

CALTECH NEWS

February 1987

Caltech sets all-time record in fund raising

During the 1985-86 fiscal year, Caltech received \$77,604,692 in gifts, setting an all-time record and substantially exceeding the \$38.5 million raised in 1984-85. This was an extraordinary year, as payments were received from some previous commitments. The totals include \$21.5 million from the Keck Foundation for the W. M. Keck Observatory, \$18.63 million from the estate of Liliore G. Rains, and \$2.5 million from the Lucille P. Markey Trust for a new program in developmental biology.

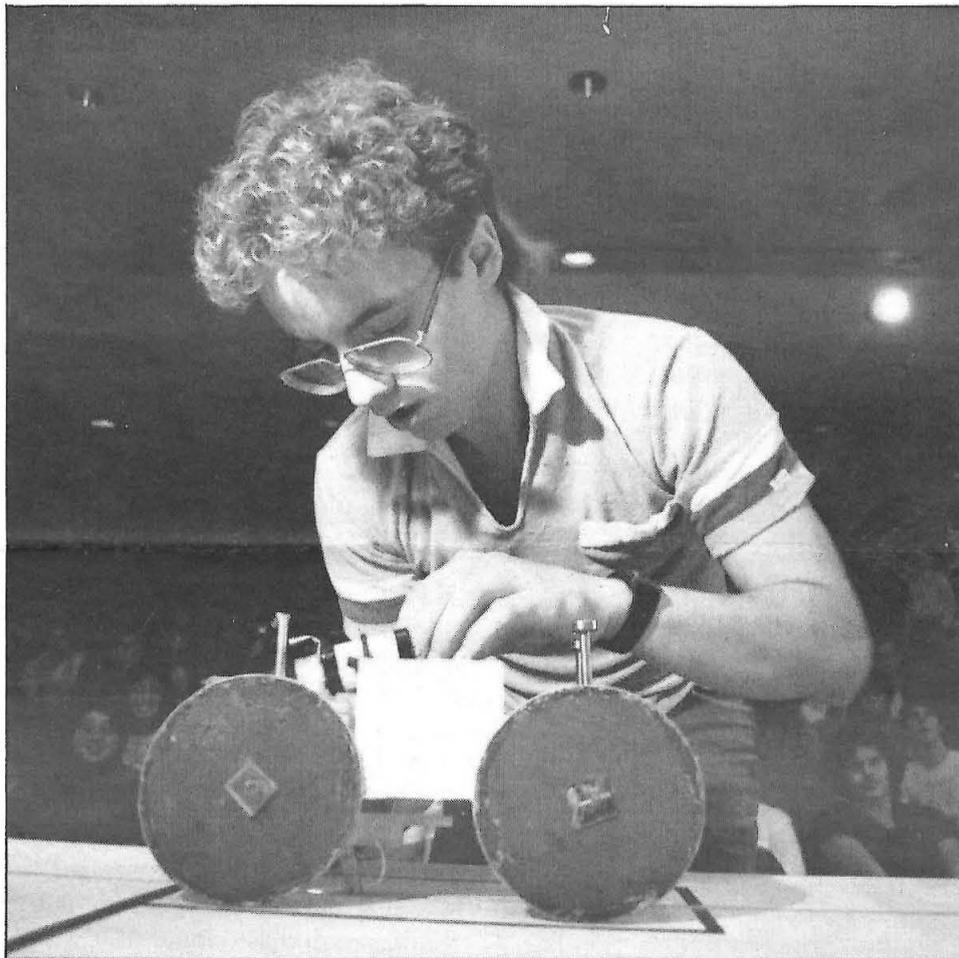
Trustees, alumni, Associates, and other friends are vital to Caltech's fund-raising efforts. In addition to making gifts themselves, they help spread the word about the Institute by communicating its goals with energy and enthusiasm. "We are delighted with this fine support and grateful for the confidence placed in us by our donors," said Theodore P. Hurwitz, Caltech's vice president for Institute relations.

Caltech's support from the private sector comes from many sources: corporations, foundations, alumni, and other individuals. The Institute continues its strong program of planned giving and currently administers more than \$42 million in life income plans and trusts, which will provide support far into Caltech's future. Encouraging news is the increasing number of individuals, especially alumni, who are including Caltech in their estate plans.

Though the total dollars received were extraordinary, only six percent was for unrestricted purposes. Unrestricted funds are the most difficult to raise, but they are the most important because they can be used where the need or opportunity is the greatest. The Alumni Fund, The Associates, and the Industrial Associates

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Caltech Hill Climb: an automated final



Erik Antonsson plans a final for his students in Mechanical Engineering 72A that is a little out of the ordinary. He gives them bags of identical materials — odds and ends of Plexiglas, bushings, tubings, ball bearings, rods, nuts, washers, springs, etc., with which to make vehicles that will compete on a 10-foot track, featuring a four-inch-high bump. The event is dubbed the Caltech Hill Climb. The vehicles are as individual as their creators. Above, Bradley Solberg, a junior majoring in engineering, preps his entry for the competition.

Caltech astronomers begin five-year sky-map project

Caltech astronomers have begun a mammoth five-year project to map the entire northern sky, using sensitive new photographic techniques. The resulting atlas of the heavens, contained on some 2,682 glass plates, will serve as the basic astronomical guide to the skies for decades to come.

The plates of the Palomar Sky Survey—made using the 48-inch Schmidt Telescope at Palomar Observatory—can record celestial objects several million times fainter than can be detected with the naked eye. They will become a standard reference in the libraries of every major observatory

around the world.

Like the first survey done in the 1950s, the new survey is valuable to astronomers in two ways, according to Palomar Observatory Director Gerry Neugebauer (the Howard Hughes Professor and professor of physics at Caltech). It will directly yield useful scientific results, and it will serve as a guide for astronomers using a wide array of other telescopes.

According to Neugebauer, astronomers expect to use data from the new survey to:

—discover new quasars, galaxies, stars, asteroids, and comets.

—map the structure and circulation of our galaxy, the Milky Way, by comparing the positions of stars with those in the last major survey 30 years ago.

—serve as a celestial road map for the Space Telescope.

—identify, at visible and near-infrared wavelengths, objects discovered with telescopes that see in the radio, X-ray, or infrared regions of the spectrum.

The \$1.5 million Palomar Sky Survey is funded by grants from the Alfred P. Sloan Foundation, the National Geographic Society, the National Science Foundation, and the Eastman Kodak Company, which is also supplying the photographic plates for the survey. Once completed around 1991, copies of the survey photos will be made available by Caltech at cost to all astronomers, either as glass plates or as film transparencies.

In 1980, Caltech astronomers began planning for a new survey, because of advances in photographic and telescope technology and the changes in the heavens over the ensuing three decades. The rotation of our galaxy has changed the positions of hundreds of visible stars.

A new northern sky survey would also complement a similar survey of the southern sky now being completed and using the United Kingdom Schmidt Telescope, a twin of the Palomar Schmidt in Australia.

The first major step in preparing for the new survey came in May 1985, when Caltech took delivery of a new \$380,000 lens for the Schmidt telescope. This corrector lens—four feet in diameter and weighing several hundred pounds—enables the telescope to focus sharply on a wider range of wavelengths than was possible in 1949, without the image-blurring phenomenon called "chromatic aberration."

This type of blurring tends to occur with simple lenses because significantly longer or shorter wavelengths are refracted differently by the lens and thus do not focus well. The new lens, which consists of two pieces of

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Fund-raising record

Continued from page 1

are the primary sources for these crucial funds. Caltech will continue to focus on developing sources for unrestricted and discretionary support.

Gifts were provided for many different purposes. Although not all of them can be described here, the following are a few examples of some of the projects and programs that are being funded by gifts received in 1985-86.

- A new program in developmental biology continues Caltech's long tradition of pioneering advances in the biological sciences. The grant from the Lucille P. Markey Trust establishes a research program that will use powerful new experimental techniques to unravel the mysterious processes by which organisms develop.

- A major new gift from IBM will be used to support new research, bring outstanding young scholars to the Institute as visitors, provide fellowships for the Summer Undergraduate Research Fellowships (SURF) program, and support the Secondary Schools Science Project.

- The James Irvine Foundation continues to provide funding for the renewal of scientific equipment. Research projects that have benefitted from the Irvine gift include such diverse areas as seismological engineering and radio astronomy.

- Other restricted funds were designated for enhancement of the campus. An anonymous donor provided gifts for campus beautification, and the Lon V. Smith Foundation contributed funds for the new Fox Stanton track.

"The results of this last fiscal year represent the strong involvement of our volunteers and friends, and we sincerely appreciate their consistent concern for the strength and vitality of the Institute," said Hurwitz. "Their support assures the Institute's continuing vigor as a scientific and educational resource, and makes the difference between Caltech being ordinary and being exceptional."

On the cover

Late last fall Caltech researchers, officials, and guests gathered to dedicate the Institute's new submillimeter-wave observatory "to astronomy" in a ceremony 14,000 feet above sea level on Mauna Kea, Hawaii. The telescope and the observatory dome were constructed on campus. About a year ago the parts were shipped to Hawaii where they were assembled on the extinct volcano. On the cover, President Marvin L. Goldberger addresses guests at the dedication.



Samuel C. Eastman (BS '31) reminisces at the dedication of the new Fox Stanton Track and Field about his experiences as a student athlete under Coach W. L. "Fox" Stanton.

Dedicating the Fox Stanton Track and Field

The Fox Stanton Track and Field, a new \$450,000 all-weather track and field facility, was dedicated on December 5 by Caltech officials and members of the board of directors of the Lon V. Smith Foundation. The name of the new track honors the late W. L. "Fox" Stanton, Caltech's athletic director from 1921 to 1942.

The funding for the Fox Stanton Track was provided by the Lon V. Smith Foundation of Los Angeles, a charitable foundation established by Lon V. Smith in 1951. The gift to Caltech was made with the support of W. Layton Stanton (BS '27, PhD '31), a member of the foundation's board of directors and the son of Fox Stanton. Stanton is also a member of The Associates.

During his 21 years at Caltech, Fox Stanton coached football and track, leading the Institute's football team to championships in the Southern Cali-

fornia Conference in 1920 and 1921. In 1923 the team tied for the championship with Pomona College.

When Coach Stanton retired in 1942, a writer for Caltech's student newspaper *The California Tech* wrote of his career, "In a school which does not pick men for athletic ability, he has formed championship teams. In a school where no credit is given for athletic work, where it must be carried entirely in addition to regular studies, he has developed outstanding football material."

The new Fox Stanton Track features a rubberized surface and two new sprinting lanes. The irrigation and drainage system for the track has been improved, and new runways were created for the long jump, pole vault, steeplechase, and discus throw events—all of which have been relocated to accommodate new contours of the track.

Ralph Landau honored by United Engineering Trustees

Ralph Landau, a member of the Caltech Board of Trustees, was the recipient of the John Fritz Medal of the United Engineering Trustees at a recent ceremony of the American Institute of Chemical Engineers in Miami. Landau is a consultant with Listowel Incorporated, New York City, and is vice president of the National Academy of Engineering.

Among previous recipients of the award are George Westinghouse, Thomas Edison, Alexander Graham Bell, Orville Wright, Guglielmo Marconi, Herbert Hoover, Theodore von Karman, and Simon Ramo.

Kaplan represents Pacific Bell in gift presentation

Martin A. Kaplan (BS '60) recently represented his employer, Pacific Bell, as he presented President Marvin L. Goldberger with a \$100,000 gift—\$30,000 for the Industrial Associates and \$70,000 for the electrical engineering communications group.

Kaplan is executive vice president, operations, for Pacific Bell. Donald E. Guinn, chairman of Pacific Telesis Group, parent company of Pacific Bell, is a Caltech Trustee.

Student activities center takes shape in basement complex

Work is under way to create a student activities center in the basement of the southern housing complex that comprised the four original student houses—Blacker, Dabney, Ricketts, and Ruddock. The renovation project, at a cost of approximately \$1,540,000, will make available to students 28,000 square feet of space, with an additional 5,000 square feet for house storage.

The student activities center is scheduled for completion in the late spring and will be ready for student use in the fall of 1987, according to James J. Morgan, vice president for student affairs. It will contain an office for a student activities coordinator, ASCIT offices, headquarters for student publications, a coffee house, three rehearsal rooms, five rooms for practicing instrumental music and for voice lessons, three music activities offices, a room for storing musical instruments and costumes for student musical and drama groups, a recreational reading library, five study halls, three club rooms, two small meeting rooms, a darkroom, a bicycle shop, two rooms for art activities, and laundry and storage rooms.

Morgan noted that plans for the student activities center were developed in consultation with members of ASCIT, the Graduate Student Council, and the Interhouse Committee. A major goal in the renovation has been the rapid availability of much needed space for expanded student activities, Morgan said.

He pointed out that it has been difficult to initiate new student projects because of limited space in present facilities. The new center will permit the introduction of additional activities—in graphic arts, for example.

The student activities center renovation is part of a larger project involving the four original student houses. Work on Blacker and Ricketts houses was completed last summer, and Dabney and Fleming renovation will take place this summer. This project involves painting and refurbishing internal walls and woodwork, recarpeting, installing new lighting, placing new sinks in each room, modifying plumbing with isolation valves to create self-contained systems for each house, and painting the exteriors of the houses and relandscaping the entire complex.

Telling the Gnome story

A new book features
the club's history and members

by Winifred Veronda

By all rights, the Gnome Club should have faded quietly into oblivion, its traditions forgotten by now by all but a few stalwart survivors.

But the Gnomes were too stubborn to let this happen, and Caltech's oldest social organization continues to thrive, initiating outstanding graduates each year and conducting a variety of service projects for the Institute.

Now a new book edited by Theodore C. Combs (BS '27) tells the Gnome Club's complete story, from its beginning in 1897 as a part of Throop Polytechnic Institute, through the days of the old fraternity house on Holliston Street, to the end of fraternity life at Caltech in 1931, when the student Gnomes became residents of Ricketts House and the club evolved into its present form as an organization of graduates dedicated to fellowship and service to the Institute. The book is called *The Gnome Club: Throop & Caltech*.

In addition to giving a history of the club, the book is filled with anecdotes submitted by several members—and of biographies of a few notable members, among them Frank Capra, who created such film classics as *Mr. Smith Goes to Washington* and *It's a Wonderful Life*, and who became the first Hollywood director to have his name above the film title.

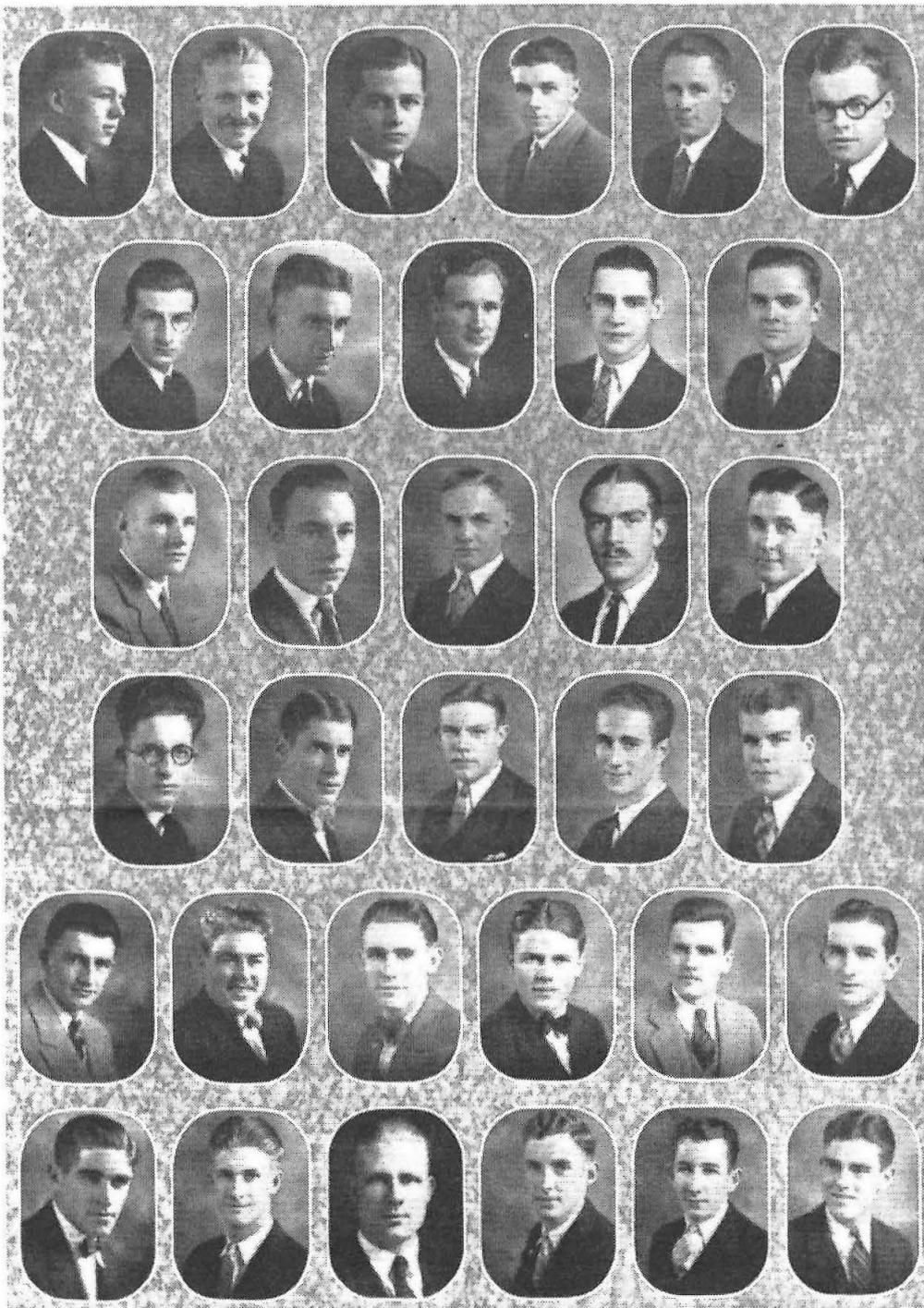
The book also contains a Gnome Club directory and a numerical listing of members by order of initiation.

The Gnome Club golden era, its biographer points out, was the decade from 1921 to 1930. In 1921 the club moved from a smaller fraternity house at 351 South Euclid, to a house next door to the northwest corner of Madison Avenue and Del Mar, in order to accommodate a growing membership.

The era ended when the new student houses were completed in 1931, and fraternities were required to discontinue pledging students and the members required to live in the new residences.

It is primarily from this era that a rich vein of anecdotes emerges from several Gnomes who report their memories in the new Gnome history.

Fred Groat (BS '24) recalls that Caltech Professor Royal Sorensen (who later became Groat's father-in-law) gave Groat a formula for dealing with the pressures at the Institute. "Take a complete break, preferably in the middle of the day, close your eyes, and let your mind go blank," Sorenson counseled.



Sixty years ago, as featured in the 1927 Big T, members of the Gnome Club were: Row 1: Theodore C. Combs, H. Fred Peterson, V. Wayne Rodgers, Frank H. Wiegand, M. Dick Darling, Robert F. Heilbron. Row 2: Robert T. Ross, Frank P. Meserve, Jr., Clarence L. Haserot, Edward P. Jones, Jr., George F. Collins. Row 3: William H. Mohr, Murray N. Schultz, Albert E. Lombard, Jr., Edward R. Gilmore, Ray E. Copeland. Row 4: Maxwell F. Burke, Edward Joujon-Roche, Kenneth H. Robinson, Elbert W. Miller, Guy L. Chilberg. Row 5: Robley D. Evans, Charles F. Lewis, Fred A. Wheeler, Laurence E. Lynn, Karl A. Ganssle, Hubert M. O'Haver. Row 6: Sidney T. Exley, Jr., Thomas H. Evans, Harry A. Peterman, Roscoe P. Downs, Leslie O. Scott, Alphonse Cramer.

"Sometime later, after he became my father-in-law," writes Groat, "I learned that the professor spoke from experience. He would go home at noon, and while Mrs. Sorensen prepared lunch, lie face down on the floor, and wake up 10 minutes later, fully refreshed."

Groat goes on to relate that this habit of Sorensen's once caused some consternation when Sorensen visited the home of Howard Vesper (BS '22, Caltech life trustee). As Mrs. Vesper was setting the luncheon table, she

was startled to see the prostrate form of her house guest as he lay face down on the floor.

"Fortunately," writes Groat, "Ruth recovered from her shock, and Sorensen was the brightest person at the lunch table."

Henry Gunning remembers that at a business session, the Gnome treasurer reported that the light bill was getting out of hand, and that the Gnomes should make a greater effort to study during daylight.

To this admonition, Frank

Wiegand (BS '27) responded: "Keep on studying at night, fellows; I'll take care of the light bill."

"We didn't realize," writes Gunning, "and Frank forgot, that he had reversed the wires at the light meter. Within a few weeks a city investigator discovered the trick and arrived at the house, after records showed that the city owed the Gnome Club money."

Gunning also describes the uncertainty that prevailed over whether to subject a new pledge, Ray Untereiner, who was also a faculty member, to the full initiation, or whether to exempt him from its key element: crawling on his hands and knees through a city block of Pasadena storm drains underneath the campus.

"We took a deep breath and decided on the works," reports Gunning. "Ray made the crawl with his usual good humor, and received his pin with much applause from his new brother Gnomes."

Gunning departs momentarily from strictly Gnome history to recall the 1926 Caltech football season: The Engineers ended in a four-way tie with UCLA, Whittier, and Pomona.

"It was a Caltech team but a Gnome line," relates Gunning, "with Eddie Jones, Sid Exley, and Al Lombard at ends, with Bob Heilbron, Ed Joujon-Roche, and Bill Mohr at tackle, with 'Fat' Lewis and Guy Chilberg at guards."

Gunning's prolific memory also calls forth images of dances at the fraternity house: "We had to enter the house through an upstairs window and slide down the stairway bannisters to the dance floor in the living room."

But *The Gnome Owl* would soon report an end to the golden era. "Gnomes Now Ricketts Boys," proclaimed a banner head in the *Owl's* final edition on May 25. The proclamation came at the conclusion of a year when the Interfraternity Council had faced the fact that the new student houses called for the extinction of the fraternities as individual organizations.

An extra edition of the *Owl* in November 1933 contained a daring announcement: "The Gnome Club will pledge undergraduates regardless of faculty opinion and regardless of any previous understanding."

Five seniors were pledged that year: Robert P. Sharp (BS '34, MS '35), Donald R. Rooke (BS '34), James N. Gregory (BS '34), and Lee P. Morris (BS '34).

They were initiated on Founders Night, March 9, 1934—the last Gnomes to be initiated for more than a decade, with one exception.

Although the club had no official connections with Caltech during this

Please turn the page

Gnome Club history

Continued from page 3

period, Gnome alumni fellowship continued year after year through a series of social activities. One Gnome—Frank B. Jewett, Jr. (BS '38), the son of a Gnome founder, Frank B. Jewett (BS '98)—was initiated in 1928. Jewett went on to participate in the 1936 Olympic games, in sailing.

Meanwhile, the Gnomes continued to search for a way to maintain an official connection with Caltech. The opportunity came through President Lee DuBridg, who succeeded Robert A. Millikan as head of Caltech in 1946.

DuBridg, after attending a Gnome Founders' Night dinner, made it possible for the club to continue as an active organization by allowing it to initiate selected graduating seniors each year. The members are chosen for leadership and participation in campus activities, as well as academic excellence.

"This," writes Coombs, "has allowed the Gnome Club to carry on operations as a recognized part of the Caltech community, dedicated to serving the Institute."

The new wave of initiations began in 1949. Among notable Gnomes initiated during the early years of this period were Ed Reinecke (BS '50), who served as California lieutenant governor; Philip Conley (BS '56), a member of the U.S. Olympic team in the javelin throw; and Harrison Schmitt (BS '57), astronaut and former U.S. Senator from New Mexico.

Gnome history was made in 1974, when the first Caltech women undergraduates were initiated at the end of their senior year. Lisa Anderson (BS '74), Louise Kirkbride (BS '75, MS '76), Karen Roberts (BS '74), and Janet Wainwright (BS '74) composed the first group. Kirkbride went on to serve as president of the club in 1980-81 and 1981-82.

Meanwhile, the Gnomes continued to be active in service to the community. In 1972 the organization raised \$4,000 and contributed a van to ASCIT to be used for transportation to off-campus functions. Career counseling became a major Gnome Club activity when it was started in 1978 by Philip Neches (BS '73, MS '77), Lisa Anderson, and Walt Meader, director of the Caltech Y. And the Gnome Scholarship Fund has continued to help meet an increasingly critical need for student scholarship aid.

Gnome Founders' Day Dinners have continued to be a magnet for the polarizing of energies, and they became even more successful in the mid-1970s when spouses and guests were welcomed to the annual gathering, and the location was

shifted to the Athenaeum.

Here, each year, Gnome traditions renew themselves and songs like *Lead Us On, Our Fighting Beaver*, and *Hail C.I.T.* conclude an evening filled with nostalgia that is mingled with announcements that indicate dynamic program planning.

The Gnome Founders claimed they drew their inspiration for their traditions from a group of learned Gnomes on an island in the Aegean Sea. Fortunately Caltech students don't have to travel that far. In the Gnome organization, they have a solid source of inspiration much closer to home.

All Gnomes have received a copy of the new book. Others wishing a copy may obtain one for \$10.00 through the Alumni Association.

CALTECH IN THE NEWS

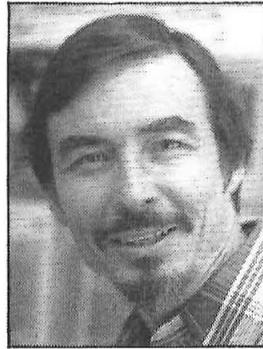
This issue initiates a new column with excerpts of news about Caltech that has recently appeared in the national media.

Caltech is one of 16 great research universities described at length in *To Advance Knowledge: The Growth of American Research Universities*, a major work by Roger L. Geiger published by Oxford University Press. A hallmark of the nation's place in modern history is its universities, says the author, and he explores the history of five state institutions, five grown from colonial roots, and five private institutions founded in the late 19th century—plus "the remarkable and more recent prodigy"—Caltech, according to a review in *The New York Times* book review section.

• "Scientists watching the celestial objects known as quasars have spotted giant blobs of matter shooting from seven of them, doubling the number of quasars known to behave that way," according to the *Atlanta Journal*. Anthony Readhead, director of Caltech's Owens Valley Radio Observatory, is leader of the team that made the discovery. The discoveries bring to 14 the number of quasars known to emit such jets of material.

• The section of the San Andreas Fault that stretches from San Bernardino through Palm Springs now appears to be the likeliest segment to cause a disastrous earthquake, according to Kerry Sieh, professor of geology, as quoted in the *Santa Monica Evening Outlook*. Recent research suggests that great quakes measuring 8.0 or more on the Richter scale rock the Indio segment of the

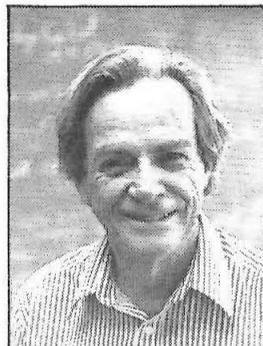
fault roughly every 250 years, and it has been about 300 years since the last such temblor. "It looks like we're in the tenth month of pregnancy," said Sieh during a luncheon meeting of the Town Hall of California.



Carver Mead: He's forging a new approach to electronic computation.

• "Carver Mead, who pioneered VLSI design techniques, is now forging a new approach to electronic computation," according to the *Electronic Engineering Times*. Analog systems that make extensive use of negative feedback loops and variable resistances have been incorporated into a new kind of intelligent photo-detector, which is modeled on the human eye. Mead is the Gordon and Betty Moore Professor of Computer Science.

• "Strolling in his garden, President Marvin L. Goldberger picked up a balloon. Attached was a note, signed by Mayra Avilez, a kindergarten student at Sunkist School in Oxnard, California. She and the school's other 644 students had each released a balloon. Goldberger wrote to Mayra, enclosing a dollar for the student fund, as she requested, and he invited her and her schoolmates to visit Caltech and learn how a balloon can travel so far," reported the *Pasadena Star News*.



Richard P. Feynman: "There was a moment when I knew how nature worked. It had elegance and beauty."

• "There was a moment when I knew how nature worked. It had elegance and beauty. The goddam thing was shining," says Richard Feynman of his reaction when he gained insight into a quantum electrodynamics problem—the solution of which led to the Nobel Prize in physics. Feynman, "the smartest man in America," is featured in a recent issue of *GQ [Gentlemen's Quarterly]*.

• "An ambitious program that would send a nuclear-powered spacecraft into deep space at more than 225,000 mph is under study at JPL," according to the *York, Pennsylvania,*

Daily Record. Although the proposal is only the earliest planning stages, it could carry JPL into the 21st century with a program that could send back scientific data for more than 50 years.

• "Eight similar meteorites found scattered on several continents may be pieces of Mars," say Caltech researchers John D. O'Keefe and Thomas J. Ahrens in *Science* as quoted in the *New Orleans Times Picayune*. A large asteroid or comet could have boosted the Martian pieces into space after striking the surface of the planet, according to the scientists, who suspect a Martian origin because of the meteorites' geological characteristics and chemical composition.

• "Maps of the depths of the earth show that its molten metal core is not a smooth sphere but instead has mountains taller than Mount Everest and valleys six times deeper than the Grand Canyon," according to the *New York Times* in a report on research by Robert Clayton, Olafur Gudmundsson, and Don L. Anderson of Caltech; by JPL and NASA; and by the Geophysical Fluid Dynamics Laboratory in England.

The maps of the core-mantle boundary, about 2,000 miles beneath the Earth's surface, were made using a five-year-old technique, seismic tomography, in which varying speeds of earthquake waves through molten and solid rock are measured.

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Allman and Wright follow the trail of the lemurs of Madagascar

By Phyllis Brewster

In April the world's foremost authority on the behavior of nocturnal primates will arrive on campus to spend four months as a research associate in biology. Pat Wright, assistant professor at Duke University, will bring to Caltech not only her exceptional knowledge of *Primates of the Night* (the title of the book she will be working on while at Caltech), but also the kind of courage it takes to set out in almost total darkness to plow through rugged, mountainous, dense rain forests, tracking the creatures whose waking hours are our sleeping hours.

Wright comes to Caltech to collaborate with Professor of Biology John Allman and his wife, EveLynn McGuinness, member of the professional staff in behavioral biology, who have been mapping the mechanisms of visual perception in nocturnal owl monkeys and galagos ("bush babies"). Their scientific interest, however, embraces the whole family of primates, especially the primitive lemurs, which represent a level of brain organization in the evolution of primates that has not yet been investigated.

It was that consuming interest in the evolution of the brain and behavior in primates that led Allman and McGuinness, last summer, to the rain forests of the island republic of Madagascar—the only place in the world where lemurs exist.

Going out from Wright's base camp in the mountain regions of the southeastern part of the island, Allman and McGuinness were able to observe several dozen lemurs for hours at a time—including *Haplorhina simus*—a bamboo-eating species presumed to be extinct until only a few months ago when a family was sighted by Wright. In addition, a troop of 40 lemur *fulvus*—one of the nocturnal species—came crashing through the forest every evening at dusk.

"Lemurs are living fossils representing a way of life 50 million years old," Allman says. When the island that is now Madagascar (the size of Oregon and California together) was cut off from Africa, animals there developed unique evolutionary patterns. The arboreal lemurs evolved to fill ecological niches occupied on the continents by animals like the squirrel and the baboon. Their variety once included sizes that ranged from one ounce to 500 pounds.

Now only 40 species are left, the largest of which is the indri, weighing 25 pounds and standing four feet high, and the smallest of which is the microcebus (mouse lemur) weighing about one ounce.

Lemurs spend most of their time eating, Allman and McGuinness observed. Grooming is also a time-consuming and important daily ritual. For more than an hour every



Described by John Allman as "living fossils representing a way of life 50 million years old," lemurs exist only in the rain forests of Madagascar.

morning, they work at each other's coats, using special comb-like teeth, until their coats are "resplendent." They even have a little brush under their tongues that they use to clean the teeth-combs, Allman says.

"I hadn't expected them to be so beautiful," Allman says, particularly of the indri. "They are majestic animals. And they have wonderful haunting cries as they call in chorus back and forth to each other."

Another impressive observation was of the animals' spectacular leaping ability. "Lemurs can be off almost ballistically; they get in the crown of a tree and go soaring up to 30 feet in a single leap."

But what struck Allman and McGuinness most was the benign quality of the lemurs' lives—their remarkably low level of aggression, and their tameness. The observers could watch them from close range. One species even hung around camp

to watch the humans. During their month's stay, Allman and McGuinness nursed an injured lemur until she was well enough to be released back into the forest.

The lemurs' tameness is due partly to the fact that most of them in the camp area have been observed by other scientists, and partly because there are no predators on the island (only small carnivores), and guns are outlawed. Although some of the smaller species are hunted for food by boys with sling shots, the indris are considered sacred, and most of the larger lemurs are taboo to hunt in the area where the camp was.

Nevertheless, the lemurs are very vulnerable. The most serious threat to their continued existence is that their environment is disappearing. Once covering most of the island, the rain forest has been reduced to a mere 10 percent of it. And, says Allman, it is literally being hacked away a tree at a time, day after day, for timber and firewood. In addition, there is the much more destructive process of clearing the land by burning. Thus a way of life dating back 50 million years may very soon come to an end.

Caltech astronomers begin five-year sky-map project

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special glass cemented together and ground to a complex surface, can sharply focus light throughout the visible range and into the near-infrared.

The new lens was only part of an extensive refurbishment by the Palomar technical staff of the 48-inch Schmidt and its support facilities. Once these improvements were complete in early 1986, the astronomers and technicians were ready to begin the gigantic task of photographing the entire northern sky. Over the last several months, they have tested the facilities and procedures and have now begun to produce the plates of the survey.



Newton: his missing portrait remains a mystery

If you see a portrait of Isaac Newton on display, take another look. It *could* be a valuable art treasure that disappeared from the Caltech campus in September 1979.

The life portrait of Newton was given to the Institute during the 1930s and hung in East Bridge Library for many years before Millikan Library was constructed. Then it was stored in the basement of the Athenaeum until David Goodstein, professor of physics and applied physics, retrieved it to have it hung in his office in Sloan Laboratory. One evening, Goodstein left the locked office at midnight and, when he returned at 8 the following morning, the portrait was missing. It was severely underinsured and has never been recovered.

The portrait was painted by John Vanderbank (1694-1739) and is believed to be one of only four portraits of Newton by this master that are in existence. Two of the others are at Trinity College, Cambridge, and the Royal Society, London. A visiting professor of art history, in conversation with Goodstein, once placed the portrait's value at around \$250,000.

After considerable effort on the part of Caltech archivist Judy Goodstein to meet bureaucratic requirements and validate its value, the portrait has been placed on a registry of lost and stolen art works. If anyone can offer insight into the ongoing mystery of its disappearance and present location, the Institute would be happy to hear from you.

Research goal: breakthroughs in cataract surgery

By Heidi Aspaturian

"In polymer chemistry," explains Robert Grubbs, "we combine large numbers of atoms to create long molecular chains." Today, Grubbs, professor of chemistry, and his research group at Caltech have become a major link in a chain of events that could lead to fundamental breakthroughs in cataract surgery, and eventually to revolutionary treatments in ophthalmology.

Since late 1984, Grubbs, his Caltech colleagues, and a group of surgeons from the USC Doheny Eye Institute have been working on a technique for restoring the normal functions of the eye's lens following the removal of cataracts. Unlike the current operation, which removes the lens and replaces it with a rigid synthetic substitute, the new procedure would preserve the functions of the original lens, leaving the natural flexibility and focusing ability intact.

The lens sac of the mammalian eye is filled with fluid, Grubbs explains. As the body ages, the fluid may harden, producing the cloudiness and blurred vision associated with cataracts. (Hardening of the lens fluid also reduces responsiveness to muscles that control the lens movements, he adds, which is why very near-sighted people may start to develop symptoms of farsightedness in middle age).

"Unlike natural lenses," says Grubbs, "the implant is as hard as a BB, unable to change its shape." As a result, while cataract patients experience major improvements in the quality of their vision, they may have a new series of problems associated with the inability to focus, as well as intermittent discomfort.

In 1981, however, a team of eye surgeons at USC developed a method of draining the aging lens fluid from the lens sac, while preserving the sac itself and its attachments to the muscles that control it. Their next objective was to develop a replacement for the fluid that duplicated its crucial properties and would not be rejected by the body. For assistance, they turned to Grubbs and his work with polymers.

The molecular structure of polymers, says Grubbs, accounts for the material's outstanding property, which is plasticity. Natural polymers include such substances as cotton and rubber. Since the forties, they have been joined by a range of polymers created in the laboratory, including most synthetic fabrics, all plastics, and a variety of specialized fluids.

When the USC medical team

reached Grubbs, he was working on methods to create customized polymers whose properties could be fine-tuned to very exacting and precise specifications.

"Since the natural lens fluid is also a polymer," he explains, "the challenge was to use synthetic polymer techniques to create its equivalent."

In developing the fluid implant technique, Grubbs and the USC surgeons faced two major challenges. The first was to seal the fluid inside the sac, once it had been injected, by lengthening the polymer chains—a procedure somewhat similar to inflating a model of a ship once it is in the

bottle. "What we've done," says Grubbs, "is to create polymer chains with special activator groups at each end that respond to low-intensity light from the ophthalmological microscope used during surgery."

When stimulated by the light, the shorter chains that were injected into the lens sac link up, creating a thicker fluid that cannot seep back out through the injection incision.

According to Grubbs, the next major step is to create a lens fluid with properties of viscosity, longevity, and refractive capability that mimic those of the natural lens. Once this has been accomplished, it may become

possible to perform cataract surgery during an earlier phase, before the more severe symptoms begin appearing. A longer-range goal is to develop a fluid that can be fine-tuned to alter the curvature of the lens during cataract surgery, eliminating or alleviating vision problems that now require corrective lenses.

Caltech researchers who have worked with Grubbs on the project include former research fellow Bob Coots and Stan Pine, visiting professor of chemistry at Caltech. The USC surgical team is headed by David Schanzlin, M.D., professor of ophthalmology.

Sub-sea explosions may trigger quakes

Geophysicists have confirmed the existence of a new way for the earth to produce an earthquake—by an immense explosion in the sediments beneath the seafloor, triggered by a volcanic eruption. The scientists were Hiroo Kanamori (Caltech professor of geophysics), Goran Ekstrom and Adam Dziewonski of Harvard University, and Jeffrey Barker of Pasadena-based Woodward-Clyde Consultants.

The discovery began with a mysterious earthquake that occurred near Tori Shima, Japan, on June 13, 1984. Although the tremor was only a magnitude 5.5 on the Richter scale, it produced tsunamis, or tidal waves, that were disproportionately large—about 120 to 150 centimeters high at a distance of more than 100 miles away from the epicenter.

In examining the seismograms produced by the earthquake, Kanamori detected other abnormalities in the

radiated waves that set this earthquake apart from those caused by fault movement in the earth's crust.

Because of high-quality digital recording stations now deployed throughout the world, Kanamori was able to analyze the source of the earthquake with far greater precision than ever before. Working with Ekstrom, Dziewonski, and Barker, he developed a detailed scenario of how the quake occurred.

"When we looked at the data, we found that the pattern of seismic radiation from this event was totally different from any other earthquake," said Kanamori. "The quake couldn't have been due to faulting. The best explanation is that there was a sudden intrusion of magma into the oceanic crust, and that this molten rock reacted with the water in the sediment. The magma rapidly raised the water temperature, causing it to explode sideways within

the sediments."

According to the scientists' calculations, the injection of magma, which would have taken about 20 seconds, blasted about three tenths of a cubic kilometer of magma-water into the sediment beneath the seafloor.

By contrast, the 1980 eruption of Mount St. Helens involved about a cubic kilometer of material. That eruption was estimated to have the energy equivalent of about 500 Hiroshima-sized atomic bombs. At a temperature of 1,000 degrees centigrade, this magma would have quickly superheated the water in the ocean sediment, increasing its volume 30-fold, causing the explosion that lifted the seafloor over a large area.

Such an event is possible, according to Kanamori, because the epicenter of the earthquake was near the Bonin volcanic arc, about 500 kilometers south of Japan.

"Injection of magma as a cause of earthquakes was first suggested almost 50 years ago by a Japanese seismologist, M. Ishimoto," according to Kanamori. "A few seismologists subsequently reported evidence for such events, but the issue has been a matter of considerable controversy.

"However, the data for a volcanic origin for the Tori Shima event, especially the long-period waves of about 200 seconds, are more convincing than anything previously reported," he said. "Together with the evidence from the unusually large tsunamis, the seismic data make a very strong case for magma injection as a cause of this earthquake.

"This is a geological process that we cannot see directly, and the only way to study it is by seismological records. We had no idea that such a violent event could take place with such speed."

New Associates officers



New Associates officers are: Hugh Colvin, treasurer; J. Howard Marshall III, vice president; Robert Henigson, president; Caltech President Marvin L. Goldberger; Richard L. Hayman, immediate past president; Joanna Muir, vice president; and William T. Gimbel, secretary.

Media-besieged football squad stars in 8-1 season

Football

The 1986 "Battling Beaver" football squad withstood an unprecedented rash of publicity as it fought its way to an eight-win, one-loss season. Coach Lin Parker's latest gridiron edition was featured by CBS Evening News, the Los Angeles Times, USA Today, and other newspapers that published an Associated Press wire story on the squad. In addition, reporters from Sports Illustrated and the Smithsonian wrote stories for future publication.

This year's team averaged 22 points per game while allowing only 12. The National Collegiate Football Association gave the Beavers a final national ranking of fifth. This lofty finish prompted rumors once more of a match between Tech and MIT in a "Brain Bowl."

Early season victories were captured over La Verne's Reserves 7-0, Rio Hondo Academy 15-0, and an especially sweet victory over Cal Poly Pomona's 17,000 student body team, 21-14. In a season-ending appearance, Caltech defeated the Pasadena Police Association 20-12 in the second annual "Tournament for Tots" Bowl to aid needy children.

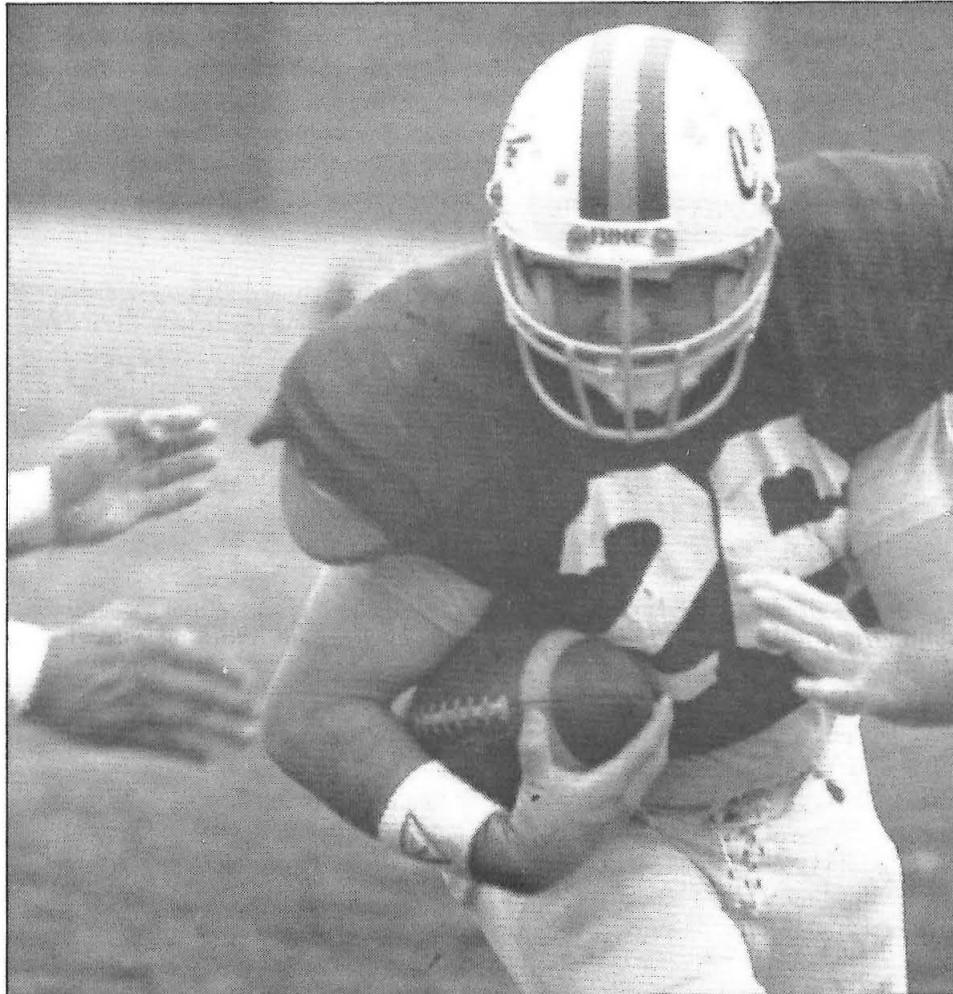
Of the 55 men who checked out football equipment this fall, 42 celebrated Caltech's second most successful season with the annual awards barbecue at the Alumni House. Four-year letter winners included Mike Burl, Steve Roskowski, and John Mann. Twice-retired Larry Sverdrup, a PhD in applied physics, received the longevity award as he lettered for the eighth year. Tri-captains Craig Jahnke, Scott Miskovich, and Rick Gilbrech received plaques for leadership.

The Rookie of the Year Award went to Page House member Dwight "Ice" Berg while Mike Burl received the Best Defender Award. The Irv Noren Trophy for outstanding back was voted to Martin Brouillette, and Page House senior Steve Roskowski was chosen for the Max West Trophy for outstanding lineman. David "Bubba" Brinza received the coveted Wheaton Trophy for leadership and all-around excellence.

Elsewhere in the SCIAC, Claremont-Mudd broke the Oxy stranglehold on the conference title.

Men's Cross Country

For the second consecutive year, participation in cross country increased dramatically at Caltech. As a result of the growing numbers, the competitive level of the team is rising. The influx of new talent comple-



Steve Collins eludes opposition in the final football game of the season against the Pasadena Police Association. Collins, a draftsman at JPL, played quarterback early in the year but took the fullback role in the final game.

mented the returning veterans to produce an 8-6 winning season.

The top five runners varied throughout the early season with freshmen Ron Rogge and Andrew Stevens, as well as sophomore transfer Ted Sande, turning in strong performances. Veteran John Gehring established himself as the top runner on the team while setting a school record of 29:37 on Caltech's home course in Lower Arroyo Park.

Seniors Mike Jensen and Chuck Lee continually pushed each other to outstanding efforts throughout the entire season as they traded second- and third-place finishes. Sophomore Alex Athanasopoulos, who established himself as a force to be reckoned with on the track, is in the process of learning how to transfer his talent to the cross country course.

Senior John Beck worked his way into shape throughout the season despite minimal training during the sum-

mer months. He displayed his immense talent and experience as he steadily worked his way up the ladder from ninth to third man by the season's end. Other notable performances were turned in by senior Darin Acosta and sophomores Jeff Willis and Ray Hu; each runner made his presence felt by running in

The NCAA western regional meet was held on the campus of the University of California at San Diego. Caltech managed to garner tenth place out of the 14 teams represented. John Gehring led the charge with a superb 23rd place finish with a time of 27:33.

Mike Jensen and John Beck both ran their best times of the season, completing the course at 28:39 and 29:38, respectively. Chuck Lee and Darin Acosta completed the scoring with times of 29:55 and 30:16.

At the team's annual awards banquet, John Gehring was the recipient of the prestigious Paul Barthel Award, presented by vote of the team for achievement, dedication, and leadership. The Outstanding Newcomer Award went to freshman Ron Rogge. Ray Hu received a special commendation for most dedicated athlete, while Mike Jensen claimed the Most Improved Award. Darin Acosta received a plaque that rewarded his excellence as a varsity letterman for all four years of cross country participation.

Women's Cross Country

The Caltech women's cross country team expanded to 11 competitors this year—a significant percentage of the number of women on campus. Youth and inexperience were the distinguishing traits of a team of six freshmen and three sophomores. Seniors Clea Bures and Jarita Holbrook provided a stabilizing influence as the team made tremendous week-to-week progress.

Despite the fact that four out of five top runners from last year's squad graduated, the group learned quickly that through consistent hard training, they could be competitive. Although the dual meet record stands at 3 wins and 11 losses, several other meets were decided by five or fewer points.

Strong contributions were made by Christina Garden, Bibi Jentoft-Nilsen, Dee Morrison, and Carmen Shepard—all of whom ran in the top five at various times during the season. Newcomers Ami Choksi, Mirian Yee, and Jennifer Low showed great promise.

Tech's women harriers finished sixth in the SCIAC, compiling a 1-5 record within the conference. At the SCIAC championship meet at La Mirada Park, the team scored 140

Continued on page 8

the top seven throughout the season.

Claremont hosted the SCIAC championships at La Mirada Park, a challenging neutral site course. Occidental ran away with the men's title with the lowest score of 33 points while Redlands and Pomona finished second and third, respectively. Host Claremont claimed fourth as Caltech claimed fifth, improving 22 points over last year by scoring 126 points. Whittier and La Verne rounded out the standings by placing sixth and seventh, respectively.

John Gehring ran a strong race to capture twelfth place at 27:30, earning second team all-conference status. Mike Jensen claimed 25th in 28:58 with Chuck Lee in close pursuit at 28th with a time of 29:23. Alex Athanasopoulos ran 29:55 for 31st place, as John Beck closed out the scoring in 35th place in 30:29. Ray Hu and Jeff Willis finished in 36th and 37th place, respectively.

Women's cross country

Continued from page 7

points as Clea Bures ran 21:39 to claim 17th place and second team all conference honors. Jarita Holbrook and Vicki Lane took 29th and 30th places with 23:25 and 23:26, respectively. Margi Pollack and Christina Garden were in close pursuit, recording personal best times of 24:03 and 25:00. Closing out the scoring for Caltech was Carmen Shepard in 39th and Dee Morrison in 41st place.

Claremont was able to hold off Occidental to claim the championship with 33 points to Occidental's 35. Redlands, Pomona, and Whittier took third, fourth, and fifth, with La Verne finishing behind Caltech for seventh place.

In the NCAA Western Regional meet in San Diego, Tech's top four women ran their best times of the season. Clea Bures placed 37th in a time of 20:16, followed by Jarita Holbrook and Vicki Lane in 22:49 and 22:50. Christina Garden ran 24:14.

Margi Pollack rounded out the scoring by finishing in 25:15, with Bibi Jentoft-Nilsen and Carmen Shepard not far behind in 25:52 and 26:04. Caltech placed 11th out of 16 teams represented in the region, showing true determination and spirit.

At the annual awards dinner, Clea Bures was presented a plaque designating her the outstanding female runner for the second consecutive year. Additionally, she received a prestigious award recognizing her for earning a varsity letter for four years. Vicki Lane received the Outstanding Newcomer award and Christina Garden was recipient of the Most Improved Runner Plaque. And for the second year, Dee Morrison received the Most Dedicated Athlete Award.

Soccer

In a season marked by several close, exciting games, the Caltech soccer team finished with a 7-8-1 record.

The season highlight was a 2-1 victory over La Verne. In this game, Caltech played the last 25 minutes with only nine players. (Derek Ney and Paul Cabral were ejected from the game by a referee known as "Hector the Ejector.") During the final 30 minutes, Van Eric Stein, Tech goal keeper, stopped, in magnificent style, everything that La Verne threw at him.

Another season high point was the

Occidental game, which Caltech lost, 4-3. Flavio Noca scored three goals for Caltech, only to see Occidental score with 30 seconds left in regulation. Unfortunately Flavio was injured as he scored his final goal, and was out for the remainder of the season.

The alumni game proved disappointing this year. The alumni team was short handed, and was supplemented by junior varsity players. The score: 7-1 varsity.

Claremont once again won the conference, winning all its conference games, scoring 52 goals, and only conceding 2. Tech finished in the conference with a 4-7-1 record.

Van Eric Stein and John Josephson were named first team all-conference and Mike Keating and Konstantin Othmer were chosen second team. Keating was a very able team captain, and Stein was selected most valuable player.

With only one senior (Derek Ney) graduating, prospects for next year look promising.

Water polo

The water polo team ended the season with 10 wins and 17 losses and a fifth place finish in the SCIAC conference. Early in the season, the young Tech squad posted impressive wins over Chapman, Dominion, and the University of Redlands. Later victories came at the expense of Rio Hondo and Chaffey Junior colleges.

Coach Clinton Dodd reported that "The team played at, or above, its abilities all season. We came close to upsetting some excellent teams, and we beat the teams we were supposed to beat."

The season produced a record-breaking effort by junior David Bruning. The primary setter, Bruning garnered 120 goals during 27 games,

surpassing polo All American Matt Wette's 1981 record of 63 goals. In addition, Bruning was the SCIAC scoring champion, even though he missed a conference game. Bruning racked up five 6-goal games, and in three games, scored 7, 8, and 9 goals. He could claim the team's highest shooting percentage: 49.4 percent.

This year three seniors led the team: Vince Ferrante with 63 goals, Randy Brown with 29, and Chris Assad with 8. The season effort benefited from the guidance of Caltech alumnus Chris McKinnon as assistant coach.

Junior Eric Christensen outperformed everyone's expectations, blocking 275 shots. With no experience, junior transfer Mark Holdsworth (with 5 goals) made the starting group and will be a real asset next year.

A strong sophomore group was led by Devin Leonard (35 goals), Brian Hayes (11), and Jordan Holt (9). Chris Habecker (14) and Clark Highstrete (15) took control of the hole area.

Janine Hopkins was the only member of the freshman squad with experience. Hopkins will be in training this spring for the Women's Junior National Team.

At the awards dinner, David Bruning received the coach's cup while Vince Ferrante and Randy Brown were awarded three-year letterman's plaques. Goalie Eric Christensen and Randy Brown took the Most Improved award, and Janine Hopkins received the Most Valuable Freshman trophy.

David Bruning was voted next year's captain by the team, and was voted second team All Conference by the coaches. Ferrante received an honorable mention All-Conference vote.

At the conference level, Claremont finished 12th in the nation in a field that included Division I colleges. Pomona-Pitzer finished fifth in the NIT Tournament and Whittier placed seventh.

Monterey Bay Aquarium tour set

A unique opportunity for alumni to tour the Monterey Bay Aquarium will be offered on Saturday, February 21, from 7 to 10 p.m. The aquarium will be open exclusively for Caltech alumni and their guests. The evening will feature exhibit viewing, refreshments, and informative guides, and a special presentation by Wheeler North, professor of environmental science at Caltech.

The cost of the event is \$30 per person. Details and sign-up information have been mailed to alumni in the area. If other alumni would like to participate in this event, please call the Alumni Association office, 818/356-6594, or write to the Association at 1-97, Pasadena, California 91125.

Biotechnology Frontiers: IA conference topic

The Industrial Associates will sponsor a conference on Chemical Frontiers in Biotechnology on March 31-April 1, with Peter B. Dervan (professor of chemistry) as chairman.

Topics will include mapping the human chromosome, automated DNA sequencing, separation techniques for large DNA, regulation at the level of gene transcription, regulation of gene expression by gene rearrangements, messenger RNA splicing, total chemical synthesis of proteins, catalytic antibodies, and molecular modeling for protein folding.

Additional information is available through Linda McManus, events coordinator, Development 105-40, Pasadena, California 91125.

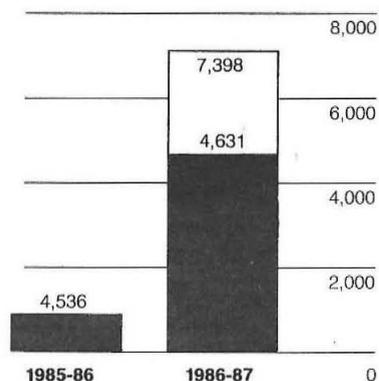
Development staff moves

The Caltech development staff has moved across campus to Dabney Hall. Their phone numbers are unchanged, but they have a new mailing address: Mail Code 105-40, Caltech, Pasadena, California, 91125. Development residents of Dabney Hall include the Alumni Fund, The Associates, Corporate Relations, Foundation Relations, Gift and Estate Planning, and Industrial Associates. Other development staff at the same location are alumni and development information services and development research.

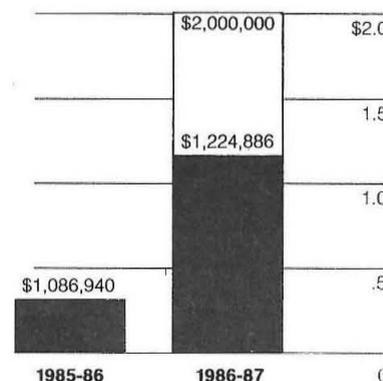
The Alumni Fund 1986-87/Goals and Achievements

□ Goals ■ Achievements as of Jan. 15, 1987

Donors



Dollars



Corporate matching gifts this year are down 50% (\$75,000) in comparison with the same time last year.

From the president

A new column of alumni news by Alumni Association President Paul Winter

This year I have the privilege of serving as president of the Caltech Alumni Association. The Institute means a great deal to me, and I am delighted to be able to help in this



Paul Winter,
Alumni
Association
President

way. The Alumni Association is your organization, and I invite your help

in making it the best in the country.

One of our primary goals this year is to create formal chapters in more cities across the country. Victor Veysey (BS '36) is chairman of our Chapter Affairs Committee and is actively involved in helping us organize our chapters. We are pleased with the initial response from alumni, and I will be reporting on our progress in future *Caltech News* issues.

In the meantime, many events for alumni are taking place, and it is too bad that not all of us can attend all of them. The remarkable exhibit "25 Years of Space Photography" opened

in October in the Museum of Contemporary Photography in Chicago. Caltech alumni were invited to a private reception, lecture, and viewing of the exhibit.

On December 11, James M. Bower, Caltech assistant professor of biology, spoke to a gathering of Caltech alumni in Seattle. Gil Peppin (BS '53), president of the Seattle chapter, has been instrumental in organizing events in that city.

San Francisco alumni can look forward to two exciting events in February. The space photography exhibit will open at the Exploratorium,

and a special evening is being planned at the Monterey Bay Aquarium. We look to Stephanie Charles (BS '73), who has served as president of the San Francisco chapter for two years, for assistance with our programs in the Bay Area. Hugh Dubb (BS '54), Don Cleveland (BS '34), and Paul Wolf (BS '44), who organize monthly luncheons in Palo Alto, Santa Cruz, and Sacramento, also rate our thanks.

Spring break will take the Caltech Glee Clubs to the Denver area, and Peter Bloomfield (BS '68) has been instrumental in developing a program for alumni on March 28. A number of other programs are in the planning stages, and I will keep you informed as they emerge.

Along with the efforts to strengthen chapter activities, the Board of Directors is working to continue to improve our traditional events. Our wine tasting programs will be held in the Athenaeum on two evenings in March. A special 50th annual Seminar Day is planned for May 16 under the direction of the Seminar Day Committee headed by LeVal Lund (BS '47), the general chairman. This committee has already begun its work to develop an exciting, educational day of lectures and exhibits for Caltech alumni in May. Individual reunions are planned for the classes of 1937, 1942, 1952, 1962, and 1977, along with a combined reunion for other classes graduating at five-year intervals. See the activities calendar for details.

Alumni volunteers are the backbone of our efforts, and I am indebted to each of you for your assistance. Janet Davis, executive director of the Alumni Association, and her marvelous staff are ready to help. I urge you to call the Alumni House if you have any questions about any of our programs. We welcome your ideas and comments, and we do want to hear from you.

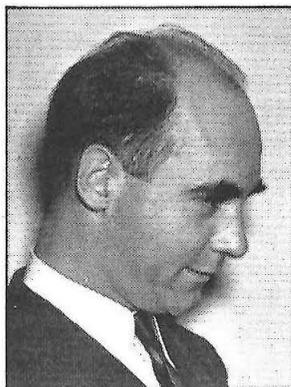
Seminar Day: looking back 50 years

This year Caltech will celebrate its 50th annual Alumni Seminar Day on May 16, following a 50-year-old tradition.

So many Caltech alumni (almost 400) turned out for that first program that larger rooms had to be found and simultaneous sessions arranged to accommodate everybody. The guests heard a distinguished group of speakers, three of whom would later become Nobel laureates, some of whom would give their names to campus buildings, and many of whom would spark warm memories of excellent instruction.

The first Seminar Day was a two-day affair, on March 5 and 6, 1938, and featured—in addition to lectures, exhibits, and meals—a Saturday night Glee Club concert. After the concert, alumni were lodged in the student houses, the Athenaeum, and

Lindvall on "Advances in Transportation," Clarence F. Kiech on "The Cancer Problem," Henry Borsook on "Vitamins in Health and Disease," Alexander Goetz on "Pursuit of Absolute Zero," and William B. Munro on "Domestic Tranquility for the Next Fifty Years."



Carl Anderson spoke on "The New Particles in Physics."

The afternoon program (after lunch in the student houses) featured Carl D. Anderson, "The New Particles in Physics," and Ira S. Bowen, "Astrophysics." Later, the alumni gathered for group seminars on specific disciplines, featuring Royal W. Sorensen, Robert L. Daugherty, Romeo R. Martel, Frederick J. Converse, Linus Pauling, William V. Houston, John P. Buwalda, Arthur L. Klein, Graham A. Laing, and Clinton K. Judy.

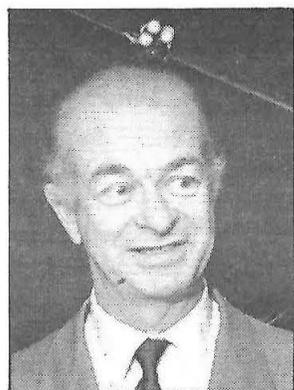
At a dinner meeting in the Athletic Club, Robert A. Millikan introduced the speaker, Arthur Raymond, an aeronautical engineer. On Sunday, alumni could attend chapel services in Dabney Lounge conducted by Caltech Y secretary John W. Price. Theodore G. Soares spoke on "Ethics and the Engineer," and afterward, the

guests listened to seminar presentations by Horace N. Gilbert, Thomas Hunt Morgan, Henry Borsook, Frits W. Went, Arnold O. Beckman, and Eric Temple Bell.

The original program was created by a committee including Clarence F. Kiech (chairman), Fred Ewing, Warn Foster, Wesley Hertinsein, Donald Clark, A. D. Hall, William Humason, and Edward Tuttle, along with directors of the Alumni Association.

This year's Seminar Day Committee is hard at work to create a program that alumni will find as exciting as did those 400 guests half a century ago. The event continues to provide a unique opportunity to share in exciting research on the campus. Committee members include: Gary W. Stupian (BS '61), past chairman; Leval Lund, Jr. (BS '47), general chairman; Joseph A. Dobrowolski (BS '49), program chairman; Franklin Dryden (BS '54, MS '57), assistant program chairman; and the program committee—Leo L. Baggerly (BS '51, MS '52, PhD '56), G. Edward Bryan (BS '54), Robert C. Burket (BS '65), Munson W. Dowd (BS '38, MS '46), Duane Erway (BS '57, MS '58), David J. D. Harper (MS '77), Robert G. Hawthorne (BS '47), David Hayward (BS '49), P. Douglas Josephson (BS '65), Dennis V. Long (BS '49, MS '55, PhD '61), John Odden (BS '74), Frank L. Vernon, Jr. (PhD '59), Donald H. Webb (PhD '65), and Donald P. Wilkinson (BS '48).

All alumni are encouraged to attend the special 50th Seminar Day this year. The April *Caltech News* issue will feature speakers for the event, and in April, registration material will be sent to alumni in California, Arizona, and Nevada.



Linus Pauling led a chemistry seminar.

private homes, so they could continue with the event on Sunday.

During the morning program, Ernest C. Watson talked to the graduates on cooperation between the Institute and alumni, Frederick C.

Alumni invited to swing

The Caltech Jazz Band will provide music for an evening of swing at 8 p.m. on Valentine's Day, February 14, in Dabney Hall. All alumni are invited to the event, which is under the auspices of the Alumni Association, the Caltech Y, the Graduate Student Council, the Master of Student Houses, and the Office of Student Affairs. Two dance practices—at 7:30 p.m. on February 3 and February 12—have been scheduled in Dabney Hall in preparation for the party.

ALUMNI ACTIVITIES

Mark your calendar with the dates below and join us for some of the Alumni Association's best programs. For more information about any event, please call Janet Davis, executive director of the Alumni Association, at 818/356-6594.

FEBRUARY 6, *Special preview of the exhibit "25 Years of Space Photography"* for Caltech alumni and guests at the Exploratorium in San Francisco.

FEBRUARY 21, *Monterey Bay Aquarium event* for Caltech alumni, featuring a private reception and tour of this unique marine facility. Details are being mailed to alumni in the area. See article on page 8.

MARCH 13 AND 20, 23rd annual wine tastings in the Athenaeum. An opportunity to taste fine wines, learn about their origins, and meet wine-makers from a variety of wineries.

MARCH 28, *Glee Club concert* for Denver alumni. Details are being mailed to alumni in the area.

MAY 1, *Reunion for the class of 1977* at the Athenaeum.

MAY 2, *Combined reunion event for the classes of 1947, 1957, 1967, 1972, and 1982* at the Athenaeum. Make a weekend of this reunion event by participating in Sports Day on Sunday, May 3.

MAY 2, *Reunion for the classes of 1942 and 1952* at the Athenaeum.

MAY 3, *Sports Day* on the campus. A chance for alumni, faculty, and students to compete in a variety of sports activities for fun and fitness.

MAY 15, *Reunion for the class of 1962* in the Athenaeum.

MAY 16, *50th annual Alumni Seminar Day* on the campus. This promises to be an exceptional Seminar Day and we hope you'll join us in celebrating 50 years of learning and achievement.

JUNE 5 and 6, *Reunion for the class of 1937*. Dinner on June 5 will be in the Annandale Country Club.

JUNE 6, *Half Century Club luncheon* in the Athenaeum.

OCTOBER 5-9, *New England alumni trip through New Hampshire and Vermont*, guided by Robert P. Sharp, professor of geology, emeritus, and by Jo Laird (PhD '77) and Wallace Bothner, professors of geology at the University of New Hampshire. Details and sign-up information are in the mail to Eastern alumni.

Students boost Alumni Fund



Some 200 Caltech students are calling alumni throughout the country this winter, seeking their support for the Alumni Fund. Above, Lisa LePome of Ricketts House and Frank Vasquez of Fleming House talk with alumni. Giving his support is Mario Capozzoli, Alumni Fund assistant director.

Alumni reunions feature class gifts to Alumni Fund

Alumni who graduated in 1937, 1942, 1952, 1962, and 1977 will celebrate their anniversaries with special reunions this year—and each class will make a cash gift, through the Alumni Fund, to the Institute. Contacts to individual alumni are in progress, as reunion gift campaign chairmen and their volunteers work to achieve goals before the spring events.

Classes, reunion gift campaign committee chairmen, and dollar and donor goals are: 1937 (50-year reunion), Irving Ashkenas, \$15,647, 108 donors; 1942 (45-year reunion), Hugh Baird, \$64,490, 127 donors; 1952 (35-year reunion), William Rihn, \$43,050, 158 donors; 1962 (25-year reunion), Wilfred Charette, \$22,077, 165 donors; 1977 (10-year reunion), Steve Mitchell, \$15,860, 189 donors.

All reunion gifts are unrestricted, and gifts from alumni to The Associates are given reunion credit. The reunion gift replaces an alumnus's regular Alumni Fund gift during the reunion year.

Other classes celebrating five-year reunions will take part in a reunion event on May 2.

LETTERS

Dear Editor:

I'm writing a biography of U.S. Senator Robert Packwood (R-Oregon), the author of the landmark 1968 tax reform bill, who enrolled as a freshman engineering major at Caltech in September 1950 but departed at the end of the term. I would tremendously value receiving a card or letter from anyone remembering Packwood in classes, on campus, or in the student houses. Thank you.

Mark Kirchmeier
403A Seward Square, SE
Washington, D.C.
202543-1651

Dear Editor:

The enclosed is a brief extract from a chapter out of some memoirs I am writing. I wondered if it might interest you in view of several news items and articles that have recently appeared in Caltech publications about Linus Pauling.

I enrolled at Beverly Hills High School in February 1928 at age 15. For my ninth grade year I chose a "literary course" composed of English, algebra, Spanish, and general science.

It was the latter course that interested me most. It was taught by a Dr. Frost, a medical doctor who, with his goatee beard, captured my imagination with his image of what I thought a scientist should look like.

About six weeks into the course, Dr. Frost announced that he would

take a small party of students to a Friday evening demonstration lecture on gravity at Caltech. The lucky ones would be those who had obtained an average of 325 points out of a maximum of 400 in their classwork so far. My name came at last and the number 323 appeared. I was devastated. I decided I would make my own way to Pasadena.

The specified Friday came and I started out. I was living alone in a small hotel on Reeves Drive as my parents had moved to Monrovia. To get to Pasadena I had to take one of the open-top deck buses along Wilshire Boulevard to Pershing Square. This part of the journey took 45 minutes. Then I walked to the Pacific Electric terminus on Main Street and waited for the big red car. Finally, some two hours later, I arrived in Pasadena and sought out Caltech.

I found the physics building and the lecture hall. I had given myself plenty of time and was early. I opened the large door and looked inside.

Clustered together were a group of students in animated conversation. On the demonstration table were models of crystal structures. On the blackboard were drawings of chemical molecular bonds. The centre of attention was a tall, slim young man with curly hair who was in excited discussion with the students. It was Linus Pauling.

I closed the door quietly in a state of euphoria and turned to look at the announcements on a notice board. There, in the dimly lit corridor of the Norman Bridge physics building, I vowed that somehow I would make it to Caltech.

The vow came to pass, although there was some opposition from my mother, who thought I should follow in my father's footsteps to New College, Oxford.

I might well never have set my goal to attain Caltech if I had not missed that A at half term, and so had not unexpectedly met Linus Pauling that evening, so great an impact he made on my life at the time.

Sincerely,
Adrian H. Gordon (BS '35)
Belair, Australia

Prank foiled

A few days before the Rose Bowl game, the frequency of a radio-controlled model airplane that was flying near the goal posts inadvertently triggered two banners that had been concealed inside the posts. One unfurled banner read "Dear Mom, send ♀. Love, Caltech." The second: "MIT prohibited." Thus did a well-planned prank meet an untimely demise.

Mechanical Universe Premiers on KCET

Beyond the Mechanical Universe, the second half of Caltech's college-level video introduction to physics, premiered February 3 on KCET. The series will run for 13 weeks, during which two programs a week will be shown—on Tuesdays and Thursdays from 12:30 to 1 p.m. Beginning February 10, the show is also being shown on KLCS, channel 58, on Tuesdays and Thursdays at 6:30 p.m.

Beyond the Mechanical Universe explores electricity, magnetism, and modern physics. The first 13 programs of the series, *The Mechanical Universe*, featured classical mechanics.

Obituaries

1921

CHARLES F. SIMPSON, of Burlingame, California, in October. He retired from Richfield Oil Corp. (now ARCO) in 1963 after more than 28 years. He is survived by his wife, Esther, and two daughters.

1925

FRANK M. FOSTER, of Pasadena, on September 4, after a long illness. He is survived by his wife.

1926

Oliver R. Wulf, PhD '26 and senior research associate emeritus in physical chemistry, died on January 11, 1987, at the age of 89. A member of the Caltech community for 42 years, he was the first research associate to be awarded the status "emeritus." After earning his PhD here, he spent 11 years with the US Department of Agriculture, where he was a senior physicist, and later worked for the Weather Bureau as a senior meteorologist. He joined the Caltech staff in 1945 to research solar-terrestrial relationships, geomagnetism, and large-scale circulation of the atmosphere. Dr. Wulf was elected to the National Academy of Sciences in 1949. He retired from Caltech in 1967. His wife, Bea, survives him.

1929

LAWRENCE J. GRUNDER, of La Habra, on November 4. He retired from Atlantic Richfield in 1968 when he started his own consulting firm, L. J. Grunder and Assoc. A memorial fund has been established in his name at Caltech, Office of Memorial Funds, Pasadena 91125. He is survived by his wife, Kathryn, and three daughters.

1933

THOMAS S. TERRILL, of Anderson, California, of cancer. He is survived by his wife, Leila.

1934

RAY E. KIDD, MS '35, of Arcadia, California, on November 20, after a long illness. He was an electrical engineer. He is survived by his wife, Dorothy, and three children.

1935

ALAN BEERBOWER, of San Diego, on September 1. He had been a consultant in lubricants and energy, associated with the energy department at UC San Diego. He retired as a senior research associate for Exxon Research & Engineering in Linden, New Jersey, in 1976. Surviving is his wife, Clarissa.

PERRY P. POLENTZ, of Saratoga, California, on May 24. He is survived by his wife.

1936

W. BRUCE BECKLEY, of Las Vegas, on October 5. He was a senior partner in the firm Beckley, Singleton, Delaney & Jemison.

1941

DANA E. WASHBURN, of Garden Grove, on May 13, after a heart attack. He was a retired Navy commander. Surviving is his wife, Christine.

1943

IVAN W. NELSON, Ex, of San Jose, on April 22. He is survived by his wife.

1944

STEPHEN W. DANA, PhD, on October 11. He had been a professor of geology at the University of Redlands. His wife, Jane, survives.

1947

BERNARD WALTER MARSCHNER, MS, Eng '48, PhD '54, on October 7, in Loveland, Colorado. He was a retired colonel and former administrator and faculty member at Colorado State University. At CSU, he had served as head of the mechanical engineering department, vice president for university affairs, and chairman of the computer science department. He is survived by his wife, Elaine; three sons; three daughters; a half-brother; a half-sister; and 11 grandchildren.

1949

LUIS E. BENITEZ, of Camarillo, California, on November 21. He was a programming manager at System Development Corporation in Santa Monica. His wife, Suzanne, survives.

Personals

1925

LINUS PAULING, PhD, is the 1987 winner of the American Chemical Society Award in Chemical Education. The award will be presented in April at the society's 193rd national meeting in Denver.

1942

CARL H. SAVIT, MS '43, has retired as senior vice president of Western Geophysical after 38 years of service. He was responsible for coordination and direction of Western's technical activities and associated companies in the Litton Resources Group. A member of many professional organizations, he has served as president of SEG, editor of *Geophysics*, and chairman of the NAS National Research Council Committee on Seismology. He has also received many awards, including the Marine Technology Society Compass Award, SEG's Kauffman Gold Medal, and IAGC's Distinguished Achievement Award.

1949

WILLIAM W. WARD, MS, PhD '52, has been selected by the AIAA as one of its Distinguished Lecturers for 1986-87. His talks to several AIAA sections on the exploration of the outer planets emphasize the engineering dimensions of Voyagers 1 and 2 and Pioneers 10 and 11. He works at MIT's Lincoln Laboratory as associate leader of the communication-technology group.

HUGH H. WOODBURY, PhD '53, was part of a team that recently received one of the General Electric Research and Development Center's Dushman Awards in recognition of outstanding contributions to scientific projects or technologies. The team contributed to the development of an advanced solid-state sensor array offering improved sensitivity to infrared energy. The device was developed primarily for military surveillance applications.

1952

ALEX DESSLER, professor of space physics at Rice University, is editor-in-chief of *Geophysical Letters*. His research at Rice concerns the sources of power for planetary magnetospheres and also atmospheric electricity.

1953

ALAN H. HABER, professor of biology at the State University of New York's University Center at Binghamton, writes that he is pursuing "two of my old interests: 1) student life—as master of this residential college (Hinman) within our university, and 2) writing—as an instructor in a philosophy of science course for freshman science students."

RONALD WATSON, MS, PhD '63, was one of two recipients of the 1986 President's Award for Engineering, one of the highest honors presented to employees at The Aerospace Corporation. An engineering specialist in the systems and computer engineering division, he was cited "for devising cost-effective surveillance radar modifications to enhance space defense capabilities." A resident of Manhattan Beach, he joined Aerospace in 1979.

1960

BRUCE R. DOE, PhD, has been named assistant director for research of the U.S. Geological Survey at its National Center in Reston, Virginia. A specialist in geochemistry and economic geology, he will serve as the principal adviser to the USGS director on major research initiatives and program directions within a wide range of USGS earth-science research activities. He is a Fellow of the Geological Society of America and a member of many professional organizations, including the American Geophysical Union, the Geochemical Society, and the Society of Economic Geologists. Among his many honors is the Meritorious Service Award—the second highest award of the Interior Department—which he received in 1983.

1963

ALVIN L. KWIRAM, PhD, has been named vice provost of the University of Washington. He joined the faculty in 1970 and has been chairman of the department of chemistry since 1970.

ROBERT W. NOYES, PhD, has been elected chairman of the board of the Association of Universities for Research in Astronomy. He has been a physicist at the Smithsonian Astrophysical Observatory since 1962 and an astronomy professor at Harvard since 1973.

NICHOLAS J. TURRO, Jr., PhD, has received the 42nd Harrison Howe Award of the Rochester Section of the American Chemical Society. He was recognized for his seminal research in many areas, including the synthesis and study of new and unusual high energy molecules, mechanistic organic photochemistry, the characterization of transient intermediates, and magnetic effects on chemical reactivity. He is the William P. Schweitzer Professor of Chemistry at Columbia.

CHARLES P. WANG, MS, PhD '67, is president of Optodyne, Inc. based in Compton. The firm develops, designs, manufactures, and sells laser-based diagnostic or measurement systems.

1967

JORAM P. PIATIGORSKY is the 1986 recipient of the Friedenwald Award which is presented annually by the trustees of the Association for Research in Vision and Ophthalmology in recognition of distinguished scientific achievement. Piatigorsky has been at National Institutes of Health since 1967 and is chief of the NEI's Laboratory of Molecular and Developmental Biology, where research focuses on the molecular biology of the lens. The author of over 100 articles on developmental biology and molecular genetics, he has also served on the editorial boards of several journals.

1971

CLIFFORD M. WILL, PhD, has written *Was Einstein Right?* Published by Basic Books, the book describes the people, ideas, and machines behind the experiments that have verified Einstein's general theory of relativity. Will's *Theory and Experiment in Gravitational Physics* was translated into Russian and published by a Soviet company.

1972

JOHNNIE B. CANNON, MS, PhD '75, has been named head of the Energy Division's Integrated Analysis and Assessment Section at Oak Ridge National Laboratory. The section's primary responsibility is to assist the Department of Energy, the Nuclear Regulatory Commission, and other federal agencies in the preparation of environmental statements and assessments in compliance with the National Environmental Policy Act. Cannon joined the staff there in 1975. He serves as research liaison for ONRL's Historically Black Colleges and Universities defense waste activities in the Nuclear and Chemical Waste Program. He and his wife live in Knoxville with their three children.

1974

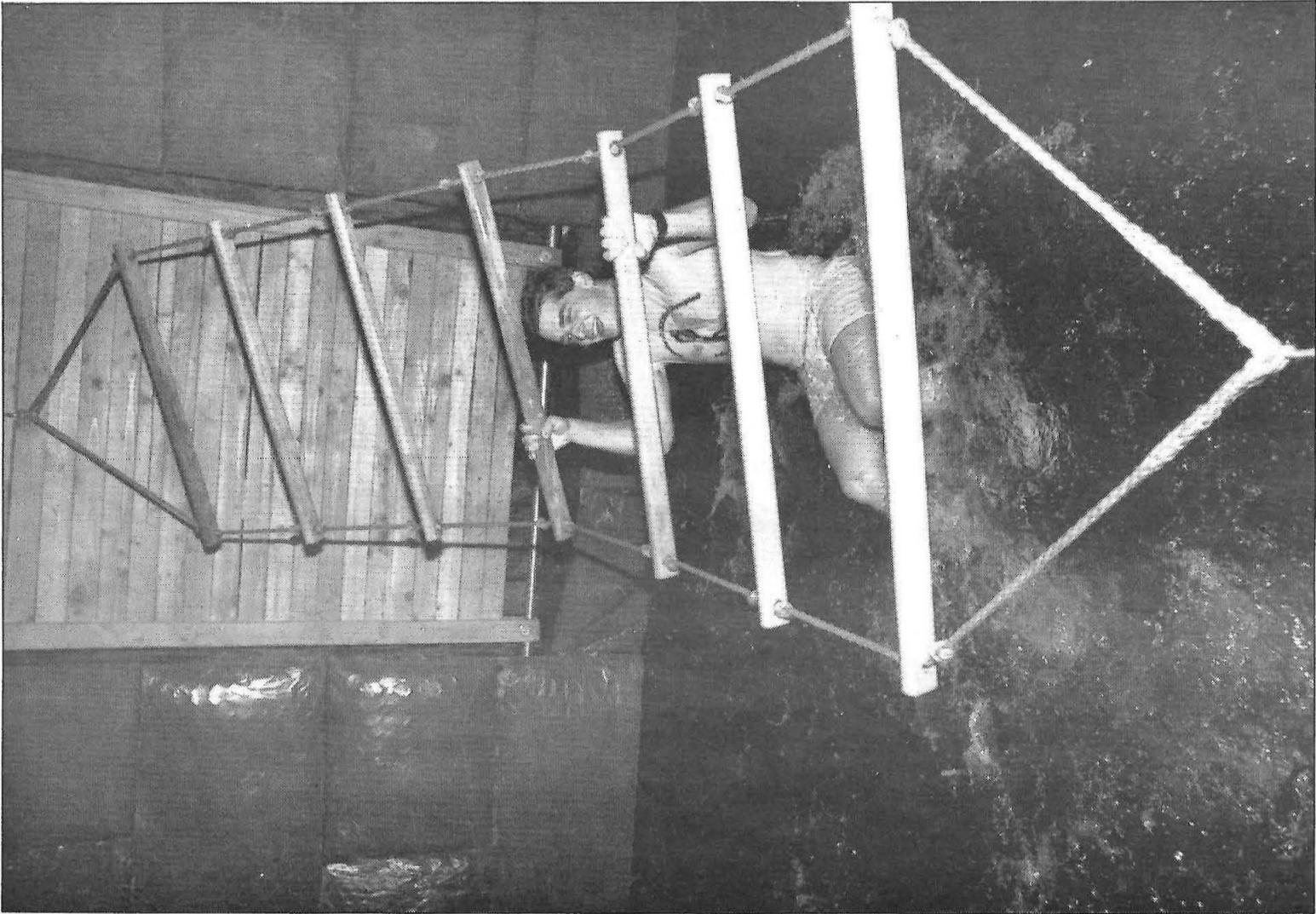
JOHN N. HURLEY, MS, has been promoted to assistant vice president and medical director at Ayerst Laboratories in New York. Before joining Ayerst in 1985, he was director of medical services at Rohrer and as director of clinical investigation at Smith, Kline & French.

PAUL A. THOMAS, MS '78, is an economics instructor at Lake Forest College in Illinois. A PhD candidate at Washington University, he was recently an instructor in economics at Purdue.

1978

JOSE I. CABEZON has joined the faculty at Carleton College in Northfield, Minnesota, where he is an instructor in religion. A PhD candidate in Buddhist studies at the University of Wisconsin, he has a special interest in Asian religions, languages, and literature.

CALTECH NEWS



Brad Scott of Blacker House tries in vain to master a Fleming House test of skill at Interhouse. Scott attempts to climb a swinging ladder connected to a drawbridge — a maneuver that would cause the drawbridge to open — and then to walk to the end of the drawbridge for a prize. (Scott was not alone in defeat; no one managed to make the climb.)

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President Marvin Goldberger addresses guests at dedication of Caltech's new submillimeter-wave observatory on Mauna Kea, Hawaii. See page 2.

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