Vol. 14, Number 7, November 1980

CALTECH NEWS

Galileo: the first to discover Neptune?

Galileo, the famous 17th-century astronomer who chalked up many discoveries during his prolific career, also was the first person to observe Neptune but he didn't know it was a planet, says Caltech astronomer Charles T. Kowal.

Kowal says that an examination of Galileo's observations show that the Italian astronomer actually saw Neptune twice—on December 28, 1612, and January 28, 1613—some 234 years before the planet was officially discovered.

While he was observing the planet Jupiter during two days in 1612 and 1613, Galileo recorded observations of "fixed stars" that happened to be near Jupiter, Kowal explains. But painstaking studies of tables that give the computed positions of heavenly bodies during the 17th century have convinced Kowal that Galileo was actually looking at Neptune.

Kowal, who evolved these findings in collaboration with Stillman Drake of the University of Toronto, says that Galileo made his most important observation of Neptune on January 28, 1613. Neptune happened to be close to a bright star on that night, and Galileo made a drawing of both with a scale indicating their separation. He also noted that the separation was smaller than on the preceding night.

According to textbooks, Neptune was discovered on September 26, 1846, by a young astronomer in Berlin, Johann Gottfried Galle, whose achievement was hailed as a great triumph in celestial exploration. The path to the planet's

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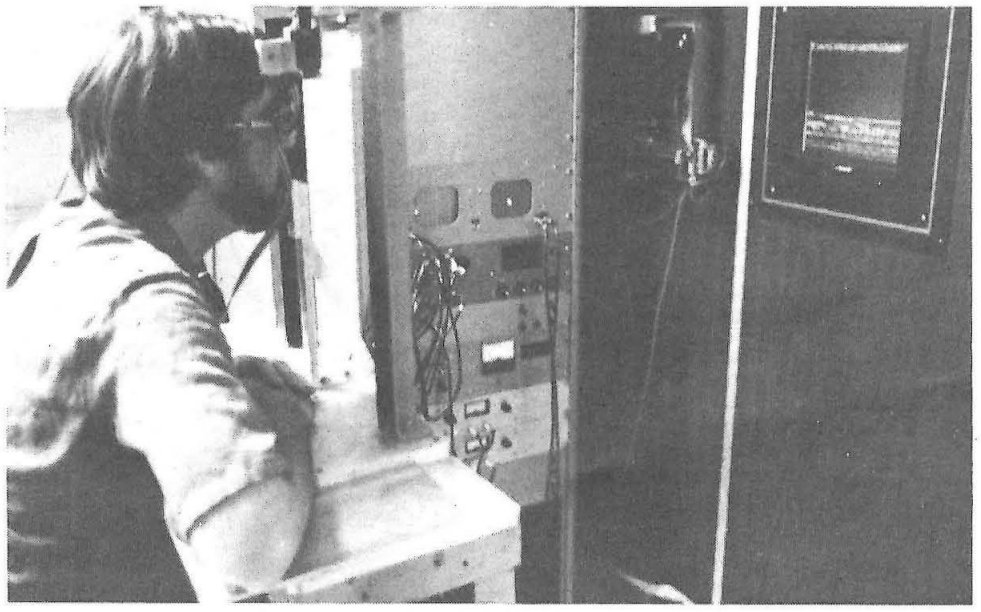

This computerized machine analyzes the way William Rosar's eye and brain function as he reads.

How do humans read? At last, the mystery yields

by Dennis Meredith

Even after more than a century of research on the process of reading, scientists still don't understand how you read this sentence. This is because normal literate human beings read at rates far faster than their eyes could possibly comprehend individual letters or words. They zip through sentences in a fraction of a second, sorting through a massive vocabulary to recognize words and understand their meanings.

Now some of the mystery that surrounds this process is beginning to yield to investigation. Raymond Briggs and his colleagues, William Rosar and Dennis Hocevar, are making significant progress in understanding how reading occurs. (Briggs is working as a visiting associate with Caltech Professor of Biology and Applied Science Derek H. Fender.)

The research team is in the final stages of developing a computerized machine, the only one of its kind, that is literally quicker than the eye. The machine can change the text on its display screen with such lightning speed that researchers can at last analyze the complex strategies that the eye and brain use in recognizing words and coding their meanings.

The lack of scientific insight into the reading process is more than academic, Briggs stresses, because reading is second only to speech in determining whether a person can successfully communicate in society. Despite society's massive educational apparatus, 10 to 20 percent of the people remain functionally illiterate, and a similar percentage have difficulty reading a newspaper.

"The consequence of reading failures for society read like a horror story in terms of unemployment, poverty, delinquency, and crime," Briggs says. "Reading failure is partly related to socio-economic factors, but reading difficulties occur throughout the population—and often in children of exceptional intelligence from wealthy families."

In attempting to understand the root of reading problems, scientists have known since 1879 that the eye does not fixate on individual words in reading, but skitters across a sentence in a series of jumps, or saccades—about six jumps per second in an accomplished reader. Each saccade lands several words farther along in a sentence, and so sophisticated is the mental processing involved that the brain even anticipates the end of a line and whips back to the beginning of the next. Perception of words occurs between saccades, but the actual mental coding of what has been read may occur during the saccades themselves.

Exactly how the eye recognizes words between saccades is unknown, but several theories have been advanced. The most popular theory, called orthographic coding, holds that readers selectively recognize high-probability clusters and look for distinctive word features, rather than trying to figure out all of the letters in all of the words. The Caltech scientists' aim is to manipulate text so rapidly that they can precisely control what the eye is able to perceive, and thus separate the perception of words from the cognitive processing of printed material.

To do this, they are developing a computerized "traveling window" system, drawing on pioneering research at MIT. Subjects tested on this system are fitted with contact lenses from which protrudes a tiny stalk with a light on the end of it. As the subject's eye moves, the beam from this light travels across a photomultiplier tube, and the information on eyeball position is fed directly into the computer. This computer also controls a display screen that can alter almost instantaneously the text that the eye is reading, and can record data on how the eye reacts.

For instance, the screen can be programmed to allow the subject to see only a limited amount of text, no matter where his eye moves. Using this method, scientists can determine how much information the reader obtains via his peripheral

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vision in cognition. Additionally, the device can fool the eye by altering the text in the instant before, during, or after a saccade, to see how well the eye can reprogram its jumps and what the brain actually understands at different points in the reading process.

A major technical problem with such studies in the past, including those at MIT, has been developing a screen that can be altered in the few thousandths of a second necessary to beat the eye movement. Ordinary television-type screens cannot do this because their pictures are constantly renewed by scanning. Under a command to change displays, the scanning process reacts imprecisely and with some delay.

In contrast, the Caltech group uses a "plasma screen" as its display medium. The screen consists of an array of 512 by 512 luminous dots, each of which the computer can turn on or off individually. Moreover, the screen can change 20 or 30 characters per millisecond.

The scientists also are developing high-speed computer programs that are fast enough to detect the beginning of a saccade and to change the screen. Besides the text to be read, the screen also features two "eye buttons" in the lower corners of the display. The computer registers glances at one or the other of the eye buttons, enabling the subjects to respond to questions about the text without taking their attention from the screen.

The researchers have been gradually working their system up to the necessary speed, doing preliminary experiments to build up the conceptual model of the reading process that they will explore when they use the final device. They expect to have the full system operating next year.

"Our current model accounts for about 40 percent of what's going on in reading," says Dr. Briggs, "which is better than the 15 percent we began with."

By using the new system, scientists may at last be able to understand how the halting, letter-by-letter reading of children is transformed into the rapid, sophisticated information processing of adults. "In the future, children may be given computerized tests, either in school or at home, to diagnose perceptual problems before they even begin reading," Briggs says. "This kind of early diagnosis is vital to solving reading problems before the child's internal misprogramming permanently leads him astray."

Bower and Gates: new Caltech Trustees

Donald L. Bower and Charles C. Gates have been named to the Caltech Board of Trustees, Board chairman R. Stanton Avery has announced. Bower is vice chairman of the board of Standard Oil Company of California; Gates is president and chairman of the board of Gates Rubber Company of Denver, Colorado.

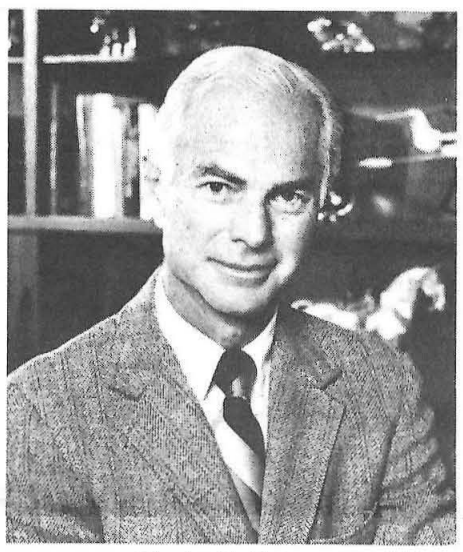
Bower is a 33-year veteran of Standard Oil; he joined the firm in 1947 after receiving his BS degree in business administration from Oregon State University. He held a succession of positions in marketing on the Pacific coast and in Arizona and Hawaii, and in 1963 he was appointed president of a company subsidiary, the Eastern Division of Chevron Oil Company, headquartered in New Jersey.

Donald L. Bower

In 1967, Bower was appointed vice president of Standard Oil Company of California. He was elected a director in 1968, and in 1977 he became the first president and chief executive officer of Chevron USA. He was elected vice chairman of Standard Oil Company of California in October 1979. Bower is also a director of Crocker National Corporation and Crocker National Bank.

Gates, who is also chairman of the board of Gates Learjet, received his BS degree in engineering from Stanford University in 1943. After three years with CoPolymer Corporation, he joined Gates Rubber Company in 1951 as a vice-president, becoming president and chairman of the board in 1961.

The recipient of an honorary doctorate in engineering from Michigan Technological University, he is also a director of the Colorado Association of Commerce and Industry, the National Association of Manufacturers, and the Rubber Manufacturers Association. He is a member of the board of trustees of the Denver Museum of Natural History and a director of Hamilton Brothers Petroleum Corporation, Robinson Brick & Tile Company, and the Federal Reserve Bank of Kansas City.



Charles C. Gates

Weingart Foundation gives $1 million for special projects

A facility to isolate human genes, an astronomical data processing center, and programs in resource geology will be among Caltech projects supported by the Weingart Fund for Special Programs. The Fund is being established by a grant of $1 million from the Weingart Foundation to the Institute.

President Marvin L. Goldberger said the gift has special meaning to Caltech because "it gives the Institute an opportunity to initiate exciting, important, and innovative projects that show great promise."

Among the areas benefiting from the grant will be a facility to be developed at the Institute to isolate human genes. This program is expected to substantially alter the study of human genetics and the sensitivity and speed with which genes and their products can be isolated and characterized.

The facility will be available to scientists from all over the world, in the way that a few centralized high-energy accelerators are used by physicists from many different countries. Two molecules to be studied will be interferon (which may play a major role in fighting viral infections and checking certain types of cancer) and dynorphin (a neurohormone that may be helpful in the treatment of mental disorders and that may play a critical role in the aging process).

Also receiving support from the Fund will be the Institute's resource geology program. This field is of special importance as human beings increasingly exploit less traditional types of fossil fuels and minerals, especially those containing lower concentrations of the desired end products. Institute geologists will develop an x-ray fluorescence chemical analysis facility, which will provide a highly sensitive, reliable method of analysis of trace constituents in minerals and fossil fuels.

In astronomy, the Weingart Fund will support the establishment of a data processing center to analyze information received simultaneously from several radio telescopes around the world. Thus Caltech will be the first institution with the ability to analyze these important data, which will provide clues about the structure of quasars, the behavior of black holes, and the origin and size of the universe.

The Weingart Foundation was established in 1951 by Ben Weingart and his late wife, Stella. The Foundation supports programs that improve the quality of life for the elderly and disadvantaged, pilot projects leading to advances in medical science, and distinguished institutions that conduct important research.

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Historical (hysterical) student life

Caltech Archivist Judith Goodstein described student life through the ages—and especially at Caltech—in her talk at the Gnome Club annual dinner. Her remarks are condensed below.

Student life is as old as organized education. In the early days of university life, students banded together to protect themselves from townspeople and their professors. Back then, professors lived solely on the fees of their students. To protect their interests, the students drew up elaborate statutes governing the conduct of their teachers. If the professor decided to cancel one of his regular lectures, he needed permission from his students. If he wanted to leave town during the term, he had to post a bond to ensure his return. If less than five students came to class, the students slapped a fine on the teacher. Clearly, something was the matter with the man's teaching if he could not attract even five pupils.

Much of what we know about medieval students comes from the records of courts of law. It is there that we learn about the case of the Bolognese student who was attacked with a cutlass in a classroom, or the student in 1289 who was set upon by a townsman as he exited from the lecture hall. The townsman, we are told, "wounded him in the head with a stone, so that much blood gushed forth." Meanwhile, other townsmen watched the proceedings and urged their comrade on, saying, "Give it to him, hit him." One suspects the student forgot to pay a bill.

Student quarrels then typically involved sword fights, and the resulting loss of one or more fingers. Classrooms were noisy places. Students whistled, hissed, stamped their feet, and applauded loudly, depending on how the lecture was going.

Let's turn now to student life in the early days of Caltech. In the beginning there was Throop University, beginning in a rented building in downtown Pasadena in 1891. Within the year, Throop University had outgrown both its name and its quarters. It began a new life as Throop Polytechnic Institute on a new campus. In 1910, the school shed both its name and its co-educational tradition. Throop Polytechnic became Throop College of Technology and moved to its present site. In 1920, the school finally made up its mind what its name was, and Caltech it has been ever since.

FREE **FREE**

THROOP CLUB

STAG

When? **--Monday, Sept. 23, 8 P. M.**

Where? **--Campus Den of Iniquity**

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FREE **FREE**

This 1935 bulletin summons students to a beginning-of-the-year stag party in the Dugout as guests of the Throop Club. After 1931, when most undergraduates moved into the new student houses, the Throop Club became the focus of the social activities for students living off campus. The Dugout served as an on-campus club room. (Bulletin courtesy of the Caltech Archives.)

Most of its undergraduates came from neighboring communities. Although we don't think of it today as a commuter college, Caltech could accommodate only a small fraction of its student body prior to the construction of four student houses in 1931.

Student life changed dramatically when the new dormitories opened. For the first time in Caltech's history, the majority of undergraduates were living together on campus. What has come down from the thirties are records of various faculty and administrative committees set up to deal with student matters: manuals of etiquette, letters of irate parents, and a host of other written and visual documents—which taken together, suggest that the Caltech student of fifty years ago enjoyed taking on the campus authorities.

For one thing, the students were great petition writers. When Dr. Millikan in the early thirties announced that tuition rates were going up, the students immediately circulated a petition denouncing the action. On that one Millikan had the last say. When a student waiter was suspended by the dormitory housekeeper for failing to show up for his duties, the other student waiters petitioned the administration; they threatened to walk off the job as well. The housekeeper capitulated.

With the coming of student houses came the Faculty Committee on Campus Life and Interests, and their rules. The preamble to the original student house by-laws begins: "Ideally, each house should be a mature, self-governing community." Having satisfied themselves, the committee then set about the task of helping the Caltech student achieve his civic potential. After sober reflection and deliberation, the school's elders settled on fourteen commandments of Caltech student life. These are among my favorites:

"There shall be no willful destruction or defacing of property in the houses."

"There shall be no firecrackers in the houses."

"Students shall keep off the roof."

"There shall be no water fights inside the House."

"During vacations, none of the above rules is suspended."

The students listened, but they didn't always heed.

One friendly fight in Fleming and Dabney Houses began on the afternoon of February 20, 1935, and continued in a friendly way into the evening. The next morning, the damages were tallied up. Fleming House needed one new teak door and some new roof tiles, and the water in the hall needed immediate attention. Over in Dabney, there were a couple of broken windows, a broken broom, door bolt and chain, and possibly the court walls needed refinishing. The damage to both houses was about $300, the annual tuition fee for undergraduate students in those days.

Millikan promptly called a meeting of his Executive Council. Millikan was famous for doing most of the talking at these meetings. He would present an issue, essentially think it through for the whole group, and then dismiss the council with the statement, "Well, gentlemen, I'm glad to see you all agree with me."

Now Millikan decided that what Caltech needed was a faculty committee on student houses. A committee was formed on the spot. The students, understanding the power structure at Caltech, promptly sent a new petition to Millikan about the food situation in the student houses. The petition criticized the planning and preparation of meals. "For $1.17 per day, which is what we pay for food in the student houses," the students wrote, "one can eat better food in similar quantities" elsewhere.

The students made a number of meal recommendations. Breakfasts, they noted, should include bacon and eggs, not bacon one day and eggs the next. Also, scrambled eggs should be prepared in a less watery way so that no drainage was necessary. Fleming House in particular voted down stewed apricots and prunes. Complaints about meats and vegetables tied for second place. The bean, hot dog, and brown bread meal was very unpop-

Please turn the page

ular. Other universally unpopular foods included brussels sprouts, pineapple pie, and the soggy cake with apple or peach on top.

Food also figured in festivities before the football game with Occidental. As part of the Pajamarino preceding the game, the students had a food free-for-all in the dining room. Caltech's elders took a dim view of this practice, and asked the resident associates in the houses to explain their charges' behavior. The resident associate of Dabney House, Donald Clark, a Caltech man himself, tried to explain the matter in a letter to the dean of students.

"We *must* remember that we are dealing with young men who are filled with enthusiasm and particularly at this time with spirit in anticipation of the Pajamarino . . . ," he wrote. "None of us would care to see this enthusiasm and spirit completely subdued."

Clark did allow in his letter that no resident associate had ever attended one of these Pajamarino dinners. He had it on good authority, however, that the food caused no permanent disfigurement to the walls, ceilings, or furniture.

Student life at Caltech in the early years also consisted of going to Mrs. Millikan's senior tea. The 1923 tea was truly memorable because Dr. Millikan went to sleep while his wife questioned each senior about his desired life work.

During the depression years, Millikan balanced the budget, and found the money besides to support special research projects. Millikan also consulted his faculty less and less during the thirties. If they complained about this (and some did) they nevertheless recognized Millikan's genius as a money raiser for the Institute.

So did the students. An anonymous Caltech graffiti artist added his message to others on the steam shovel several days after it arrived on the campus to begin excavations in 1937 for the Crellin Laboratory of Chemistry.

Underneath ROOSEVELT FOR KING and JESUS SAVES, the student wrote: BUT MILLIKAN GETS CREDIT.

The students often have the last word at Caltech.

Molten rock: the earth's first sea?

The ancient earth was once covered with a gigantic ocean of magma, or molten rock, as deep as 400 kilometers, according to a new theory of the earth's formation.

The theory, developed by Caltech professor of geophysics Don L. Anderson, is drawn from over a decade's worth of research on global geophysical processes, mineral analyses, and studies of seismic waves, and represents a radical departure from commonly accepted theories of the earth's early history. According to traditional beliefs, the earth formed with a largely pristine interior, and with only modest amounts of melting to supply the molten material that emerges from volcanoes or flows from within the mantle at ocean ridges.

(The mantle is the semi-solid region of the earth between its thin crust and its superdense nickel-iron core; it is separated into an upper and lower region by a sharp discontinuity at around 670 kilometers. Earthquakes do not occur below the demarcation, presumably because the mantle's extreme density there prevents the surface plates from sinking any deeper.)

According to Anderson's theory, the layers of the earth's upper mantle were separated and solidified from a giant magma ocean or series of huge lava lakes, on an earth that 4 billion years ago was a violent cauldron. His concept is based on a new explanation of the way the upper mantle is layered.

Chemists have found that two distinct kinds of material are emerging from the planet's depths, in terms of the concentrations of a dozen or so trace elements such as potassium, rubidium, strontium, barium, and uranium. One kind of material emerges from the mid-ocean ridges and another kind emerges from hot spots on continents and ocean islands — for example, Iceland, Hawaii, the Canary Islands, and the Azores. These hot spots are marked by volcanoes or geothermal activity. The two sources of mantle material appear to be complementary, according to Anderson, in that the hot spots are rich in the trace elements that have been depleted from the ocean ridges.

Studies of the seismic waves that ring the earth after large earthquakes have revealed two

Don Anderson

layers in the upper mantle of the earth, which probably represent the sources of the two types of mantle material. A shallow layer just beneath the crust is called the low-velocity zone because seismic waves are slowed as they travel through it. A deeper layer is called the transition zone because it is intermediate in properties between the low-velocity layer and the deeper mantle.

Anderson was able to compute the probable volume of the reservoirs for ocean ridge and hot spot material by analyzing how various mantle materials would extract trace elements. His conclusions agreed with what would be expected if the hot spot material came from the shallow low-velocity zone and the ocean ridge material came from the deeper transition zone. The shallow zone begins about 27 kilometers within the earth and extends to about 220 kilometers, and the latter ranged from 220 kilometers down to 670 kilometers.

This explanation for the layering of the upper mantle of the earth led Anderson to his new theory of the earth's formation. He believes the best explanation for the layering and for the extent of trace-element enrichment is that, billions of years ago, the earth coalesced as a hot ball, covered by an immense ocean of magma.

A thin temporary crust may have formed over this ocean while it cooled, but the main solidification of the ocean took place from the bottom up, because the crystals that formed out of the ocean — principally the minerals garnet and clinopyroxene — were denser than the melt and sank to the bottom. An upper layer of lighter material — principally garnet and peridotite — was also created. Thus the magma ocean fractionated into two principal layers, which became the layers of the upper mantle.

Eventually, Anderson believes, the earth cooled enough so that the crust material could sink, and a steady pattern of convection was set up in which the material from the transition region oozes upward through the mid-ocean ridges. There it spreads away and cools, creating the ocean floor.

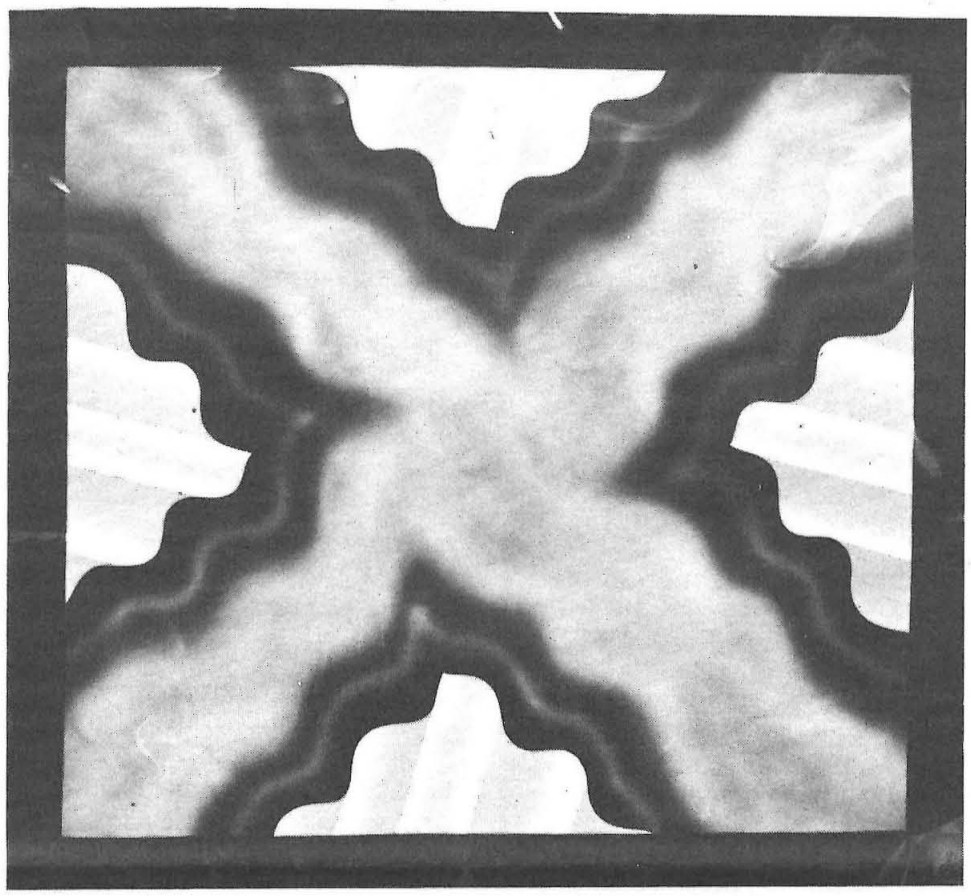
Millions of years later this material, now denser than the mantle, sinks back into the mantle in such deep ocean trenches and island arcs as Japan, Tonga, Chile, and the Aleutians.

Meanwhile, the shallow low-velocity zone material (a red-hot slush of liquid and solid rock that Anderson suggests is the hot spot reservoir) periodically punches its way through the continental plates, creating eruptions of material distinct from that in the deeper transition zone.

The new theory offers an explanation for why there are no "genesis rocks" on the earth — rocks as old as the earth itself. The oldest rock found so far is only 3.8 billion years old while the earth was formed almost a billion years earlier. According to Anderson's theory, solidified rock such as that in the primitive temporary crust would have been sucked totally into the depths of the earth as the ocean of magma cooled and set up powerful convection forces.

Art at Caltech: a gallery comes of age

by Phyllis Brewster



This work, "Rio Grande Dracula," in acrylic and polyester resin on aluminum, was featured in an exhibit in Baxter Art Gallery in 1979.

The exhibition of fine art seems far afield from Caltech's traditional areas of strength. And yet, as the result of a little more than ten years of cultivation and hard work, Caltech is entering the 1980s with an established art gallery with a steadily growing audience of visitors, an expanded educational program, substantial financial support, and an increasingly fine reputation in its special field.

That special field—in the words of gallery director Michael Smith—is "art in the present tense." Smith says that this encompasses more than just contemporary art, that Baxter's emphasis is on "artists living and working today for audiences who will experience the art today."

Among the exhibitions by artists both widely accepted and widely controversial that Baxter has presented in the past three years since Smith took over the directorship have been a collection of imaginative timepieces, a documentation of corporate art attitudes, invisible acoustic sculpture, and a proposal for a children's museum that drew 10,000 visitors in five weeks. Baxter also sponsored the lecture appearance of one of the major art historians in the country—Barbara Rose—and the gallery put together an exhibition of Nathan Oliveira monotypes, which was subsequently shown in The Phillips Collection in Washington, D.C., and hailed by *Washington Post* critic Paul Richards as "one of the finest in years" to be mounted in that museum. This is in addition to regular exhibitions of watercolors, photography, sculpture, video, performance, and music of non-traditional, creative, contemporary, imaginative origins.

The exhibition of art at Caltech on a regular basis began in 1969 with a show in Dabney Hall. The next ten years were marked with troubles and triumphs and uneven growth. By the time that the exhibition of art had found a home in the newly built Baxter Hall of the Humanities and Social Sciences, it had generated the kind of parental concern — and painful criticism—that almost always accompanies the development of a first child.

But all that is now a matter of family history. Today Baxter Art Gallery is a healthy, self-confident adult, enjoying recognition and praise from professionals and from an involved public coming from both the campus and from the greater southern California communities.

How did all this happen at a stronghold of science and technology? According to Roger Noll, chairman of the division that has the gallery under its financial wing, it was a coming together of several historical circumstances.

One of those circumstances was the transformation in 1974 of the Pasadena Museum of Modern Art—which for years had been the southland's primary repository for contemporary art—into the Norton Simon Museum, with an entirely different focus. At about the same time this metamorphosis took place, the Baxter Art Gallery was in a crisis situation. Funds were tight and the valiant efforts of faculty members—among them David Smith, Robert Rosenstone, and Kent Clark—who had been working to keep it going, were nearly exhausted. Fortuitously, the Pasadena Art Alliance affiliated with the gallery, bringing with it a commitment of time and energy and money from some 150 persons dedicated to the support of contemporary art. Baxter Art Gallery became heir to the void left when there was no longer a public museum in Pasadena with a modern art emphasis

In his search for a wide range of art that communicates, Smith has carefully avoided a forced wedding of art and technology, something that might be supposed to draw Caltech people. But he feels that this combination can be a real detriment. "To the artists, technology is either a mystery or gadgetry," he says. "On the other hand, the scientist tends to judge the combination of art and technology on its scientific merit and often finds such presentations lacking."

The decision of Baxter's planners to focus on contemporary art is one of the primary reasons for its increasing success, some people believe. "It is clearly in the tradition of Caltech to identify things that others don't do and then to do them well," Chairman Noll says.

Doing them well has been the responsibility of Director Michael Smith, a man who, Noll says, will "go to the wall" for art.

The director considers his main challenge at Caltech to be organizing exhibitions of sufficient quality to attract the very busy, highly intelligent, sophisticated audience of Caltech. "I wanted to start on a high level," Michael says, "and to stay there."

Smith feels that if art is to communicate, then artists and their publics have to be on the same wavelength: "Today's artists are trying to accomplish this," Smith says. "They are not creating for posterity, but for now."

Smith has worked hard to make himself accessible to those interested in learning anything about the exhibitions, the artists, or contemporary art in general. A series of programs, called Every Tuesday, offers noon discussion meetings, informal beer gatherings for students, docent tours led by Smith, opening night receptions by the Alliance, receptions for the artists, and evening programs of films and lectures.

All this careful attention to quality and the individual has resulted in a whole new audience of people who have never come to the gallery—and some never to Caltech—before. "The exhibits reach a whole new group of friends and potential supporters," Noll says.

Elliot awarded NATO fellowship

David C. Elliot, professor of history, has been awarded a NATO advanced research fellowship for the 1980–81 academic year. His is one of 25 awards to citizens of countries that are members of the North Atlantic Alliance.

The aim of the fellowships is to promote research leading to publication of studies on aspects of common interests, traditions, and viewpoints of the 15 member countries of NATO. Elliot's field of study will be "A Study of European Moves for Arms Control Measures Dealing with Theater Nuclear Forces, with Emphasis on the Special Study Group Set Up in 1979 by the NATO High Level Group."

The making of a (vice) president

by Phyllis Brewster

James J. Morgan has been heard to say that he is a product of the streets of New York. Given that he did spend large portions of his boyhood and adolescence between Broadway and Amsterdam in upper Manhattan, Morgan, who has been professor of environmental engineering science at Caltech since 1969, has obviously been honed by more than just the asphalt jungle.

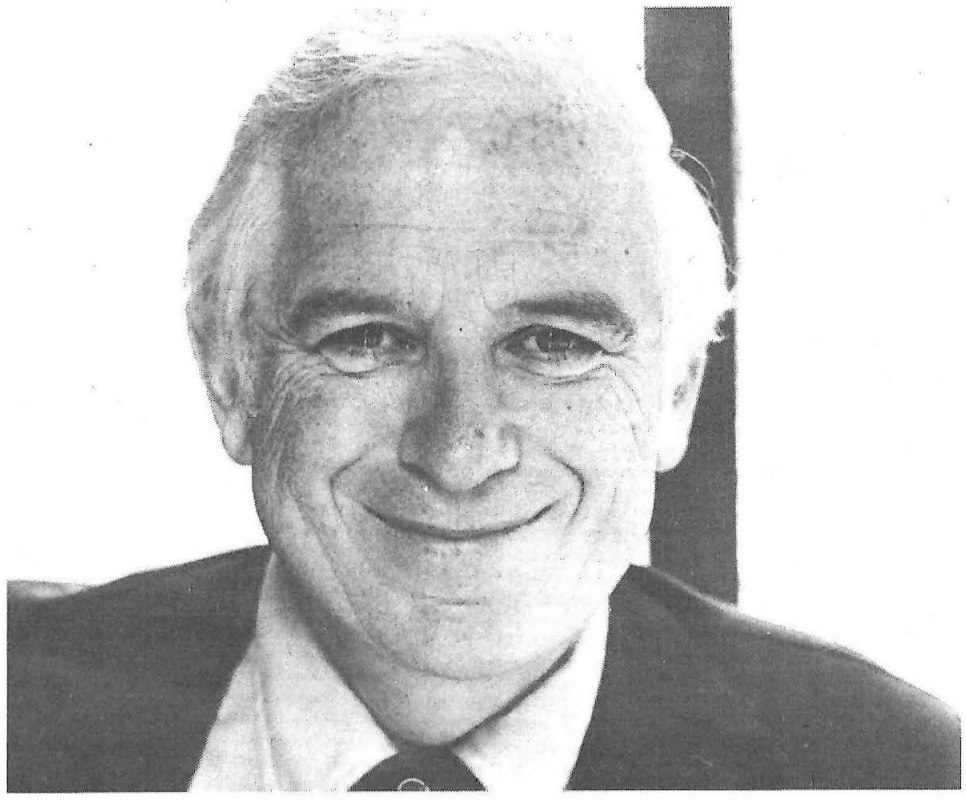
For example, he gives credit to his childhood in Ireland, his parochial school education in the Bronx, the Christian Brothers of Manhattan College, two inspirational teachers—one in college and one in graduate school—the well waters and river waters of Michigan and Illinois, and the playing fields of Caltech.

Whatever else has gone into the shaping of the scientist, the scholar, and the man, today Jim Morgan is well equipped—philosophically and otherwise—to handle the new job he has just assumed—that of vice president for student affairs.

Under this all-encompassing title, Morgan has varying degrees of responsibility for almost all of the functions and philosophies that affect undergraduates, from admission to commencement. Not the least of his challenges will be to help keep a delicate balance between the maintenance of academic pressure and the relief from academic pressure.

What makes Jim Morgan prepared—and more important, willing—to take all this on may hark back to his childhood in Ireland and New York. But an important factor is his strong respect for Caltech students. After 15 years among Techers, Morgan continues to be excited about how bright they are. And his enthusiasm extends beyond their academic capabilities to their other interests. These, he says, are wider than most people think.

Morgan's caring about student interests reflects his own wide variety of involvements. Although science has been the focus of his professional life, and his research accomplishments have been considerable, his early attachment to the humanities and to the teaching profession has influenced him a great deal.



Morgan was born in 1932 in Manhattan's Sloan Hospital—the first child of a young immigrant couple who had arrived in New York from Ireland just six years earlier. By the time their son was born the Depression was hitting hard, and, as Morgan says, "It was a matter of their choosing where they could starve most gracefully."

When he was six months old, they opted for returning to the family farm in County Monaghan. It was there, among the Irish grandparents, aunts, uncles, and cousins who peopled the neighboring farms, that Jim came to idealize teachers—his relatives who were priests and nuns. They were the heroes and heroines of the rural Irish, who saw education as the only way out of a killing farm subsistence.

By the time the Morgans returned to New York to try again, they had a baby daughter, and Morgan, at six, was ready for the first grade. By the time he entered Cardinal Hayes High School, he had built a reputation for being especially good in history.

He placed fourth in the William Randolph Hearst American History Contest in an all New York City schools competition, and the local fame that resulted earned him an invitation to be a quiz kid on TV. Once a month, for $25 an appearance, Morgan fielded questions on history while other bright kids on the panel handled such subjects as science and engineering. (One question he remembers missing—but now can answer—was to name the states formed from the Louisiana Purchase.)

It was not until Morgan was at Manhattan College that science and engineering came strongly into his life—though not at the expense of other interests. He was editor of the campus engineering journal (Morgan's secretary, Elaine Granger, attests to the fact that his journalistic skills are still intact), and he was president of the student body—active in the National Students Association, and vehemently opposed to Joe McCarthy's efforts to get China out of the UN.

Then one of those rare persons who determine one's life's direction came into Jim Morgan's world—the teacher of one of his first classes in civil engineering. Donald O'Connor's special work was in water pollution control. And so it was that Jim Morgan headed in that direction several decades ahead of worldwide concern over this environmental issue.

Morgan's decision to specialize further (an idealistic rather than an economic motivation, he says) took him to the University of Michigan on a fellowship sponsored by the pulp and paper industry. There he was apprenticed to industrial pollution researcher Clarence Velz, working on stream pollution in U.S. rivers, mostly doing desktop calculations and modeling, but with occasional forays into field research on the rivers. It was in Ann Arbor that Morgan met and married Jean McIntosh, and the couple started expanding their family, which today comprises five daughters and one son.

Morgan was still strongly attracted to teaching, and after he got his master's degree he accepted a teaching post at the University of Illinois. In Urbana, he became more and more interested in research, working on the intrusion of synthetic detergents into Illinois groundwater and streams.

After four years Morgan went on to Harvard to get a PhD, and there he encountered a second rare teacher in his life. The young Swiss chemist, Werner Stumm, accepted Morgan as his first graduate student, and the bond that grew between them had an immense influence on Morgan, professionally and personally. Their work together on the chemistry of manganese in water involved a field of research "that just happened to take off," Morgan says.

From Harvard it was only two more steps to Pasadena. He accepted a two-year teaching appointment at the University of Florida in Gainesville, and then, in 1965, Caltech professors Jack McKee and Sheldon Friedlander decided that the Institute needed a water chemist.

In environmental science engineering at Caltech, Morgan continued work on manganese in water, and added to his research the problems of water purification, especially new approaches to treatment by synthetic polymers. His research brought recognition for him and his students. In 1978 Morgan was elected to the National Academy of Engineering, and last year he was given the American Chemical Society Award for creative advances in environmental science and technology. Most recently he made the science journals with reports of his studies of acid rain, done in conjunction with then graduate student Howard Liljestrand (PhD '80), now a faculty member at the University of Texas.

But science has in no way been his sole involvement. His love of teaching is reflected in his earning the undergraduate student three-star award for his class in Chemistry of Natural Water Systems for several years in a row, and this year the ASCIT award for excellence in teaching.

In 1972, he took on the job of dean of students, and for three and a half years he counseled and advised undergraduate men and women. He also served as academic officer and then executive officer for environmental engineering science, and as chairman of the faculty from 1977 to 1979.

Colleague David Elliot, secretary of the faculty when Morgan was chairman, says, "Jim had to put up with all sorts and conditions of men—and he was almost always patient, fair-minded, long-suffering, and cheerful."

Others who have worked with Morgan—staff, graduate students, and undergraduates—offer other character indicators such as "well-respected," "quick-witted," "perceptive," and "terrifically well organized." One graduate student says, "Whatever he advises me turns out to be right every time—dammit."

While Morgan is at the height of his intellectual and behavioral modes, he may be slowing down in athletic prowess. After years of playing doubles tennis with Caltech cronies Fred Shair, Henry Keck, Ned Munger, and Bruce Murray, Shair reports that Morgan "tends to go to sleep at the net." ("Except when he's really challenged," Shair adds.)

Morgan also used to cut a figure on the basketball court, but recently he has more often been seen perfecting his aim by throwing wadded-up telephone messages into the wastebasket on the other side of his office.

And, oh yes, he whistles a lot. According to some of the other inhabitants of the first floor corridor in Keck, he's current in his choices of tunes. For example, "When Irish eyes are smiling . . . "

Pings named AIChE Fellow

Cornelius J. Pings, vice provost and dean of graduate studies at Caltech, has been named a Fellow of the American Institute of Chemical Engineers (AIChE), the 50,000-member national technical society. He was elected by his fellow members for his research into the structure and properties of liquids and for his contributions to chemical engineering education.

A graduate of Caltech with BS, MS, and PhD degrees, Pings has been honored by the AIChE with both the Alpha Chi Sigma for Chemical Engineering Research and Professional Progress awards.

Jones Foundation endows computer network

Caltech has been awarded a $600,000 grant by the Jones Foundation of Los Angeles to establish a unique computer network at the Institute. The new network will link a wide variety of computers and peripheral devices on the campus.

Although several dozen other similar local computer networks exist at universities and advanced research laboratories around the country, they are smaller than the system planned for Caltech, and they typically join limited types of computing equipment, not the heterogeneous population of devices found in most institutions.

Thus, the Caltech high-speed transmission network will not only link the Institute's many computers but will also provide communications among the devices.

Caltech President Marvin L. Goldberger said the exchange of ideas and information, and the sharing of expensive equipment, will "greatly enhance our research and teaching efforts." He termed the network a "technical and management challenge of the first magnitude," and "one that will work substantive changes in the intellectual life of Caltech."

About 80 computers and minicomputers and many smaller microcomputers are in use at the Institute, both at the main campus computing center and at laboratories spread across campus. The Institute also utilizes many devices such as high-resolution graphic plotters, laser printers, mass storage devices, and high-performance tape drives that could be used more efficiently in a shared network.

The campus network will utilize either cable television technology or data links of hair-thin fibers that carry data via light waves. The new resource will enable each user to have access to all the facilities on campus.

According to network planners, the system will also allow ready linkups, via national networks, with the wide variety of computers at other universities and research institutions, and will represent a model for other institutions and for the computer industry.

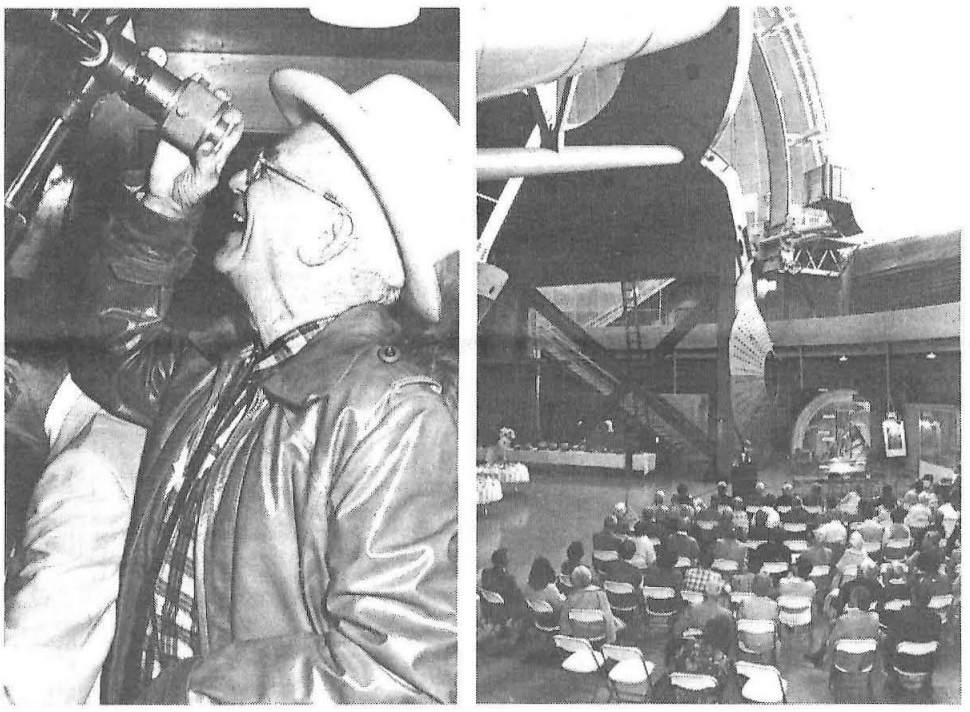
The Jones Foundation is based in Los Angeles and was funded under terms of the will of the late Fletcher Jones, who died in 1972. During his lifetime, he was the co-founder and chairman of the board of Computer Sciences Corporation.

Caltech engineers' invention wins national prize

A power converter invented by two Caltech engineers has been awarded a national prize as one of the most significant inventions of 1979. The device, which converts from one direct current voltage to another, was developed by Slobodan M. Cuk, assistant professor of electrical engineering, and Robert D. Middlebrook, professor of electrical engineering.

Called the "Cuk Switching DC-to-DC Converter," it was selected as one of the 100 most significant inventions of the past year by *Industrial Research/Development Magazine*. Converters of its type are vital components in devices including computers, spacecraft, solar arrays, electric motors, and audio amplifiers.

The Cuk converter is more efficient than other devices of its type because it is smaller and lighter, and has high reliability. It also produces an output voltage with very low ripple and little electromagnetic interference.



Samuel P. Krown (left) enjoys the view through the 200-inch telescope at Palomar Observatory, on a visit to Palomar by members of The President's Circle of The Associates of Caltech. About 170 President's Circle members toured the observatory, viewed the universe through the 48-inch, 60-inch, and 200-inch telescopes, and heard talks on astronomical research by Caltech astronomers Jesse Greenstein, Gerry Neugebauer, and Wallace L. W. Sargent. Afterward they topped off the day with a cocktail reception and dinner inside the dome. At right: The guests listen to a presentation by Dr. Greenstein.

Lee E. Hood and Fritz Huntsinger view an architect's drawing of Caltech's Braun Laboratories of Cell Biology and Chemistry (presently under construction) at a dinner meeting for members of The Associates in the Ventura area. Mr. and Mrs. Huntsinger were hosts at the dinner, at the Pierpont Inn in Ventura, for some 60 members of The Associates in the Ventura area and their guests. Hood, Caltech's Ethel Wilson Bowles and Robert Bowles Professor of Biology, described research programs planned for the new building.

Galileo: first to find Neptune?

Continued from page 1

official discovery had been complex and convoluted. In 1841 an undergraduate student at Cambridge University in England, John Couch Adams, calculated that an unknown planet was disturbing the motion of Uranus. But no one took his results seriously and nobody looked for a new planet where Adams predicted it would be found.

Meanwhile, a French astronomer, Urbain Leverrier, became interested in the problem of the disturbed motion of Uranus and in 1845 he worked out calculations indicating a position for an unknown planet exactly the same as that predicted by Adams. When French astronomers did not seem interested in pursuing the matter, Leverrier wrote to Galle in Berlin; Galle found the planet in his first attempts.

According to Kowal's and Drake's calculations, there is a strong possibility that the ephemeris (astronomical data chart) of Neptune is in error by a significant amount, suggesting an unknown orbital perturbation. If this is the case, a revision of the orbital elements of the planet will be necessary.

Kowal has reported his findings to the National Science Foundation, which funded a portion of his research, and he plans to publish details in the British journal, *Nature*. NASA is also contributing to his funding.

The solar system's outermost planet except for Pluto, Neptune is about 2,790,000,000 miles from the sun. It is 15 times more massive than Earth and orbits the sun once every 165 years.

On the cover

The engraving of Galileo on the cover of *Caltech News* appears courtesy of the Caltech Archives. It is from a 1613 publication in Italian in the rare books collection, and is entitled *Galilei Istoria e Dimostrazioni intorno alle Macchie Solari . . . Si aggiungono nel fine le Lettere, e Disquisizioni del finto Apelle.*

Ernesto Weber: psychotherapist—and engineer

by Winifred Veronda

Ernesto Weber (BS '52) had no reason to ponder decisions about a mid-life career switch as he approached middle age. He had made his decision 20 years earlier. As a Caltech undergraduate earning a mechanical engineering degree, Weber decided he would work as an engineer until he was 40 and then become a psychotherapist. And he did exactly that.

A native of Mexico City and around the age of 40, Weber sold his engineering firm, Schultz y Cia, and enrolled in a graduate program in humanistic psychology at the Universidad Iberoamericana. Now, his doctorate completed, he counsels in a new office condominium suite that he shares with three associates, mixing paying clients and charitable consultations.

Meanwhile, he continues to write on the theory of personality and counseling, based on his PhD dissertation on "A Unified Theory for Eclectic Psychotherapy"—work received with honors. He is also teaching theory of counseling and supervising students' counseling sessions at the Universidad Iberoamericana.

Weber's decision to make this unusual career change came when he was a Caltech freshman, coping with the core curriculum and the tensions of living in a foreign country. He found himself questioning his values and looked for help. His experience with a Jungian analyst that he selected for counseling sessions impressed him so much that he decided that eventually he would become a psychotherapist himself—but not before establishing himself as an engineer.

A Mexican citizen of three-quarter Swiss and one-quarter Mexican descent, Weber enrolled at Caltech as its student body was undergoing a transition. The veterans who dominated the student population shortly after World War II were leaving and were being replaced by younger people. Weber was a member of Ricketts House and he says of himself and his housemates of that era, "We were the campus rowdies."

Some of the rowdiness derived from the brake drum riots that were prevalent in Ricketts House in those days—late night melees when freshmen and sophomores competed passionately and noisily for possession of a 1920s automobile brake drum.

Weber also recalls water balloon fights, ice skating in the Winter Gardens rink in Pasadena, intramural sports to break the pace of studying—and especially the late Alfred Stern's philosophy course. "He was a remarkable teacher," says Weber. "I still have his modern European philosophy outline, and I often refer to it."

After graduation from Caltech, Weber worked in Mexico for three U.S. firms, including Honeywell. After his studies at the Institute he says he found the work "like children playing. It seemed so easy after Caltech," he recalls. "I kept thinking, 'They're paying me for doing something so simple?' "

In 1962 Weber went to work for Schultz y Cia, a firm designing and manufacturing industrial instrumentation. He bought the company from its owner and it prospered, but he began to feel ready for a change. It was time to consider his early goals of becoming a psychotherapist. So in 1971 he began to sell the company to some of his employees, and he made arrangements to enter graduate school. Today he derives an income from patents on industrial control devices that he developed—now being manufactured in the United States and several other countries—as well as from his counseling practice.

When he isn't involved in his work, Weber likes to play the accordion and piano, and he runs several miles, several times a week. He and his wife, Vera, have two sons and a daughter.

As an engineer in Mexico, Weber is a member of a profession that carries high prestige. The demand for engineers is rising rapidly, especially for those with civil, electrical, and mechanical engineering training, and will continue rising as the Mexican economy booms with increasing oil and natural gas production. The inflation rate, outstripping that in the U.S., races along with the economic boom and is running at about 30 percent.

Although many of the country's engineers were educated in other countries, Weber says there has been a marked increase in the quality of engineering education in Mexico over the past 15 years and that "some excellent engineers are coming through the system." He believes that engineering training at the Instituto Technológico de Monterrey (where he studied in his sophomore year) carries the most prestige.

Although he is not professionally active as an engineer at present, Weber stays involved in engineering design. "I miss the technical outlet," he says, "even though I wouldn't want it to be a full-time career at this point. Eventually I'd like to combine the professions and counsel for half a day and work the other half day on technical matters."

This program seems not only entirely feasible, it seems blissful. Happy the man who is paid for doing something he would like to do anyway; twice happy the man who is paid—in coin and satisfaction—for doing *two* things he would like to do anyway.

Sieh receives Burwell award

Kerry E. Sieh, assistant professor of geology, is recipient of the 1980 E. B. Burwell, Jr., Award by the Geological Society of America for his publication, "Prehistoric Large Earthquakes Produced by Slip on the San Andreas Fault at Pallett Creek, California."

The award is made to the author of a work that advances knowledge concerning the principles or practice of engineering geology, or of related fields (soil or rock mechanics) where geology's role is emphasized.

Caltech athletes welcome two new coaches

Two new coaches have joined the Caltech Athletic Department, according to Warren G. Emery, director of physical education and athletics. They are Lin Parker as head football coach, and Clint Dodd as swimming, diving, and water polo coach.

Parker, a veteran semipro player and football coach, holds a BA degree in physical education from Cal State Northridge and an MA degree in education from Azusa Pacific College. At Cal State Northridge he played for three years as linebacker and guard, and was team captain. He also played for nine years on the Antelope Valley Sidewinders, a semipro team.

Parker also was head coach at Antelope Valley High School, Boron High School, Kingman High School in Kingman, Arizona, and Mojave High School in Bullhead City, California.

Parker says he plans to center on developing a passing attack for the team and to concentrate on its offensive attack, while acting as an aide to defensive coaches Gene Renfroe and Dean Bond.

"Lin Parker brings a wealth of football experience to our program," said Emery. "His approach to sports is consistent with Caltech's sports philosophy, and I'm impressed with his ability to relate to Caltech students, despite the short time he's been here."

Dodd received his BA degree in physical education from Humboldt State University in 1977. He comes to Caltech from Whittier College where he was water polo coach, and has taught extension courses in biology at California State University, Los Angeles.

About Caltech's athletic program —which offers no compromises to athletes relative to the Institute's stiff academic requirements— Dodd said, "I wish more schools would adopt Caltech's philosophy about athletics. Academic work comes first here, but students can also participate in successful amateur sports programs."

Dodd added that prospects for Caltech's water sports programs this year seem promising. "We have some excellent athletes coming into the program, and a fine nucleus of returning students," he explained. Dodd noted that last year for the first time in several years Caltech sent two swimmers to the national championships: Chris McKinnon, who placed 25th overall in the nation in the NCAA championships, and Lynn Hildemann who came in 32nd in the AIAW championship meet in 3-meter diving.

"Clint has a solid background in aquatic sports, and he brings a contagious enthusiasm to the Caltech athletic program," Emery said in discussing the appointment. "He will be a great asset — not only to competitive water sports but to the instructional program as well."

Another new addition to the athletic department staff is Steve Percy, Caltech's first full-time athletic trainer. Percy, who recently completed a master's program in physical education with emphasis on sports medicine, at Indiana University, came to work at Caltech in September.

Whitham wins mathematics prize

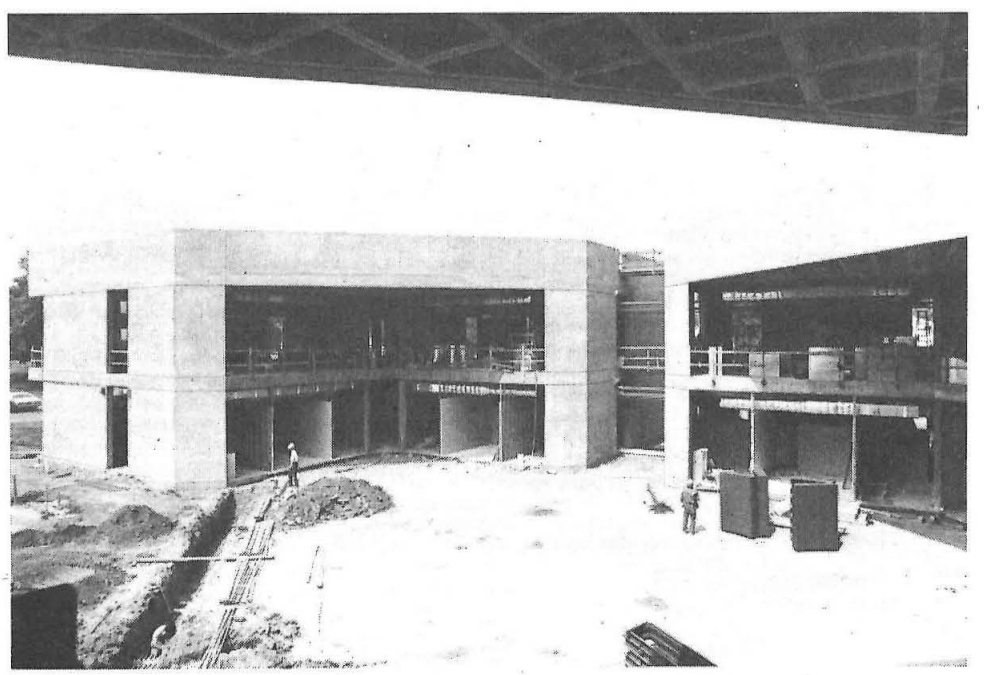
Gerald B. Whitham, professor of applied mathematics, has been awarded the 1980 Norbert Wiener Prize for Applied Mathematics.

The award is given jointly every five years by the Society for Industrial and Applied Mathematics and the American Mathematical Society. It carries a grant of $1,500.

A present for the Institute

President Marvin L. Goldberger (left) accepts the keys to an electric touring cart from Byron Keith, motion picture and television coordinator for AMF, Inc. A gift to the Institute from AMF, Inc., the cart is used to transport distinguished visitors on tours of the campus.

The Watson Labs: on the rise



The Watson Laboratories of Applied Physics rises north of Steele Laboratory. The new building is scheduled for completion early in 1982, according to campus spokesmen.

EVENTS AT CALTECH

Saturday, November 8, 8 p.m., Beckman Auditorium. "Off the Wall," an evening featuring seven improvisational comics who react to suggestions from the audience. Admission $7.50.

Tuesday, November 18, 8 p.m., Beckman Auditorium. Leakey Lecture. An environmental scientist, Tepilit Ole Saitoti, will talk about his people, their legends, and their society. Saitoti is author of the autobiographical book, "Masaii," whose name derives from the unwritten "maa" language of the Kenya and Tanzania Great Rift Valley. Admission $6.50.

Wednesday, November 19, 8 p.m., Beckman Auditorium. Earnest C. Watson lecture. Anthony C. S. Readhead, Caltech research associate in radio astronomy, will talk about current research on quasars, radio galaxies, and black holes. Admission free.

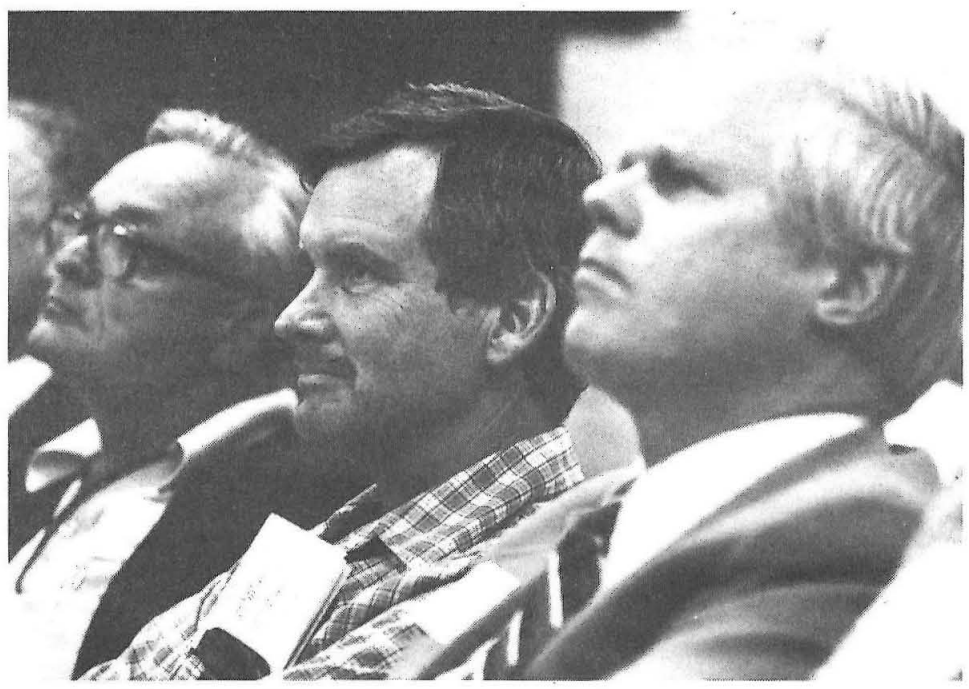
Friday, November 21, 8 p.m., Beckman Auditorium. Armchair Adventure, "The Great Canadian Train Ride," a film depicting Canada from Vancouver to Newfoundland. Admission $4.

Saturday, November 22, 8 p.m., Beckman Auditorium. The West Berlin Rias Kammerchor chamber choir performing classical and popular music by Paul Hindemith, Kurt Weill, and other twentieth-century composers. Admission $7.

Sunday, November 23, 3:30 p.m., Beckman Auditorium. Coleman Chamber Music Association concert featuring the Sequoia String Quartet. Admission $10, 9, 8, and 6.

Wednesday, December 10, 8 p.m., Beckman Auditorium. Earnest C. Watson Caltech Lecture. Norman Davidson, professor of chemistry, will talk on "The Recombinant DNA Revolution." Admission free.

OF SPECIAL INTEREST TO ALUMNI



At a session of the Alumni Leadership Conference, Amnon Yariv, Thomas G. Myers Professor of Electrical Engineering and professor of applied physics, describes research in his laboratory. Right: Listening intently to a presentation are Area Chairmen Kenneth L. Powlesland, Collis C. (Hunt) Holladay, and Donald W. Peterson.

Fund leaders honored for achievement

Alumni Fund Area Chairmen William H. Cook, BS '45, and Vern Edwards, BS '50, received top honors for overall achievement at the Alumni Fund Leadership Conference on the campus in September.

Cook, a new area chairman, won a Rookie-of-the-Year award for obtaining gifts from 88 percent of the Caltech graduates living in upper New England — the highest percentage of participation. Vern Edwards, western Pasadena, earned his fourth straight Pro-of-the-Year award for achievement by an experienced area chairman. Fifty-one percent of the alumni in his area contributed $55,751.

Two alumni chairmen who received special recognition for dollar contributions in their areas were James L. Hieatt, MS '54, TRW, with $40,101; and Ed Foss, BS '32, Rancho Santa Fe, with $38,285. Hieatt and Dave B. McCarroll, BS '66, ranked as runners-up in donors—Hieatt with 66 percent participation and McCarroll with 60 percent.

Seven other area chairmen received special recognition for obtaining high dollar contributions ($30,000 or above), while another 11 received special recognition for obtaining at least 51 percent donor participation.

Receiving honorable mentions — dollars — were Chris Diamantoukos, BS '72, Fred C. Anson, BS '54, Allan M. Goldberg, BS '57, MS '58, Bob M. Worlock, PhD '58, Roger W. Caputi, BS '57, PhD '65, Steve D. Hall, BS '65, MS '66, and Hodge C. Gaines, BS '52.

Recognized with honorable mentions for donor participation were Frank A. Fleck, BS '42, David L. Hanna, BS '52, Lee T. Carleton, BS '33, John R. (Roscoe) Howell, BS '26, Doug R. Christman, BS '59, Don McFaddin, BS '28, Allen M. Goldberg, BS '57, MS '58, Doug C. Strain, BS '48, John S. Nieroski, MS '55, Frank F. Sheck, BS '48, and Ed Foss, BS '32.

Paul MacCready, MS '48, PhD '52, winner of two Kremer Prizes for human-powered flight, spoke to the group at dinner while Joan Williams, a communications specialist from Xerox Learning Systems, talked with the area chairmen at noon about how to motivate prospective volunteers.

During the morning and afternoon sessions, the participants took part in workshops designed to help them present Caltech's story and its needs to other alumni, and they heard talks by leaders in the Alumni Fund, the Alumni Association, and the Institute administration.

A preview of the Alumni House

The garden of the new Alumni House during its first social event—a late-afternoon reception for members of the Board of Directors of the Alumni Association and their guests.

Alumni Activities

Tuesday, November 25
Seattle chapter meeting. Latitude 47 Restaurant, 1232 Westlake Avenue, North, Seattle. Social hour, 6:30 p.m.; dinner, 7:30 p.m. President Marvin L. Goldberger will talk about current research and programs at Caltech. Cost, $10.50 per person.

Monday, December 8
Houston chapter meeting. Rice University Faculty Club, 6100 South Main (Main at Sunset). Social hour, 6:00 p.m.; dinner, 7 p.m. Thomas Tombrello, professor of physics, will talk on "Radon Monitoring and Earthquake Prediction in Southern California." Cost, $13.50 per person.

Tuesday, December 9
New York chapter meeting. Tarrytown Hilton, 455 S. Broadway, Tarrytown. Social hour, 6:30 p.m.; dinner, 7:30 p.m. President Marvin L. Goldberger will talk about current research and programs at Caltech. Cost, $15 per person.

Thursday, January 1
Rose Parade Special. 7:30-9:30 a.m., continental breakfast in the Athenaeum; 9-11:15 a.m., walk to Colorado Boulevard to view the 92nd Annual Tournament of Roses from reserved grandstand seats; 12 noon, buffet lunch in the Athenaeum. For those with tickets to the game, a box lunch and bus transportation to the Rose Bowl will be provided.

Placement Assistance
To Caltech Alumni

The Caltech Placement Service may be of assistance to you in one of the following ways:

(1) Help you when you become unemployed or need to change employment.

(2(Inform you of possible opportunities from time to time.

This service is provided to alumni by the Institute. A fee or charge is not involved.

If you wish to avail yourself of this service, fill in and mail the following form to:

Caltech Placement Service
California Institute of Technology
Pasadena, California 91125

Please send me: (Check one)

☐ **An application for placement assistance.**

☐ **A form indicating a desire to keep watch for opportunities although I am not contemplating a change.**

Name .....

Degree(s) ..... **Year(s)** .....

Address .....

.....

Obituaries

1918
EDISON R. HOGE on July 10 in Pasadena, after a long illness. He had been a solar astronomer and photographic specialist at Mt. Wilson Observatory and at Caltech from the mid-1930's until his retirement in 1971. While a student at Caltech (then Throop Institute of Technology) Hoge was a pioneer member of the Gnome Club. He is survived by two sons, Kenneth and Wilbur, six grandchildren and six great grandchildren. Remembrances may be sent to Caltech for the Edison R. Hoge Memorial, care of Thomas Garrow, Office of Memorial Gifts.

1926
LOUIS J. CURRAN, Ex, on July 29. He had been chief engineer with Curran Engineering Company in Van Nuys, California. Curran is survived by his wife, Pearl.

1927
MORTIMER D. DARLING on August 15 in Burbank, California. He was retired from the position of civil engineer with the city of Los Angeles. Darling is survived by his wife, Shirley.

1934
ERNEST R. HOWARD, MS '35, on July 1 after a long illness. He was an engineer at Texas Instruments Company in Attleboro, Massachusetts, until his early retirement in 1970. In 1974 he and his wife, Clarion, moved to Goleta, California, where she still lives.

1937
DAVID PRESSMAN, PhD '40. He had been associate director for scientific affairs at Roswell Park Memorial Institute, part of the New York state department of health, in Buffalo.

1938
WILLIAM E. STEPHENS, PhD, on July 16 of a heart attack. Professor of physics and former dean of the University of Pennsylvania, he had been teaching at the university since 1942. He had also served as chairman of the physics department and was dean and vice-provost of the College of Arts and Sciences. He conducted research in nuclear physics, astrophysics, and mass spectroscopy analysis, and was active at Penn's tandem accelerator laboratory. Stephens did his doctoral research at Caltech under Professor C. C. Lauritsen and spent a sabbatical year on the campus in 1966. He is survived by his wife, Helen, a son, Richard, and three grandchildren.

1944
JOHN JEPSON GARLAND, JR., on June 30, of cancer, at Stanford University Hospital in Palo Alto, California. He had worked for Bechtel Corporation in San Francisco for 16 years and was a member of the American Society of Mechanical Engineers. Surviving him are his wife, Roberta; a son, Thomas; three daughters, Cynthia, Nancy, and Susan; and three sisters. Memorial donations may be sent to the Division of Oncology, Stanford University Medical Center, 300 Pasteur Rd., Palo Alto, California.

1955
DAVID H. CAMPBELL, MS, on August 17, of a heart attack at his home in Van Nuys, California. As senior research engineer in research and development at Lockheed, he was manager of the thermodynamics and propulsion groups in Advanced Development Projects, "The Skunkworks." While at Lockheed, Campbell designed the Mach 3 air intake for the S. R. 71 aircraft, for which he was listed in *Who's Who in Aviation* for 1973. Campbell is survived by his wife, Rosemary; his parents, Mr. and Mrs. Harris Campbell; and four children—Kim (Brewer), Harris, Jan, and Tracy.

Personals

1933
WILLIAM W. MOORE, MS '34, a founding partner and senior adviser of Dames & Moore, engineering and environmental consultants in Los Angeles, has been elected an honorary member of the International Federation of Consulting Engineers. Moore served as president of the group during 1970 and 1971, the first U.S. citizen to hold the post.

1941
ROBERT B. GALESKI writes, "I took notice of Fred Brunner's claim of 'largest number of living male offspring' in the August 1980 *Caltech News* issue. I can claim a tie with five sons and eight grandsons. Perhaps I can claim a record for living offspring, male and female, with twenty-four (8 children, 16 grandchildren, so far). I've been in Canada for twenty-four years, having been transferred to Calgary as chief geophysicist by an oil company. For the past fourteen years I've been operating a geophysical contracting and consulting practice."

1942
JAMES F. MEAD, PhD, professor of biological chemistry at the UCLA Laboratory of Nuclear Medicine and Radiation Biology, received the 16th Award in Lipid Chemistry from the American Oil Chemists' Society. Mead has published approximately 200 papers on his work in the metabolism of lipids (especially polyunsaturated fatty acids), the biochemistry of atherosclerosis, the biochemistry of the brain, the effects of ionizing radiation on compounds, tissues, and organisms, and the metabolic effects of aging.

1946
NORMAN A. GOTTLIEB reports, "I am now a dual retiree: Commander, CEC, USNR (29 years) and chief administrative analyst, City of Los Angeles (30 years) with a dual occupation: management consultant and stained glass artist. I am still an active tennis player, SCUBA diver, skier, horticulturist, and enologist."

1949
HUGH C. CARTER, president of Carter Engineers, announces the merger of his firm with Lockwood, Andrews & Newnam, Inc. With offices in San Diego and Cypress, California, the company is involved in energy design, solar design, and cogeneration systems.

1953
GEORGE W. SUTTON, MS, PhD '55, staff vice-president of Avco Everett Research Laboratory, Inc., is the 1980 recipient of the Thermophysics Award of the American Institute of Aeronautics and Astronautics. The AIAA's highest honor in the field of thermophysics cited Sutton's recent studies of laser beam transmission through the atmosphere and of the interaction of laser energy with target materials. Sutton lives with his wife, Evelyn, and four sons in Lexington, Massachusetts.

1955
JOHN ANDELIN, JR., PhD '67, has been appointed assistant director of the Office of Technology Assessment, to head its Science, Information, and Transportation Division. He was previously staff director for the Subcommittee on Advanced Energy Technologies and Energy Conservation Research, Development, and Demonstration of the House Committee on Science and Technology, and a science consultant to that committee.

1956
HANS H. KUEHL, MS, PhD '59, professor of electrical engineering at the University of Southern California, received a 1980 Halliburton Faculty Award for fifteen years' outstanding service to the school. He is chairman of the Academic Standards Commission of the President's Advisory Council, which has final authority on all academic matters at USC. He also heads the freshman recruitment program for electrical engineering and is a member of the School of Engineering's promotions committee. Kuehl will also become director of the USC Engineering Honors Program.

G. LOUIS FLETCHER, MS '57, has been named general manager of the San Bernardino Valley Municipal Water District, not assistant general manager, as we reported here in the August issue.

1960
NARSINGH DEO, MS, has been appointed chairman of the department of computer science at Washington State University. He went to WSU first in 1974 as a visiting professor of computer science and returned in 1977 as a full professor.

KEITH A. TAYLOR, MS '61, writes from Portland, Oregon, "Still working at Tektronix, and I just got married to Kalama Wilson, who is just getting a biochemistry master's degree."

GERALD G. WILHELMY, MS '61, reports, "I've been a dentist since 1972. I practice in Irvine, California. Although I am a genuine dentist, my interest is in treating chronic head and neck ache problems as they may relate to an improper jaw bite. Some aspects of my EE background are useful to me as a dentist."

1965
ANGELO A. LAMOLA, PhD, has been named head of the molecular biophysics research department at Bell Laboratories, Murray Hill, New Jersey. Lamola, who has been with Bell Labs since 1966, will carry out fundamental studies of the physics and chemistry of biological molecules. This research may provide insight into how biological systems store and transmit information and control simultaneous multiple activities. His most recent work has been in understanding certain human diseases associated with light sensitivity and the use of light therapy.

1966
PAUL G. RICHARDS, MS, PhD '70, new department chairman for geological sciences at Columbia University, has just had a two-volume textbook published, *Quantitative Seismology*, which he wrote in collaboration with Professor K. Alei of MIT.

1967
ALFRED W. BROWN, JR., MS, writes, "I have recently joined a fantastic little company—a new company with a 10-year track record: Point 4 Data Corporation (formerly EDSI). I'm a technical staff consultant reporting directly to the vice president for systems software. Point 4 recently moved to brand new quarters in Irvine, California. I'm Point 4's AMSI X359/IEEE (Pascal) principal standards representative."

1969
KENNETH L. JONES writes from Venice, California, "I've just completed work as technical director of special effects for a motion picture entitled *Battle Beyond the Stars*, soon to be released by New World."

1970
ERIC B. JENSEN has recently moved to Los Angeles from Sunspot, New Mexico, and reports, "I'm leaving Sacramento Peak Observatory, where I held a NAS/NRC research associateship with the Air Force Geophysics Laboratory, to take a position with the Aerospace Corporation. The move marks my departure from the field of academic astronomy. The possibility of what looks to be an exciting, stable, and remunerative alternative proved irresistible."

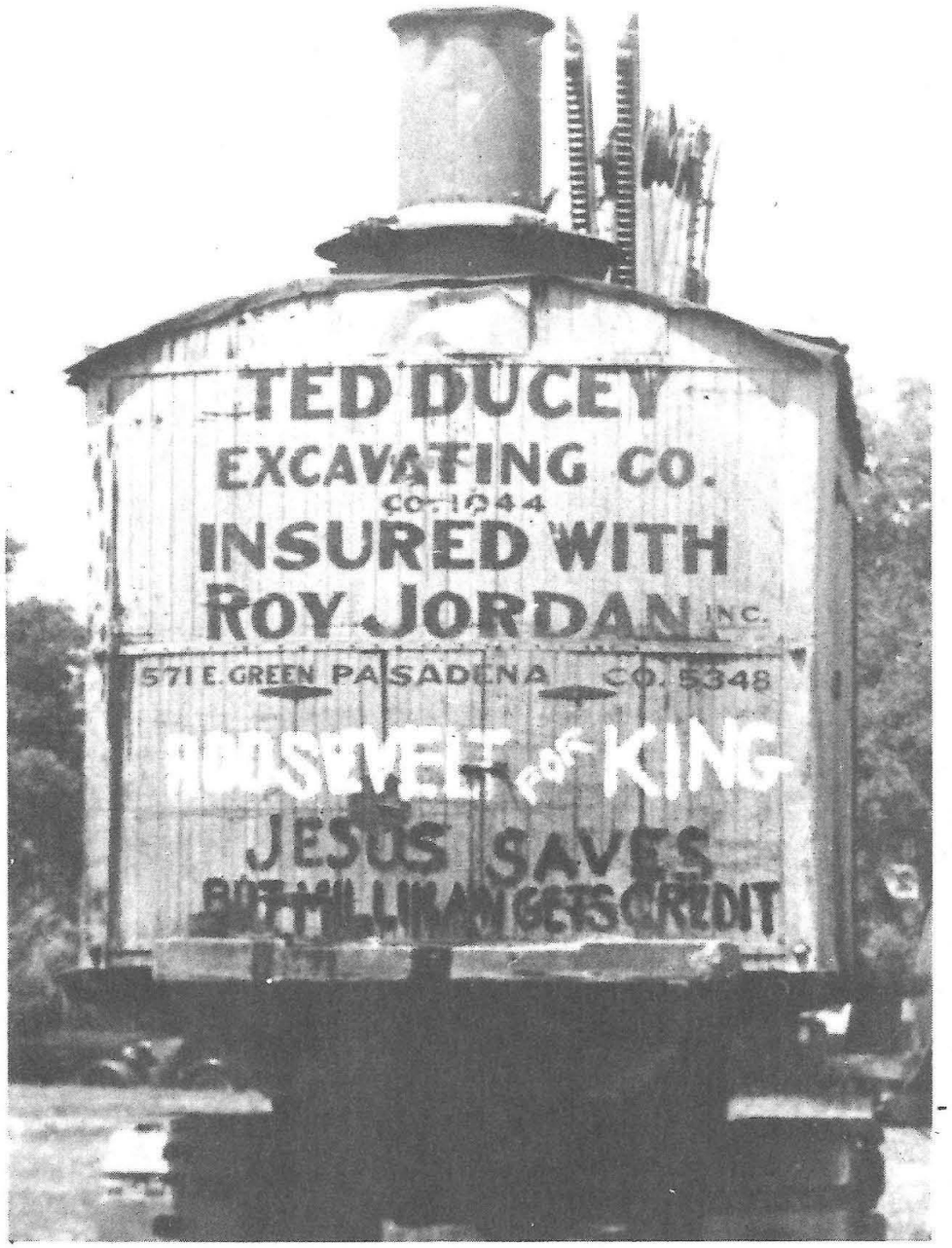
1971
PAUL T. WEGENER married Marilyn Oliver in July 1978 in Vermont and in January 1980 the couple moved to Boulder, Colorado, where he is the owner of Blue Sky Landscapes.

1975
KEVIN T. RUDDELL reports from Oakland, California, that he is studying modern dance and performs with a professional dance company, Moving Space.

1976
LAWRENCE A. WISE, electrical engineering manager of Optimetrix Corporation in Mountain View, California, was married on April 12 to Phoebe Jo Allender of Santa Fé, New Mexico, in Mission San Miguel in Santa Fé.

1977
PETER K. EDBERG, MS '80, writes, "After getting my MS in June, I moved to the Bay Area where I have a position as research engineer at SRI International in Menlo Park (California), working in the bioengineering research center.

1978
LAWRENCE I. MORTIN married Beth Mason, a recent UC Berkeley graduate, on June 28. They live in St. Louis, where Mortin is a graduate student in neurobiology at Washington University and Beth will soon enter law school.



In a tribute to Robert A. Millikan's fund-raising abilities during the lean years of the depression, Caltech students added their own bit of graffiti to this steam shovel excavating for the Crellin Laboratory of Chemistry. Jesus saves—but Millikan gets credit. See story on page 3. (Photograph courtesy of the Caltech Archives.)

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New research indicates Galileo found Neptune 234 years before its official discovery. See story on page 1.