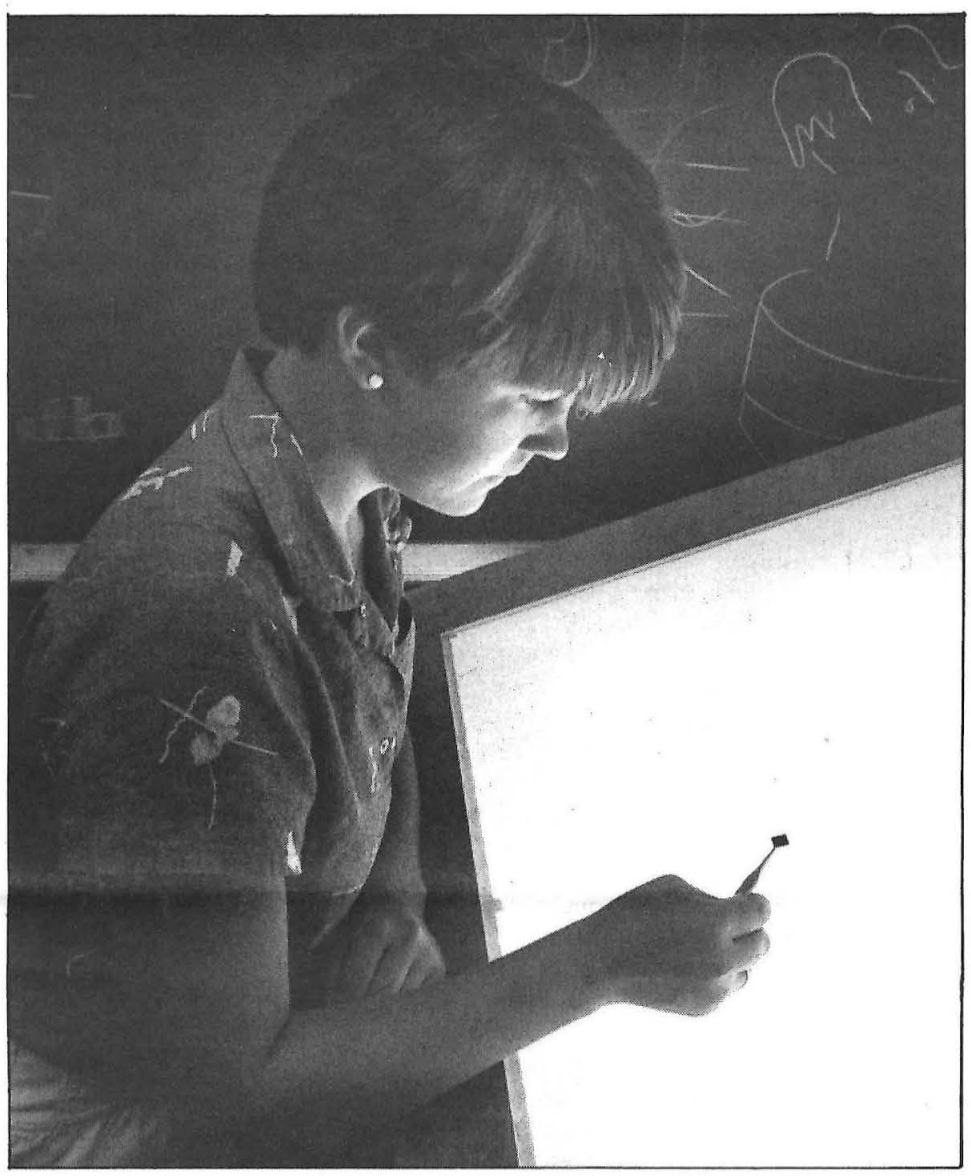
As an academic offering for freshmen, APh 9 is believed to be unique. Characteristically, universities offer similar courses only to upperclass students who plan to go on into industry.

Introducing microcircuitry technology to freshmen makes sense in an era when computers play an increasingly significant role in their lives as students, and will continue to do so throughout their professional careers, believes David Rutledge, assistant professor of electrical engineering, who teaches the lab.

"Microfabrication is a technology with many new applications, and it is changing rapidly," Rutledge says. "Future scientists and engineers will need to evaluate and to work with this technology. They will find it important to be able to assess the new developments that are taking place. A lab like this one gives them the tools to do so.

"Integrated circuits are becoming so pervasive, and microfabrication technology so powerful, that we feel this material is as important to tomorrow's applied scientists and engineers as the physics, chemistry, and mathemathics courses they take. In these times, every scientist ought to know how an integrated circuit or a transistor works."

This view is shared by Caltech undergraduates who flock to sign up for the lab, many of them planning to major in fields other than electrical engineering or applied physics. Their



In Applied Physics 9, Heidi Langeberg constructs a transistor — a step toward the creation of an integrated circuit.

enthusiasm is not surprising. Notes Rutledge: "When Caltech students use something, they want to know its fundamentals; they want to understand how it works. This is characteristic of their personalities." The lab, taken during the spring, is preceded by a lecture course during the winter quarter. It fulfills an Institute requirement for a freshman laboratory.

The lab began as Electrical Engineering 9, when Professors Floyd Humphrey and James Campbell set up experiments inspired by classroom demonstrations of Carver Mead on solid state devices. These were in Electrical Engineering 3 (later Applied Physics 3). Professor James McCaldin sculpted the lab into its present form, and Rutledge explains that it "reflects the ideas and suggestions of many of its past teaching assistants, technicians, and students. It has evolved to keep pace with a rapidly evolving field."

During 1983-84, the students taking the lab made several different diodes (semiconducting devices used as rectifiers of alternating currents) and then constructed a transistor (a device for controlling the current that flows between two circuits). During 1984-85, they will make an integrated circuit containing two to six transistors.

Rutledge explains that the students in the Caltech lab have access to technology that enables them to work through certain phases of the design project much more quickly than would be the case in a typical college laboratory.

"The computer programs are designed so that they can be learned easily. The students can learn to use the software and then they can create the graphics design for a transistor in an hour," says Rutledge.

The computer program that makes this possible was developed primarily by Carver Mead (the Gordon and Betty Moore Professor of Computer Science). Students formulate designs at a terminal on a graphics tablet, sketching components in red, green, white, and blue. The colored patterns can be moved, stretched, copied, and erased.

The alternative to this strategy would be to draw the circuits by hand — and this is tedious and time-consuming.

The lab has been generously supported by the Hewlett-Packard Corporation, which contributed instruments, computers, and gallium-arsenide substrates. This year, the class members will also have access to new Hewlett-Packard test equipment that will enable the computers to test and analyze *the circuits. Bell* Telephone Laboratories and *West*inghouse have also made contributions.

Caltech lauded for Parsons-Gates restoration

Caltech has received a Los Angeles Conservancy Preservation Award for "preservation leadership in restoration and adaptive reuse of the Parsons-Gates Hall of Administration."

Severely damaged by the 1971 earthquake, Gates Hall was initially scheduled for demolition. It was renovated in 1982-83 through gifts from The Ralph M. Parsons Foundation and The James Irvine Foundation.

Protein discovery may lead to hepatitis B vaccine

A low-cost vaccine to combat one of the world's major diseases, hepatitis B, may result from the discovery that a minor viral protein produces a powerful immune reaction to the disease in humans. The protein already offers a novel method of diagnosing the disease.

Researchers at the New York Blood Center and at Caltech have reported discovery and synthesis of the protein in an article in *Science*. The scientists are Robert Neurath and Nathan Strick of the Blood Center's Lindsley F. Kimball Research Institute and Stephen B. H. Kent of Caltech's Division of Biology.

The scientists concentrated their studies on two almost identical proteins, code-named P33 and P36, that help to make up the surface coat of the hepatitis virus. Until now, P33 and P36 have been largely ignored by researchers because they make up only a small percentage of the virus's protein coat.

However, when the researchers used protein analysis techniques to isolate the hepatitis B coat proteins, they found that P33 and P36 reacted especially strongly with hepatitis B antibodies found in humans after infection. Other tests revealed that only a small portion of P33 and P36 — a segment 55 amino acids long that is found in the major coat proteins — was responsible for the reaction. The researchers chose this portion for further analysis.

The amino acid structure of P33 and P36 was known from previous work, enabling the researchers to build and test various parts of the 55-unit segment, using protein synthesis techniques. A synthetic protein — called a peptide — representing the first 26 amino acids of the 55-unit segment was injected into rabbits. The scientists found that it induced a strong immune response, and produced high levels of antibodies in the animals.

These antibodies were isolated and added to blood samples from human hepatitis B carriers, and they reacted strongly to the hepatitis virus in the victims' blood.

"These antibodies were unusually effective in recognizing the intact virus and the virus-related particles," said Neurath and Kent. "There is no precedent for such high levels of virus-recognizing antibodies to a synthetic peptide analog of a hepatitis B virus protein."

This powerful reaction means that the peptide provides the basis for an improved diagnostic test for hepatitis B, they said, and may effectively identify the infective form of the disease.

"The animal antibodies reacted with the intact virus and the related particles so strongly that we've been able to use them to detect virus in human blood serum at a dilution of one millionfold," said the scientists.

Even more important would be the production of the peptide for use as an inexpensive, effective vaccine for hepatitis B. Such a vaccine would produce a powerful protective immune response in treated humans, enabling them to resist the disease.

Neurath and Kent have begun animal tests of the protein as a vaccine in collaboration with other scientists — experiments that should be completed in the fall. But they caution that until the results of the tests are in, the potential of the peptide as a vaccine remains in doubt.

Although a vaccine for hepatitis B already exists, it is rare and expensive because it is derived from the blood of human hepatitis B carriers. In the United States, it costs about $100 per person. But a synthetic vaccine based on the small protein could be manufactured in enormous quantities at very low cost — enough to enable mass immunizations, even in Third World countries.

Continued on page 9

Maintaining its standards, Caltech enrolls 199 freshmen

Caltech's freshman class includes 173 men and 26 women, for a total of 199 — up slightly from the 185 freshmen who entered the Institute last fall.

The Institute received applications from 1,264 students (1,060 men and 204 women) for enrollment in the fall of 1984. From this group, the class of 1988 was chosen.

In 1982-83, as the last of the baby-boom generation reached their 20s, Caltech began to feel the impact of a shrinking applicant pool and, in 1983, admitted its smallest freshman class since 1970.

Faced with increasing competition for top students, Caltech has elected to admit fewer students rather than to lower its standards. Thus freshman classes for both 1983 and 1984 have been as intellectually impressive as always, with SAT scores in the top two percent in the nation.

Realizing the necessity to compete more aggressively for students than in the past, the Institute has revised its recruitment publications, added new ones, and is expanding alumni involvement in the recruitment process. The literature stresses the Institute's new educational computing program and other programs of special interest to prospective freshmen. A new brochure, "Meet the Caltech Challenge," triggered a request for application forms by more than 2,000 high school students — most of them seniors — by mid-July, an indication of the interest generated by the publication.

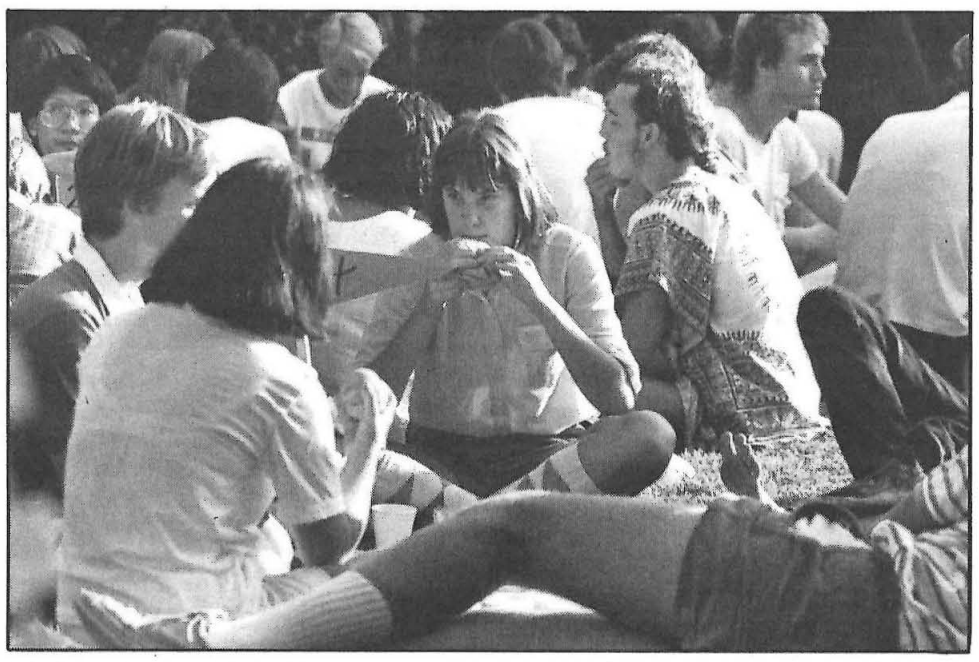
"We believe that the turndown in applications has stabilized," said Stirling L. Huntley, director of admissions.

In addition to the 199 freshmen, 32 transfer students entered the Institute this fall. Among these are a 28-year-old married woman who completed her freshman and sophomore years at Santa Monica City College, two men from the U.S. Naval Academy, one of whom was at the top of his class as a sophomore, and a student who lived for a time in a Vietnam refugee camp.

Computer-related projects continue to dominate as extracurricular science projects among the incoming students, in place of the diverse hobbies and activities once typical of young people admitted to Caltech. This increases the difficulty in evaluating prospective freshmen with respect to scientific creativity.

Of the class members, 33 percent are from California, and 15 percent are from other Western states. Sixteen percent come from the Midwest, 10 percent from the South, 19 percent from the Northeast, and 7 percent from overseas schools. Among these are students from Singapore, Greece, Canada, India, West Indies, Dominican Republic, Yugoslavia, Canada, Belgium, and Colombia.

Freshman picnic brings new friends together



Food, and conversation with new acquaintances, marked the freshman picnic on the lawn of Caltech President and Mrs. Marvin L. Goldberger's home the evening before departure to Freshman Camp.

Steel industry's inefficiencies a "dead-weight drag" on economy, Caltech author contends

The U.S. steel industry's inability to operate efficiently and competitively acts in a dangerous way to destabilize the economy, contends Caltech economist Burton Klein in his latest book. Klein recommends drastic action to deal with the "contagious disease" that this situation produces.

Among these actions: total abolition of all protection against foreign steel, and either paying an outright subsidy to U.S. steel companies to cushion their demise, or encouraging companies to shrink more rapidly by subsidizing retirement at age 45 and retraining younger workers.

Klein (professor of economics, emeritus) offers this prescription in his book, *Prices, Wages, and Business Cycles* (Pergamon Press), in which he analyzes the impact of noncompetitive industries on the economy.

His basic thesis is that firms in industries that lack significant challenges become overcentralized, inflexible, and incapable of dealing with negative feedback. Instead of dealing with risks, they can transmit these risks to the public at large — especially if they are aided by the federal government.

According to his calculations, the steel industry alone had as large an impact on increasing manufacturing costs during the 1970s as did OPEC. Steel and several other basic industries provided a source of "dead-weight drag" for the economy by generating a series of artificial shortages, he asserts.

The associated price shocks were highly destabilizing because they occurred mainly during periods of economic recovery, when the price increases for steel rose by more than 10 percent annually. These cost increases forced the government to take drastic monetary action to bring inflation under control.

Besides steel, which has been increasingly protected since the 1960s, other industries that make substitute products, such as those of aluminum, concrete, and wood, have been protected indirectly, says Klein, and their price behavior has closely followed that of steel.

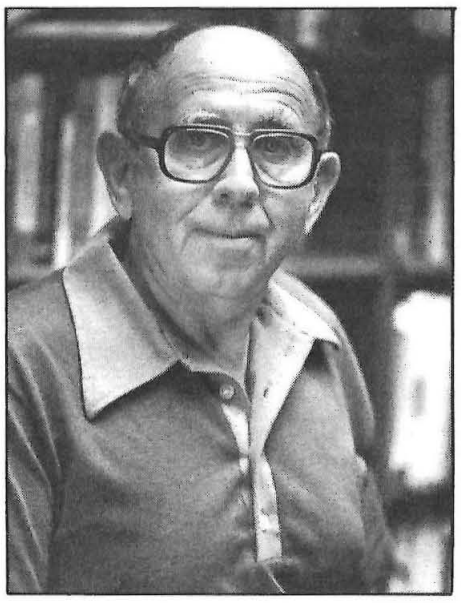
According to his statistical analysis, the growing intensity of these price shocks has been the principal cause of the increasing severity of downturns that began in 1970. Contrary to conventional wisdom, pressure for higher wage rates has not been an important factor, except to the extent that industries able to increase prices most rapidly also have experienced the most rapid increase in wage rates.

"The unwillingness of policymakers to face up to the microfacts of life has resulted in a serious dilemma," says Klein. "When the Federal Reserve Board acts too hastily to choke off incipient inflation, it risks the prevention of a recovery. If it acts too late, it almost certainly will bring on a serious downturn."

According to Klein, a basic cause of the increasing economic instability is the extent to which various private interest groups have been able to enlist government to exempt themselves from risk taking. For example, he says that for years it has been accepted policy for the government to exempt farmers from taking risks. Additionally, utility companies have no real incentive to restrict cost increases when they build nuclear power plants, because they are able to transmit the risk-taking function to the public at large.

And as the steel industry has become more and more protected, says Klein, it has acquired assets in other industries, rather than modernizing its own plants.

Finally, he cites restrictions on Japanese auto imports, which he says have had the effect of making both Japanese and American cars more plush and expensive, while permitting U.S. automobile executives to direct action far from the scene of battle, and to earn eight times the salary of their Japanese counterparts.



Burton Klein

The real danger, though, warns Klein, is that the United States is developing a private welfare state, one based on private ownership, so that a form of capitalism is preserved, but because it uses public means to minimize private risk-taking, a form that borrows the substance of socialism.

Says Klein, "It is ironic that the argument made for extending the private welfare state is the necessity to remove the U.S. economy from the destabilizing influence of foreign competition — because the truth is precisely the opposite."

Klein's analysis shows that during the 1970s, those industries most challenged by foreign competition had gains in the rate of output only about 10 percent below the 1960s. But those industries least challenged experienced growth of output about 40 percent lower. To explain this paradox, Klein cites the price behavior of the firms: Those most challenged by foreign competition raised their prices at only half the rate of those least challenged.

Price constraint is connected with productivity because if firms are to keep their price increases in check and not go out of business, they must find ways to keep costs from escalating. This means not only the acceptance of lower wage increases, but also a wider search for productivity gains, Klein says.

"The elements of luck and necessity play a role in determining which industries will benefit from a wider search. But the data made very clear that most industries subjected to greater pressures to restrain price increases gained remarkably in their rates of productivity performance, in terms of both labor and capital inputs. Several of these industries doubled or tripled their rates of productivity gain, in comparison with the 1960s.

"Conversely, almost all of the industries that were least inhibited in raising prices allowed their productivity performance to deteriorate. In fact, the inflationary price shocks in manufacturing and the decline in the productivity rate in manufacturing as a whole are the same problem."

Caltech discovery may trigger hepatitis B vaccine

Continued from page 8

Additionally, traditional vaccines may have a short shelf life, and may offer some risk of causing the disease themselves. Both these problems could be avoided with the use of a synthetic vaccine consisting only of a chemically synthesized viral protein segment that could not cause an infection.

Hepatitis B is one of the world's major health problems. There are about 600,000 carriers of the disease in this country, and some 200 million in the world. The disease is a major cause of premature adult death in Asia and Africa and is linked to liver cancer. Because of this link, the wide use of a synthetic hepatitis B vaccine would also eradicate human liver cancers associated with the disease.

FOCAL sponsors panel on "book trade"

The Friends of Caltech Libraries (FOCAL) will sponsor a panel discussion, "The Book Trade," at the Athenaeum in late October, featuring as participants a book seller, a book reviewer, and a publisher. Millicent Braverman of the KFAC radio show, "A Word on Books," will be the moderator. Call 795-4692 for the date, and to make a reservation.

A first without fanfare:

Carole Hamilton heads Alumni Association

By Winifred Veronda

Carole Hamilton decided to become a chemist when she was a little girl in Butte, Montana. In those days, her image of a scientist was that of "someone in a white coat, standing in front of a bench with a lot of strange-shaped glassware on it."

Was she ever given the message that it was inappropriate for a little girl to aspire to become a scientist?

"If the message was there," she says, "I never heard it. But then, this has been the story of my life."

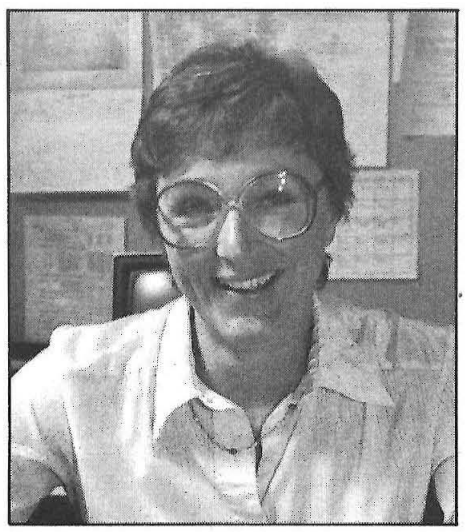
Hamilton pursued her goal as an undergraduate at Colorado State University — Colorado A & M when she was a freshman. Here she was one of a handful of women students. She graduated with high distinction. During her junior year she heard for the first time from a friend who had come to Caltech for graduate work about a small, select, scientific institution in Pasadena. "It's a good place," he told her. "You ought to apply."

She followed his suggestion and enrolled in 1958 as an organic chemist in John Roberts' group. She was the only woman graduate student in chemistry at Caltech at that time (undergraduate women were not admitted then), and one of only a handful of women students at the Institute. "We were so diluted that we rarely saw each other," she says, "but I don't remember feeling any discomfort over the situation."

After earning her PhD in 1963, Hamilton stayed on at Caltech as a postdoc. By this time, she had met and married a fellow graduate student in chemistry, Charles Hamilton, now a senior research associate in biology at the Institute.

After Charles Hamilton received his PhD in 1964, the couple went to Stanford, he as an assistant professor, she to be successively a research fellow, lecturer, and instructor. During the Hamiltons' last three years in Palo Alto, she ran Stanford's introductory chemistry laboratory classes — work that pointed her toward "management kinds of things with a logistics challenge."

Back at Caltech in 1971, Hamilton joined the staff of the Environmental Quality Laboratory, where she did fuel and energy conservation studies. Her husband became a member of Roger Sperry's research group, studying brain hemispheric specialization. In 1974 she transferred to JPL, and



Carole Hamilton

her preoccupation with logistics evolved into a full-time concern.

Today she is supervisor of the Radio Science Systems Group of the Telecommunications Systems Section in the Telecommunications Science and Engineering Division — a role that makes her supervisor to ten engineers. The group supports Voyager and Galileo projects, and the International Solar-Polar Mission, and conducts scientific investigations based on Voyager and Pioneer-Venus data.

At JPL she has been a member of the director's Ad Hoc Technology Committee on Energy Conversion, a member of the Technical Professional Women's Ad Hoc Committee, and a lab-sponsored delegate on a China study tour for U.S. women scientists.

Hamilton became involved in Alumni Association activities in 1974 as the result of a chance meeting with Arthur Spaulding (BS '49, MS '58) on a transcontinental flight. They talked about Caltech and he asked her to join the board. She accepted, and became the first woman to serve in this role. There was no comment among alumni regarding this innovation — "at least," she says, "none that I noticed."

She served for three years and returned for a second term on the board in 1980. This year she became the Association's first woman president — another first without fanfare.

"The Alumni Association is very satisfying to work for and to be part of," she says. "The members are interesting and fun, and it's rewarding to do service for the Institute."

As a priority during her term as president, Hamilton hopes to expand the involvement of Caltech alumni around the country and the world, and to develop a "strong network" of alumni in "the field" who can function autonomously. "We've been rather provincial," she says, "too concentrated in southern California. We're continuing with an ad hoc committee, formed two years ago, that seeks ways to help alumni in other places to do things together. The committee is developing a chapter handbook, an aid to groups of alumni in other places who want to take advantage of staff services and to identify programs of interest to them."

As another way to expand the role of volunteers outside the local area, Hamilton would like to see more alumni involved in the undergraduate admissions process. "With a small applicant pool, the competition for good students is very fierce," she says. "Alumni are a powerful asset for making potential applicants aware of Caltech and what an exciting place it is."

She is also interested in expanding alumni travel programs, and in organizing trips around special interests in addition to geology. And core programs will continue to be emphasized. "They're strong and well attended," she says, "and we want them to continue that way."

Active within the Caltech community in other capacities, she has been chairman of the Board of Directors of the Caltech Y and an officer in the governing committee of the Children's Center for Caltech families. She is a member of the American Chemical Society and Sigma Xi.

The Hamiltons have two children, Catherine, 15, and Christopher, 13. At their home in Altadena, family members are "busy with autonomous activities" — Carole Hamilton's often involving photography or "playing with a home computer."

"Chuck is an avid bird watcher," she says, "but our patience doesn't equal his." The family's favorite retreat is on the South Carolina coast near Georgetown. Here they spend time together each summer at an oceanside site where "life is governed by the tide tables and nothing else."

Carole Hamilton's childhood image of what it means to be a scientist has undergone quite a few transformations, as has her professional career. What has not changed is her competence at any task she undertakes. Says Alumni Association colleague William Karzas (BS '49, PhD '55), "She's unflappable and always on top of things. Nothing seems to interfere with her judgment. She has a strong commitment to the Alumni Association. I expect her to do a good caretaking job for the association and also to be an innovative president."

Carole Hamilton was featured in this picture on the cover of June 1963 Engineering & Science *with Caltech President Lee A. DuBridge (left) and H. F. Bohnenblust, professor of mathematics and dean of graduate studies (right). A record number of graduate students received doctorates from Caltech that year — 87 men and three women.*

Stan Holditch guides Fund through "Final Challenge"

G. Stan Holditch (BS '48), national Alumni Fund chairman, sometimes tells people that he was "born in Disneyland." Actually, he grew up in the country, between Anaheim and Placentia, long before Disneyland entered the picture.

The son of a Canadian-born engineer who was the superintendent of an irrigation company that seemed to strike oil more often than water, Holditch was consistently exposed to the technology of the oil industry as he grew up. This may have been a reason why he gravitated toward a technical career.

He attended Science Day at Caltech his junior year — an event held annually in those times to give high school students exposure to the Institute and the work in its laboratories. He was impressed with what he saw, and he enrolled in the fall of 1940 to major in chemical engineering.

"We've been doing so well that we have to run fast just to stay in the same place."

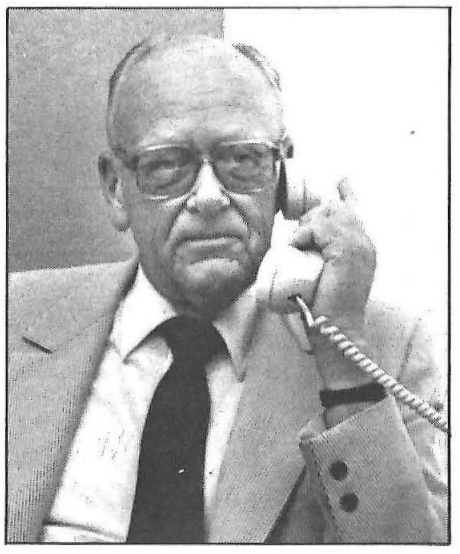
Holditch became a member of Fleming House and quickly involved himself in campus activities. He earned a letter in football, and an honor key as a student body officer, and he was a member of the Beavers, a service organization. Classes were a little hectic during the war years that quickly followed, as instructors passed rather rapidly through the Institute on their way to other assignments. "For a while, I think my physics teachers changed every six weeks," Holditch says.

During World War II he saw service in the Air Corps as a communications officer and a "skipper on a crash boat."

During the war years he married Joan Copeland, a graduate of Pomona College, whom he had met when he was a Caltech student.

Back at Caltech after the war's end, the couple lived on Oakland Avenue in a house that had belonged to Holditch's grandfather. It became a favorite meeting place for students — popular because of the Holditches' company — and because of the freedom it offered from on-campus regulations about beer drinking.

After graduation in 1948, Holditch began a 31-year career in manufacturing with Procter & Gamble. He worked for the firm in Long Beach, Kansas City, St. Louis, Cincinnati, Chicago, Dallas, Baltimore, Boston, and New York City before retiring in 1979 at age 55 from the position of manufacturing division manager in Cincinnati. That year the family returned to southern California, where both he and Mrs. Holditch had family members — including his now "97-year-old mother who still goes about calling on old people."



G. Stan Holditch

Four children were born to the Holditches during the years with Procter & Gamble. Their oldest, a daughter and mother of two, is now earning her PhD in medical research at the University of Connecticut. A second daughter and her husband are ministers and counselors to students at Princeton. Their only son recently began his medical practice in Cincinnati, and their youngest daughter is a supervising nurse at Massachusetts General Hospital in Boston.

Back in the Los Angeles area, Holditch became a corporate relations associate, working as a volunteer with the Caltech development office to interest corporations in expanding their support for the Institute.

Meanwhile, his former Fleming House roommate, Harry J. Moore, Jr. (BS '48), who is vice chairman of the Irvine Challenge Campaign, asked him to help with the Alumni Fund telephone program, and he rapidly found himself promoted to national Alumni Fund chairman, with responsibility for general Fund programs and procedures — including the solicitation of more than 12,000 alumni.

(Special gifts and reunion gifts are handled separately. George Solomon, MS '50, PhD '53, takes responsibility for solicitation of gifts between $5,000 and $10,000, Andrew B. Campbell, BS '46, for gifts between $1,000 and $5,000. Gordon Barienbrock, BS '58, coordinates class reunion gift efforts.)

Holditch acknowledges that he has accepted his role at a difficult time. "Caltech is third in the country in percentage of alumni who give to an alumni fund," he says. "We are surpassed only by Dartmouth and Princeton. We set records again this year for dollars raised and for number of workers. We've been doing so well that we have to run fast just to stay in the same place."

This year is the third year of the Irvine Challenge Program, through which the Irvine Foundation matches, up to agreed limits, increases in total contributions from alumni over the previous year for each of three successive years. This, the last of the three-year program, has been designated as "The Final Challenge."

The Irvine Foundation has allocated up to $440,000 in matching gifts to Caltech, Holditch notes, and Caltech has earned slightly more than half of this amount. During this year, workers will attempt to bring in the rest.

To help achieve this goal, Holditch and his Fund colleagues plan some innovations. Two new gift clubs have been created, with those contributing $1,000 and more designated as Golden Beavers, and those contributing $200 and more as Second Century Club members. Contributors at these levels will receive special recognition.

To achieve the man- and woman-power to make all the necessary contacts, he hopes to increase the number of workers in last year's campaign (1,127) by at least 5 percent.

All of this adds up to a significant challenge and a lot of work. Why does Holditch find the effort so worthwhile?

"There are three reasons," he says. "I feel a significant debt to Caltech for the outstanding education it gave me, and for the edge my education gave me in the business world.

"Also, it's exciting to be associated with other Caltech alumni, and to renew old acquaintances. But perhaps most important, I feel I'm making a significant contribution to the future by supporting the research that's going on at Caltech today."

"Torchbearers" honors estate-plan donors

This fall the Institute is initiating a new program to recognize alumni and other friends of Caltech who have provided for the Institute in their wills or through the creation of a life income trust. Such donors will be designated as "The Torchbearers of Caltech."

"We thought 'Torchbearers' was appropriate," said Ed Baum, senior development officer in charge of the program, "because those who support Caltech with these gifts help to pass on the torch of knowledge symbolized in the Caltech seal."

Bequests and life income trusts (arrangements that pay the contributors or their designated beneficiaries a lifetime income with certain tax benefits) have become increasingly important to the Institute in recent years, Baum said, and "we want to show our appreciation in this way to those who remember Caltech."

The Institute will start with the recognition of those who have already created life income plans and who have notified the Institute that it is included in their estate plans. Individuals interested in obtaining more details may contact Baum at (818) 356-6307 or write to:
The Torchbearers of Caltech
California Institute of Technology
1-36
Pasadena, California 91125

[The Way It Was]

1920

Herbert Hoover for president as the candidate of engineers is proposed by Frank Olmstead, former city engineer of Los Angeles, in an address at Throop Polytechnic College. The time has arrived, says Olsmtead, "when the lawyer and purely politician should step aside for the practical man in the management of this great republic," according to the *Star-News* on February 2.

President James A. B. Scherer, in a special assembly, announces that the trustees at their annual meeting have changed the name of Throop College to the California Institute of Technology, and that Pasadena Hall will be known as Throop Hall. The trustees felt impelled to make the change because "recent developments have transformed the school from a college of primarily local significance to a scientific school of national importance," says Scherer. Built in 1910 at a cost of $169,000, Pasadena Hall is one of the most imposing college buildings in the west, observes the *Star-News* on February 21.

No worthy student will be kept out of CIT because of the tuition increase beginning September 1, says President Scherer. New tuition is $200 a year, payable in three installments. "Any student who cannot pay has only to come to me in person and I will see to it that some means are devised to meet his emergency," the *Star-News* notes on March 1.

Robert A. Millikan, director of physical research at CIT, announces modifications in engineering and physics courses that will lay stress on fundamentals in math, physics, and chemistry, and sacrifice to some degree emphasis on technical work, reports the *Star-News* on March 21.

1950

The Christmas vacation work of Caltech students pays off as the Institute's first Rose Bowl float rolls down Orange Grove Boulevard on January 1. The float is primarily the work of nine students — Mike Sellen, Robert Cobb, Richard Libbey, Anthony Malanoski, Dallas Peck, Peter Price, Noel Reed, Henry Clutz and Ronald Willens — according to *Engineering & Science*. The theme, "New Frontiers," features Palomar Observatory.

Richard P. Feynman joins the faculty as professor of theoretical physics, *E&S* reports in October. He comes to Caltech from Cornell University, where he has been a member of the Laboratory of Nuclear Studies since 1945. According to President DuBridge, his appointment means that "the Institute now has a well-rounded team of some of the ablest experimental and theoretical physicists in the country."

Robert Sharp, professor of geomorphology, is selected by *Life* as one of eight great teachers of 1950. Says *Life*: "To keep in shape for his back-packing geology field trips, Professor Sharp jogs around the cinder track almost every day that he is on the Pasadena campus. Few of his students ever go this far, but Sharp's enthusiasm is contagious, and his sophomore geology course is one of the favorites. . . . It is credited with attracting many unsuspecting students into the lifetime study of geology."

1974

Billed as the celestial spectacle of the century, Comet Kohoutek has failed rather badly to live up to its advance notices. But for astronomers at the Hale Observatories, the comet provides some dramatic photographs and a lot of scientific information, according to February *E&S*.

For the first time, Caltech scientists have been able to predict the time and location of a sizable earthquake in California, relates *E&S* in May. The quake, which occurred at 10:05 p.m. on January 3, 16 miles east of Riverside, registered 4.1 on the Richter scale. Only the magnitude is amiss; James Whitcomb, senior research fellow in geophysics, and his colleagues, had predicted a magnitude of 5.5

A gigantic mural-photograph of scientist-astronaut Harrison Schmitt on the moon is one of the many features of the newly dedicated Seeley G. Mudd Building of Geophysics and Planetary Science — new home for programs in the disciplines carried in the building's name, relates *E&S* in November.

The ASCIT musical, "Kiss Me, Kate," plays for two nights in April to sold-out houses. Probably the most sophisticated musical ever attempted by Tech undergraduates, the production uses a cast of 40, according to *E&S* in May.

A pristine strip of new sidewalk at the southeast corner of Dabney Hall acquires a bit of graffiti, notes June *E&S*. Not the typical "Frank loves Angela" inscription, this one gives Einstein's tensor equation for gravity.

Letters

In the August *Caltech News*, you list Caltech participants in the Olympics, and request that if you missed anyone, "please let us know."

Because you have included Jimmy Lu Valle (PhD '40), who did his undergraduate work at UCLA and did not compete after he came to Tech, I would also suggest Duncan McNaughton, MS '34 who got a gold medal in the high jump in 1932. He represented Canada in the games, but was a graduate of USC before coming to Tech. Thus he competed on his home field (the Coliseum) in the Olympics.

If memory serves me correctly, Glenn Graham (BS '26), actually tied Lee Barnes for first place in the pole vault. In those days, I don't think ties were broken by number of misses, nor were duplicate medals awarded. What I think I remember is that they flipped for the medal, and Graham lost. I clearly remember the comments of Coach Fox Stanton on that pole vault competition. Certain vaulters who had much better records than either Graham or Barnes went out at lower heights. According to Stanton, the vaulting at Paddock Field with its poor runway and vaulting box made Graham able to cope with the poor conditions in Paris when better vaulters could not. (Lee Barnes was just out of Hollywood High School, and probably vaulted under poor conditions, too.)

Sincerely,
Robert W. Wislon, B.S. '30

36 Caltech alumni honored by IEEE

The Institute of Electrical and Electronic Engineers (IEEE) is honoring 1,984 living members with Centennial Medals in celebration of its first century, and 36 Caltech alumni are among the honorees. The medal recipients are those members judged to have made the greatest contributions to the electrical engineering profession, to the society, or both.

The alumni recipients are: Morton M. Astrahan (MS '46), Werner Buchholz (PhD '50), Lee W. Casperson (MS '67, PhD '71), Arthur N. Chester (PhD '65), Peter O. Clark (MS '61, PhD '64), Richard C. Eden (MS '62), Fred H. Eisen (BS '51), Harry M. Ellis (MS '48, PhD '51), Fred B. Hagedorn (PhD '57), Marion E. Hines (BS '40, BS '41, MS '46), Jack C. Hoagland (BS '42), Floyd B. Humphrey, (BS '50, PhD '56), John Jackson (MS '40).

Edgar L. Kanouse (MS '34), William A. Lewis (BS '26, MS '27, PhD '29), John C. Marshall (BS '49, MS '51), Gordon E. Moore (PhD '54), Frank Offner (MS '34), Bernard M. Oliver (MS '36, PhD '40), William H. Pickering (BS '32, MS '33, PhD '36), John R. Pierce (BS '33, MS '34, PhD '36), Louis T. Rader (MS '35, PhD '38), Simon Ramo (PhD '36), Herbert E. Rauch (BS '57), Irving S. Reed (BS '44, PhD '49), William Shockley (BS '32), Frank C. Smith, Jr. (BS '44), George Solomon (MS '50, PhD '53), Richard I. Tanaka (PhD '58), John W. Thatcher (BS '28, MS '30), J. Earl Thomas (PhD '43), Kiyo Tomiyasu (BS '40), Charles H. Townes (PhD '39), Victor A. Van Lint (BS '50, PhD '54), Robert W. Wilson (PhD '62).

If your address has changed since publication of the last Alumni Directory in 1981, it is important that you return your change of address card to the Alumni Association promptly in order to assure that your address is correct in the 1985 edition. Mail your change of address card to:

Caltech Alumni Association
1-97
Caltech
Pasadena, CA. 91125

1984-85 Alumni Activities

Additional events will be announced throughout the year.

October

October 6 — Water polo in the Caltech pool, 10 a.m. Varsity versus alumni with refreshments afterward in the Alumni House.

October 11 — Luncheon for Santa Cruz-area alumni, 12 noon, Hollins House, Pasatiempo Golf Course. Contact Don Cleveland for reservations.

October 18 — Luncheon for San Francisco-area alumni, 12 noon, Ming's Restaurant, Palo Alto. Contact Hugh Dubb for reservations.

November

November 3 — Marine biology trip with Wheeler J. North, Caltech professor of environmental science, 10 a.m. to 3 p.m. Meet at 9:30 at the Balboa Pavilion for boat boarding.

November 8 — Luncheon for Santa Cruz-area alumni, 12 noon, Hollins House, Pasatiempo Golf Course. Contact Don Cleveland for reservations.

November 10 — Parents' Day and Interhouse, the Caltech Campus.

November 10 — Basketball on the campus, varsity versus alumni at 2 and 4 p.m., with refreshments afterward at the Alumni House for participants and their families.

November 15 — Luncheon for San Francisco-area alumni, 12 noon, Ming's Restaurant, Palo Alto. Contact Hugh Dubb for reservations.

December

December 13 — Luncheon for Santa Cruz-area alumni, 12 noon, Hollins House, Pasatiempo Golf Course. Contact Don Cleveland for reservations.

December 20 — Luncheon for San Francisco-area alumni, 12 noon, Ming's Restaurant, Palo Alto. Contact Hugh Dubb for reservations.

January

January 1 — Annual Rose Parade Special. Continental breakfast at the Athenaeum, 7:30-9:30 a.m.; walk to Colorado Boulevard and view the parade from reserved seats, 9:30-11:15 a.m.; buffet luncheon in the Athenaeum or bus to the Rose Bowl with box lunch, 12 noon. Prices to be announced.

January 10 — Luncheon for Santa Cruz-area alumni, 12 noon, Hollins House, Pasatiempo Golf Course. Contact Don Cleveland for reservations.

January 17 — Luncheon for San Francisco-area alumni, 12 noon, Ming's Restaurant, Palo Alto. Contact Hugh Dubb for reservations.

February

February 14 — Luncheon for Santa Cruz-area alumni, 12 noon, Hollins House, Pasatiempo Golf Course. Contact Don Cleveland for reservations.

February 21 — Luncheon for San Francisco-area alumni, 12 noon, Ming's Restaurant, Palo Alto. Contact Hugh Dubb for reservations.

March

March 8 and 15 — Wine tastings, featuring California wines in a program by Bruce Hotra of Huntington Market. Reception, 8 p.m., program at 8:30.

March 14 — Luncheon for Santa Cruz-area alumni, 12 noon, Hollins House, Pasatiempo Golf Course. Contact Don Cleveland for reservations.

March 21 — Luncheon for San Francisco-area alumni, 12 noon, Ming's Restaurant, Palo Alto. Contact Hugh Dubb for reservations.

March 24-30 — Caltech Glee Club tour of Portland, Oregon, and Washington. Dates and locations of concerts to be announced.

April

April 11 — Luncheon for Santa Cruz-area alumni, 12 noon, Hollins House, Pasatiempo Golf Course. Contact Don Cleveland for reservations.

April 18 — Luncheon for San Francisco-area alumni, 12 noon, Ming's Restaurant, Palo Alto. Contact Hugh Dubb for reservations.

May

May 5 — Laguna chapter meeting, Leisure World, Laguna Hills. Program by the Caltech Glee Club.

May 9 — Luncheon for Santa Cruz-area alumni, 12 noon, Hollins House, Pasatiempo Golf Course. Contact Don Cleveland for reservations.

May 16 — Luncheon for San Francisco-area alumni, 12 noon, Ming's Restaurant, Palo Alto. Contact Hugh Dubb for reservations.

May 17 — Reunion, class of 1959, Caltech campus. Details to be announced.

May 18 — Seminar Day, the Caltech campus. Details to be announced.

May 31 — Half Century Club reunion, the Caltech campus. Details to be announced.

June

June 1 — Half Century Club reunion continues. Details to be announced.

June 13 — Luncheon for Santa Cruz-area alumni, 12 noon, Hollins House, Pasatiempo Golf Course. Contact Don Cleveland for reservations.

June 14 — Commencement, the Caltech campus.

June 20 — Luncheon for San Francisco-area alumni, 12 noon, Ming's Restaurant, Palo Alto. Contact Hugh Dubb for reservations.

June 20 — Alumni Association annual meeting and honorary dinner. The Athenaeum.

Caltech-MIT business clinic for entrepreneurs launched by IRC

A new program series in which the head of a technology-based company presents his firm's business plan to a panel of experts will be inaugurated on the campus on October 16. Called the Caltech-MIT Enterprise Forum, the entrepreneurial business clinic is sponsored by the Caltech Industrial Relations Center and the MIT Alumni Association. The format was initiated on the MIT campus and is being expanded because of its success. Both Caltech and MIT alumni will be featured in the series.

Louis Villalobos, president of Conographic Corporation, will present his firm's business plan at the first forum. Villalobos, an MIT graduate, heads a company that markets and manufactures graphic hardware and software products for the IBM PC.

The forum will be at 7 p.m. in Baxter Lecture Hall and will be preceded at 6 p.m. by refreshments and an opportunity for "networking." Admission is $10.00.

Purpose of the forum is to assist hi-tech entrepreneurs by offering them the opportunity to present their firm's business strategies to technical experts, members of financial and professional service firms, and other experienced entrepreneurs. A discussion open to all attendees will conclude each program.

Forum activities are open to anyone interested in technology and business development. Interested persons are invited to contact Nick Nichols, Caltech (818) 356-4049.

Caltech graduates on the organizing committee for Enterprise Forum are Frank Bumb (BS '51, MS '52), president, the Kennedy company; Phillip G. Cook (MS '50), president, Phillip G. Cook, P. E. Inc.; Raymond Feeney (BS '75), executive vice president, marketing, Spectra Image; Glenn F. Hightower (BS '72, MS '73), president, APh Corporation; and Philip M. Neches (BS '73, MS '77), vice president and chief scientist, Teradata Corporation.

1984-85 Alumni Fund Council

Members of the 1984-85 Alumni Fund Council at the Alumni Leadership Conference during August: Alan Beagle (BS '70), Chris Dalton (BS '56), Bob O'Connell (BS '51), Thor Hanson (BS '64), Carl Constanten (BS '72, MS '73), Don Stewart (BS '47), Martin Poggi (BS '37), Bob Brydolf (BS '44), Carleton Moore (PhD '60), Ron Findlay (BS '64), Ted Grinthal (PhD '69), Stan Holditch (BS '48, national Fund chairman), Harry Moore (BS '48, vice chairman of the Irvine Challenge Campaign), and Lee Carleton (BS '33, 1983-84 national Fund chairman).

Alumni Fund honors top volunteers

Alumni Fund area chairmen Gene Dryden (BS '55, MS '56) and Donald Stewart, Jr. (BS '47) received top honors for overall achievement during 1983-84 at the Alumni Leadership Conference on the campus during August. Dryden, a new area chairman, received a Rookie-of-the-Year award for obtaining gifts from 71 percent of the alumni in his region of San Marino. With ten volunteers, Dryden boosted participation by 11 percent.

Stewart, in the Pomona-Claremont area, working with five volunteers, earned a Pro-of-the Year award for increasing participation to 96 percent (a 22 percent increase).

Thomas R. Thompson (Eng '63) was honored for achieving a high percentage of participation (78 percent) in his region of Newport Beach (075) — as were Alfred P. Fay (BS '48) of TRW (71 percent) and Robert E. (Ed) Foss (BS '32) of Rancho Santa Fe, 71 percent.

David B. Atkinson (BS '75) was recognized for his success with a low ratio of volunteers-to-prospects in Oklahoma-Arkansas (14 volunteers for 63 prospects) as were Philip G. Cook (MS '50), Downey-Whittier (13 volunteers for 70 prospects), and Thomas R. Thompson (Eng '63), Newport Beach (075), (14 volunteers for 87 prospects).

Honored for increasing the number of volunteers in their areas were Raymond L. Heacock (BS '52, MS '53), JPL (from 11 to 28 volunteers); John A. Morgan (BS '45), South Laguna Beach (from 0 to 12 volunteers); and Frederick W. Thiele (BS '41) and Gilbert B. Peppin (PhD '53), Seattle, from 5 to 20 volunteers.

The 65 area chairmen who came for the program toured the campus and visited the laboratory of Mary Kennedy, assistant professor of biology, for a presentation. Sally Asmundson, director of Caltech's Career Development Center, spoke at noon on "From Placement Service to Career Development Center."

Leadership conferences for Alumni Fund area chairmen were also held in Washington, D. C., and in San Francisco during September.

Legends of Caltech available for gifts

A few copies of *The Legends of Caltech*, a collection of the best of Caltech pranks, contributed by alumni and published by the Alumni Association, is available for purchase. If you missed your chance last Christmas, here's another. Send a $9.00 check or money order, payable to the Caltech Alumni Association, to *Caltech Alumni Association, 1-97, California Institute of Technology, Pasadena, CA 91125.*

Personals

1926
HAROLD W. LORD, consulting electrical engineer in Mill Valley, California, has received the 1984 Society Achievement Award of the Magnetics Society of the Institute of Electrical and Electronic Engineers, and the Institute's Centennial Medal for his "distinguished contributions both to the field of magnetics and to the Institute."

1930
O. FRANKLIN ZAHN, writes from Pomona, California, where he has worked as a carpenter for many years, "At the age of 76 I have published my first book! The autobiography tells of Caltech days, of course." In *Deserter from Violence: Experiments with Gandhi's Truth*, Zahn, a religious peace activist who became interested in pacifism as a Caltech undergraduate, chronicles his experience in putting Ghandian nonviolence into daily practice in his life.

1942
EVERETT W. VAN NESS, president of the Lektos Company, an engineering consulting and marketing firm based in Aurora, Ohio, has been named a Fellow of the American Institute of Chemical Engineers in "recognition of his work in the management of engineering construction projects, both in the United States and abroad."

1951
ALBERT SIEGEL, PhD, professor in the department of biological sciences at Wayne State University in Detroit, has received the university's Distinguished Graduate Faculty Award for 1984 for "recent distinguished scholarly achievement in research, publication, and teaching which has contributed significantly to the reputation of Wayne State's graduate program." He and his wife, Betty, have four children and are living in Detroit.

1958
RICHARD J. WALKER (formerly PATCH), MS, PhD '64, writes from Bethel Park, Pennsylvania, where he is a mechanical engineer with the U.S. Department of Energy, "I married Rhonda Hill on February 19, 1983."

1963
WILLIAM C. GIAUQUE, associate professor of business management at Brigham Young University in Provo, Utah, has been appointed director of the university's Master of Business Administration program.

1964
THOR P. HANSON, senior research engineer with Westhollow Research, Shell Oil, writes from Houston, Texas, "For the past 14 years I've been working for Shell Oil in Houston at their research center. I'm married with three stepchildren — ages 6, 7, and 9. When not coaching soccer, baseball, or being a cub scout den mother, I run marathons (PR-3:09) to keep my weight down to a trim 235 pounds."

FRANCIS K. McGINNIS III, MS, sends news from Dallas, Texas: "After ten years in the aerospace industry and eight years in development/marketing of industrial process equipment, I started my own business in May of 1983. Supratec, Inc., specializes in thermal processes and related equipment and also represents several European equipment and component manufacturing companies here in the U.S."

1965
JOHN C. SIMPSON, JR., writes, "My family and I will be moving from New York to London on September 1, where I will become regional executive for Mobil Europe, Inc. We're looking forward to an exciting experience as, even though we have traveled extensively on business all over the world, this will be our first opportunity to actually live outside of the U.S."

1966
JONATHAN F. CALLENDER, professor of geology at the University of New Mexico, has been named director of New Mexico's Museum of Natural History by state governor Toney Anaya. Callender, whose full title will be director of the Natural History Division of the Office of Cultural Affairs, has been serving as the museum's chief of scientific programs since August 1983.

1967
NORTON R. GREENFELD, MS '68, PhD '72, writes from Cambridge, Massachusetts, "Since leaving Tech, have floated around various artificial intelligence research labs, then finally took the commercial plunge: am now vice president, software engineering, for Applied Expert Systems. This startup is one of the attempts to apply the technology — in our case, products for the financial services industry."

DAVID R. WOODWARD writes from Uonuatu, Fiji, "After ten years in Fiji, I have a new position — macroeconomic adviser to the government of Uonuatu. Married for the second time — 12 January, 1984. First kid now on the way."

1968
SAMUEL E. LOGAN, MS '69, PhD '72, sends news from San Francisco: "I am completing my residency in plastic and reconstructive surgery at UCSF and have been appointed assistant professor of plastic and reconstructive surgery at Washington University School of Medicine in St. Louis, Missouri. In addition to performing surgery and teaching, I will be involved in a number of research projects with the department of engineering, including three-dimensional computer reconstruction of radiographs, CAD-CAM applications to hand surgery and craniofacial surgery, and laser applications to medicine. My wife, Karen, and I are expecting our fourth child in September. Our three boys are ages four, three, and two."

1971
PAUL K. SALZMAN, PhD, has been appointed to the position of vice president, advanced systems, for Aerojet Ordnance Company's Advanced Systems and Technology Organization in Tustin, California.

1972
WILSON C. CHIN, MS, formerly telemetry supervisor with Schlumberger Ltd., has joined NL Industries as group leader, formation evaluation and fluid mechanics. After receiving his PhD from MIT in 1976, Wilson worked at Boeing, and then at Pratt and Whitney; he reports also that he is the proud father of Jonathan, six months, and Jessica, five years old, and is permanently settled in Houston.

1974
DANIEL T. SIMMONS, PhD, has been named associate professor in life and health sciences by the University of Delaware in Newark, Delaware.

1976
JACK B. BACON writes from Rochester, New York, "I received my PhD in mechanical engineering from the University of Rochester this month. I have been working for Xerox Corporation for 2½ years to develop generic design methods for the reduction of noise, heat, ozone, and dirt in copiers. I divide my professional time between CAD/CAM and the fluids labs and my personal time between singing and flying sailplanes. Please send my regards to the Gnomes!"

RUDOLPH M. PECORARO, MS, writes, "After seven years with Ford Motor Company in Dearborn, Michigan, as a product engineer, I have made a career change. In April of this year I joined the IBM Company in Hamden, Connecticut. As an industry specialist for IBM's National Accounts Division, I will be marketing computers to engineering and scientific firms in the New Haven and surrounding areas."

1977
JOHN W. CHU writes, "I am pleased to announce the opening of my dental practice, located at 1016 Fair Oaks Avenue in South Pasadena."

1979
DAVID M. GLOVER, BS, MS, sends word from Fairbanks, Alaska, where he is a graduate student at the University of Alaska's Institute of Marine Science, "Approximately one year away from PhD in chemical oceanography. Current career interests: natural waters, geochemistry, the interaction of atmosphere, hydrosphere, and lithosphere."

SANGTAE KIM, BS, MS, assistant professor of chemical engineering at the University of Wisconsin at Madison, writes, "Our second daughter, Joyce Hejin, was born last April. Denise is already two years old!"

LEONARD R. LEVY received his rabbinic ordination and master's degree on May 13 from the Jewish Theological Seminary of America in New York City.

MICHAEL WERT, a programmer with the Bendix Field Engineering Corporation, writes from Sierra Madre, California, "My wife, Patricia Jean, and I are proud to announce the birth of our first, Brandon Michael, September 1983."

1981
JOEL B. ENNIS writes from San Diego, California, "I have jumped ship and now work for Maxwell Laboratories in San Diego. I will be doing research and development work on high energy density capacitors. You may be amused to hear that I have been dating DAN PERNICH's (BS '81) sister, Gail. The adventure continues . . . ."

ERIK W. GUNDERSON, sends word from Menasha, where he is attending the University of Wisconsin at Madison: "Finished second year of medical school. Working as a programming consultant for City Software in Milwaukee. In the midst of software development for the Okidata's new color printer, the Okimate 10."

1982
JACK A. KAYE, PhD, writes from Alexandria, Virginia, "On May 13, I was married to Dawn S. Bressler, a gerontologist originally from Englewood, Ohio. I work in Greenbelt, Maryland, as a space scientist in the atmospheric chemistry branch at NASA's Goddard Space Flight Center."

1983
JOSEPH LEBOWITZ, MS, sends word from New Jersey, where he is a member of the technical staff with Bell Laboratories, "I've been very busy at Bell Labs and have just purchased a house in Watching, NJ. My wife, Michele, who worked in the alumni fund while I was a grad student at Caltech, is working at Crum & Forster Personal Insurance in Basking Ridge, NJ. She is a financial planning trainee there. I am working at Murray Hill in the materials technology group — we are a silicon technology development area, and I've found that my training at CIT has been *very* worthwhile!"

OBITUARIES

1916
TOM J. HARRIS, on April 25, 1984. He had been retired for many years and was living in Fallbrook, California. He is survived by his daughter.

1923
HAROLD S. ENDICOTT, in spring 1984, following a heart attack. He had retired from his job as electrical engineer with General Electric and was living in Laguna Hills, California. He is survived by his wife, Harriet.

GEORGE N. RAMSEYER, on May 30, 1984. He had retired as department manager with Mobil Oil in Los Angeles and was living in Glendale, California. His wife, Betty, survives him.

HUBERT A. REEVES, on October 7, 1983, at the age of 84. He had been retired for many years and was living in Torrance, California. He is survived by his son.

1925
GEORGE C. SPELMAN, on May 13, 1984. He had retired as mechanical engineer with Standard Dredging Corporation in New Orleans, where he continued to live. He is survived by his wife.

1927
ROBERT M. MOORE, on January 11, 1984. A resident of Boonton, New Jersey, he had retired as mechanical contractor with J.E. Blades, Inc., and had previously been a member of the technical staff with Bell Telephone Laboratories. His wife survives him.

FRED T. SCHELL, on June 23, 1984, after an extended illness. He had retired from his job as division manager with the Western Division of Southern California Edison Company and was living in Mission Viejo, California. He is survived by his wife.

1928
J. LLOYD BOHN, PhD, on December 12, 1982, at his home in Orford, New Hampshire. He had been professor emeritus in physics at Temple University in Philadelphia.

1932
ROBERT W. WEBB, MS, PhD '37, of a heart attack on May 4, 1984, while on a field trip with students in Mammoth Lakes, California. He had been professor emeritus in geological sciences at the University of California at Santa Barbara, where he taught from 1947 to 1974, and had served as executive director of the American Geological Institute. During his academic career, he was honored many times by his colleagues and students for his teaching skills and was a recipient of the highest award given to an educator by the Geological Society of America. He is survived by his wife, Evelyn Elaine, three sons, a brother, and five grandchildren.

1936
CARROLL R. BAKER, on July 2, 1984, at the age of 70, following a brief illness. He had retired as project engineer with Procon, Inc., in Los Angeles, and was living in Boulder Creek, California. He is survived by his wife, Elizabeth, a daughter, one granddaughter, and his brother.

EDWARD J. KASNICKA, on May 26, 1984, of a heart attack. He had been vice president and secretary of North Hollywood Printing Company after many years as deputy chief engineer, engineering operations, with Lockheed California Corporation, and was living in South Laguna, California. His wife, Geraldine, survives him.

1937
T. FOSTER STRONG, MS, Caltech dean of freshmen, emeritus, on September 8. He had been living in Altadena. A member of the Caltech faculty in physics from 1937 to 1969, Strong will be remembered by every student who entered Caltech from 1941 to 1945 as the Institute's primary instructor of undergraduate physics during World War II. In 1946, he was appointed Caltech's first dean of freshmen, a position he held for 23 years. In this capacity, he served as adviser to thousands of freshmen, and as administrator of the Institute's intensive summer science course program and Freshman Camp. The title "dean of freshmen" retired with him in 1969. Strong is survived by his wife, Oakalla, and a son, Thomas.

1944
E. FROST BASSLER, MS, in February 1984, of cancer. He had retired from his job as assistant vice president and manager, claims administration, with Liberty Mutual Insurance Company and was living in San Jose, California.

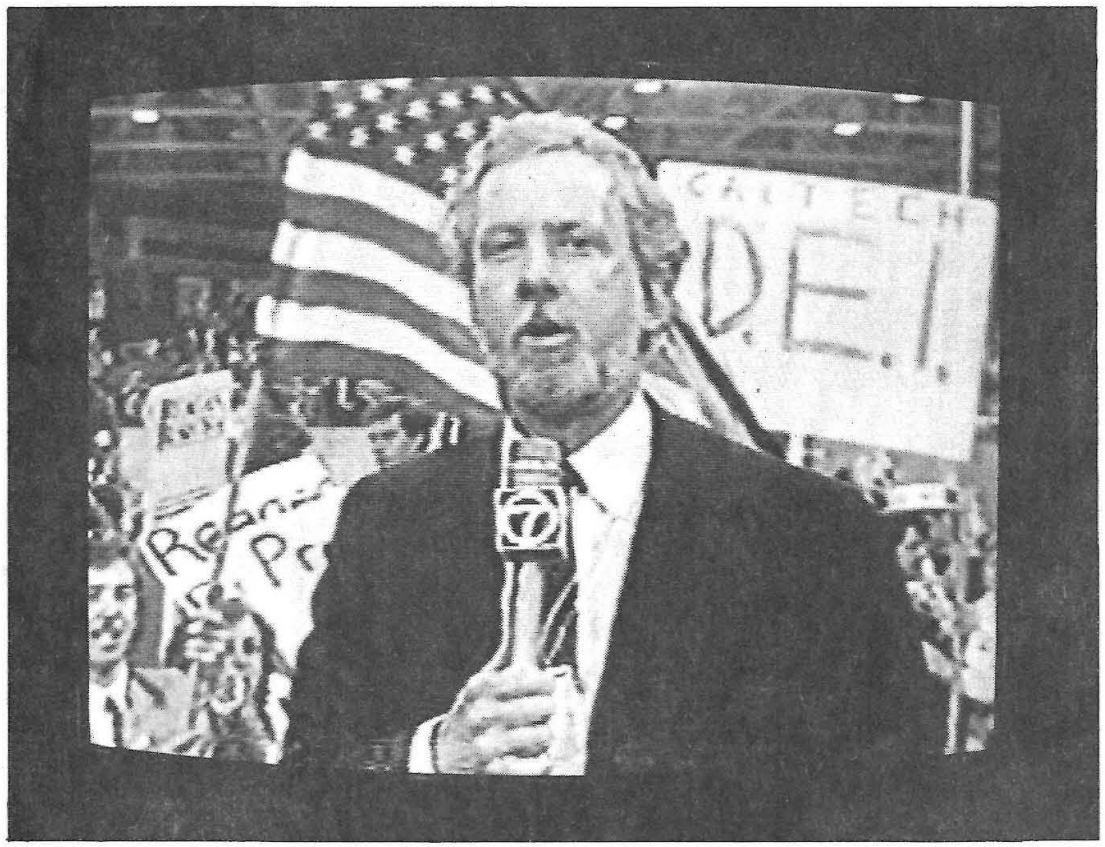
ROLF D. BUHLER, MS, Eng '48, PhD '52, on June 15, 1984, following a serious illness. He had been professor and director of the Institute for Space Propulsion at the University of Stuttgart in West Germany. His colleagues write, "The members of his Institute will always remember him as a warm and thoughtful friend, whose outstanding leadership will not be forgotten."

1948
SOL MATT, MS, of a heart attack, at age 60, on April 9, 1984. He had been manager of technical resources planning with General Electric and was living in Radnor, Pennsylvania. He is survived by his wife, Barbara, two sons, and a brother.

1949
LELAND H. SATRE, of a heart attack, on May 20, 1984, after a long illness. He had been an independent consultant in mechanical engineering in Rowland Heights, California. He is survived by his son, Gary, a masters degree student in journalism at the University of the Philippines in Manila, a daughter, Carol, three grandsons, and his mother.

1963
JOHN L. KLEIDERER, on May 5, 1984. He had been a mathematician with the McDonnell-Douglas Corporation in Los Angeles.

1982
FRANK JANECZEK, age 23, on July 4, 1984, in Playa del Rey, California, in a traffic accident that also took the life of Joanne Lee, 25, the wife of Caltech graduate student in biology James Lee. They had been attending a party with several Caltech alumni and were taking a short drive to try out Janeczek's new sports car. The driver of the other car has been booked on suspicion of felony drunk driving and second-degree murder.



DEI strikes again! On the 11 p.m. KABC Los Angeles Eyewitness News coverage of the Republican convention, the famed salute to Dabney House appeared, puzzling all but Caltech alumni.

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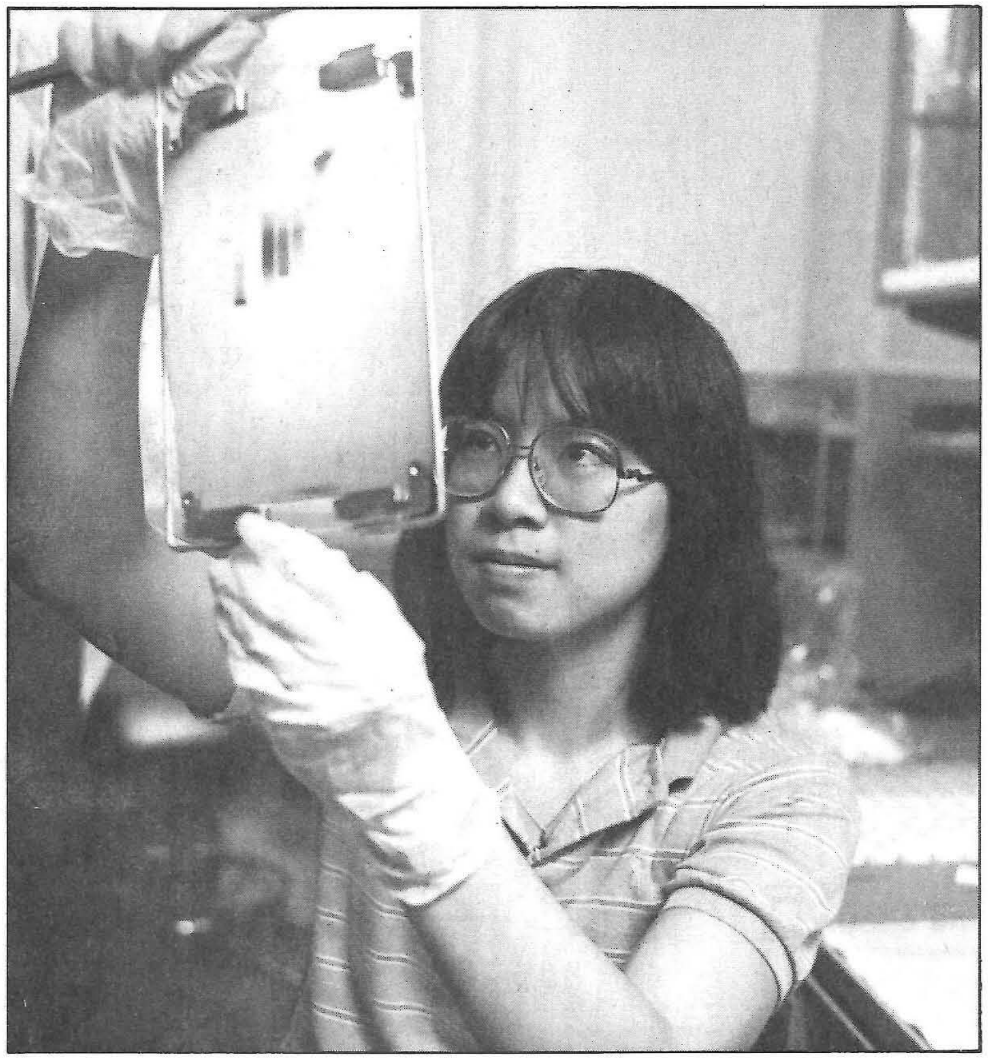

Independent research in a Caltech lab fills the summer for Susanna Chan, a senior and SURF program fellow. *See page six.*

October 1984