CALTECH NEWS

October 1985

Salary offers to Caltech grads top national average

Caltech students graduating in June with degrees in electrical engineering and in engineering and applied science continued to receive salary offers above the national average, according to Sally J. Asmundson, director of the Career Development Center. Offers averaged about two percent above the last year, Asmundson said.

Most in demand again this year were graduates in electrical engineering, followed by those in engineering and applied science. Salary offers in these fields ranged from $24,000 to $41,000 per year, with an average offer of approximately $29,500 for a BS degree.

Offers to graduates in electrical engineering averaged about $50 per month higher than those in engineering and applied science. The highest offer to a BS recipient was $34,320 to a student graduating in engineering and applied science.

Asmundson noted that the number of offers in electrical engineering was down slightly this year, apparently due to a soft market in the computer and electronics industries. Offers in aerospace and related fields were up —presumably because of the number of defense contracts held by contracting firms in the southern California area.

In general, students went to fewer interviews this year as word spread that the job market had been very strong for 1984 graduates. As a result, on the average, students received fewer offers than last year.

By June 3, 89 of 186 students graduating with BS degrees reported they were planning to enter graduate school (five of these in medicine). Two were on waiting lists for medical school, 53 had accepted jobs, 16 were still seeking positions, and the remainder had other plans.

One graduate with a BS degree in electrical engineering (a native of the United States) had traveled to France to become a free-lance photographer.

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On his visit to the United States, Chinese President Li Xiannian toured JPL where he was briefed on the Galileo Project, the laboratory's mission to probe the planet Jupiter. Here he visits an environmentally controlled "clean room" to view the spacecraft Galileo, now under construction. From left: John Casani, Galileo project manager, a Chinese interpreter, and President Li. The Chinese president's visit to the laboratory was deemed an expression of his country's interest in cooperating with the United States in space exploration projects.

Caltech, UC form corporation to operate Keck Observatory

Caltech and the University of California have announced the formation of a non-profit corporation to oversee construction and operation of the W. M. Keck Observatory. The corporation, the California Association for Research in Astronomy (CARA), has established a project office at Caltech in Pasadena and a scientific office at the UC Lawrence Berkeley Laboratory.

Under the agreement between UC and Caltech forming CARA, Caltech will fund construction of the $87-million observatory and UC will provide operating funds for 25 years at a rate of $3.5 million per year. The two institutions will share observing time on the Keck Telescope on an equal basis, after deduction of a fraction of time for the University of Hawaii, which is providing the Mauna Kea site for the telescope.

Governing CARA will be a board of directors consisting of three representatives each from Caltech and UC, and a non-voting representative of the W. M. Keck Foundation. William Frazer (senior vice president for academic affairs at UC), is chairman of the board and chief executive officer of the corporation. Rochus E. Vogt (vice president and provost of Caltech, and the R. Stanton Avery Distinguished Service Professor and professor of physics) is vice chairman.

Other board members from Caltech are Gerry Neugebauer (Howard Hughes Professor and professor of physics and director of Caltech's Palomar Observatory), and Edward Stone (professor of physics and chairman of the Division of Physics, Mathematics and Astronomy).

CARA project manager is Gerald M. Smith (formerly project manager at JPL for the IRAS telescope), and project scientist is Jerry Nelson (professor of astronomy at UC Berkeley and physicist at UC's Lawrence Berkeley Laboratory).

Ground broken for new W. M. Keck Observatory in Hawaii

Groundbreaking ceremonies for the new W. M. Keck Observatory—future home of the world's largest telescope—were held on September 12 at the observatory site on Mauna Kea in Hawaii. Construction will begin next year and is scheduled for completion in 1991.

Meanwhile, Caltech has received $7,570,000 from the W. M. Keck Foundation, representing the first in a scheduled series of payments for construction of the observatory.

On January 3, 1985, the foundation announced its intention to provide $70 million toward construction of the observatory. On June 28, the foundation board of directors voted to approve a contract between the foundation and the Institute to provide the full amount of the grant—the largest private gift ever made for a scientific project.

The mountaintop dedication featured remarks by President Marvin L. Goldberger, UC California President David Gardner, William Frazer, chairman of California Association for Research in Astronomy (CARA), George R. Ariyoshi, governor of Hawaii, and a kahuna—a spiritual leader who invoked protection and prosperity for the site in the ancient Hawaiian religious tradition.

With this new telescope, astronomers will be able to see twice as far into space as is possible with the largest telescope now in existence, and also twice as far back in time toward the origins of the universe.

Grading and preparation of the site began in late August, and construction of the telescope dome will begin in the spring of 1986. The telescope is expected to see "first light" in 1990 and to become operational in 1991.

New supernovae type discovered in another galaxy

A supernova, or exploding star, that appears to be different from any yet observed has been found in another galaxy. Its discoverers are Alexei V. Filippenko of UC Berkeley and Wallace L. W. Sargent, the Ira S. Bowen Professor of Astronomy at Caltech.

By analyzing the spectrum of light from the supernova, the astronomers have concluded that the dying star may have been "peeled" of its outer layers of hydrogen and helium before it exploded, revealing underlying layers of heavier elements.

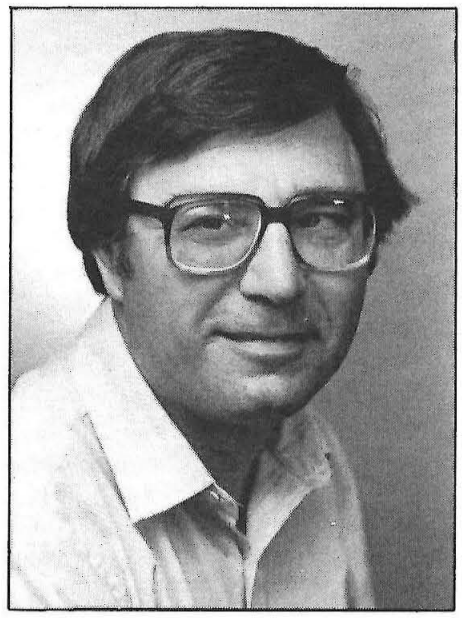
Thus far, astronomers have identified two basic types of supernovae. A Type I supernova is believed to occur when a small dying white dwarf star, about the mass of our sun, is inundated by material from a larger companion star. This material increases its mass, and the star heats up and explodes.

Type II supernovae occur in much larger stars—those more than eight times the mass of our sun. As such a star ages, its thermonuclear fires transform lighter elements into heavier ones, and finally into iron, which forms the core.

A Type II supernova is thought to occur when a massive star has burned so much of its fuel into iron that the overburdened core abruptly collapses. The collapse occurs in less than a second, and the resulting shock waves cause the star to explode.

During the explosion, the star becomes brighter than a galaxy of several billion normal stars, and in the course of a month, the supernova can give off as much light as the sun emits in a billion years.

The new supernova discovered by Filippenko and Sargent resembles neither of these types in either the spectral characteristics of its light or its brightness.



Wallace Sargent

The astronomers discovered the new supernova by accident while using the 200-inch telescope at Caltech's Palomar Observatory to attempt to study light from the center of the galaxy NGC 4618, about 30 million light years from earth.

After measuring the partial spectrum of light from what they thought was the center, they discovered features far different from the light from any known galactic center studied thus far. These were emission lines—spikes in the light spectrum—at wavelengths characteristic of oxygen, sodium, and magnesium, all of which would be found deep within an aging star.

Other features of the light indicated to the astronomers that the emitting material was expanding at 5,000 kilometers per second, as would occur with a supernova. But the astronomers found no evidence of hydrogen or helium in the light from the object. Both of these elements would have been expected in a normal Type II supernova.

Filippenko and Sargent also found that the object was not as bright as a normal supernova near maximum light. When it was discovered, it was about one hundredth as bright as a Type I and about one thirtieth as bright as a Type II supernova.

Filippenko subsequently used the 120-inch telescope and other facilities at UC's Lick Observatory to obtain a full spectrum of the object and a picture of the galaxy, which revealed a faint starlike object that was not in earlier photographs.

Aging, massive stars that produce Type II supernovae are believed to have an onion-like structure, with layers of successively heavier elements. These layers contain, in order, hydrogen, helium, carbon, oxygen, magnesium, silicon, and an iron core. Based on this model, the light from the NGC 4618 object would seem to have come from a star that had lost its outer layers long before it exploded.

The possibility that such a "peeled" supernova could exist was raised a decade ago by Roger A. Chevalier, now of the University of Virginia. He theorized that a star that had lost its shroud of hydrogen and helium before it exploded would not be as bright as a Type II supernova, because of its smaller size when the shock wave from the initial explosion passed through its surface layers.

Such a class of supernovae would explain one mysterious celestial object discovered in our own galaxy in 1953. Its radio emissions appear to mark it as a dead remnant of a supernova that would have exploded around 1665. But none of the astronomers of that time reported observing such a phenomenon.

A normal supernova would have appeared to be as bright as Sirius and would have been visible to the naked eye for several months. However, this object, in the constellation Cassiopeia, shows filaments of oxygen-rich gas extending from it. This phenomenon would occur if a star's heavier elements, normally deep within the supernova, had been the surface layers in an exploding star. The Cassiopeia object is not the only one of its type to be detected. Several similar oxygen-rich supernova remnants have been discovered in other galaxies.

The discovery of the NGC 4618 supernova could at last explain these objects, according to Filippenko and Sargent. The new supernova could also give theorists better insight into the layered elements in the depths of dying stars, and how supernovae inject these elements into interstellar space.

However, they conclude by observing that the mystery of why some dying stars lose their outer layers before their death has not yet been solved.

Mead honored for VLSI design

Carver A. Mead (BS '56, MS '57, PhD '60) is the 1985 recipient of the Harry Goode Memorial Award of the American Federation of Information Processing Societies, "in recognition of his pioneering contributions to the research and education of very large scale integration (VLSI) design."

Mead, the Gordon and Betty Moore Professor of Computer Science at Caltech, has played a fundamental role in developing novel techniques for VLSI, which combines multiple computer components on a single circuit and is the basis for much of the computer revolution.

Salary offers to Caltech grads top national norm

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One, who graduated with honors in physics, would enter law school at Columbia University. Another was traveling and studying for a year in the People's Republic of China on a Watson Fellowship.

Of the 153 students receiving MS degrees this year, 83 chose to continue for a PhD—75 at Caltech and 8 at other institutions. Of those seeking jobs, 38 had accepted offers, 10 were still deciding or seeking, and 9 international students had returned to their home countries. The average salary offer to MS degree candidates was $32,000 per year, about the same as last year.

On the average, MS degree recipients in physics and mechanical engineering received the highest salary offers with an average offer of $33,600. Offers in electrical engineering averaged $31,968, and in civil engineering, $28,000.

Caltech awarded 129 PhD degrees this year. Of these, 61 accepted academic positions and 56 took jobs in industry while the others were still undecided as of graduation. Salary offers varied widely, ranging from $37,000 to a graduate in biology to $50,000 to a degree recipient in chemical engineering. This salary was to a founding member of a corporation that was launched a year ago.

Two PhD recipients started their own business, and one would enter law school.

One student who earned a PhD degree in applied physics accepted a temporary job as a congressional fellow in the Office of Technological Assessment in Washington where he would earn $600 a month less than in a job he was offered in industry.

Up slightly this year was the demand for graduates in chemical engineering—a tight field since the activity decline in petroleum and other energy-related occupations. Most offers in this field were from private consulting and research organizations. Also receiving more offers than in recent years were graduates in civil engineering, who took advantage of the strength of the aerospace industry and of offers from private consulting and research firms.

Freshman class: one of largest in Caltech history

The largest freshman class in recent history, 204 men and 31 women, entered the Institute this fall.

Caltech received applications this year from 1,188 students and from these, the new class members were chosen. Last year, 1,264 students applied.

The two largest freshman classes in recent years have been in 1982 with 220 entering students, and in 1972, with 231. The Admissions Committee's class-size goal is 215.

This year was preceded by two years when—as the national applicant pool dwindled—freshman class sizes at the Institute shrank to the lowest levels since the early 1970s. The entering class in 1983 consisted of 187 members, the smallest number since before the Institute admitted women. In 1984, there were 194 entering freshmen.

As a result, the Institute has made special efforts to encourage more of the admitted students to accept admission. This year, the efforts proved highly successful.

Stirling L. Huntley, director of admissions, attributes the upturn in class size to several factors—but perhaps most to an improved financial aid package with an increased allowance for travel to and from home.

Other factors may include new and revised recruitment publications, increased alumni involvement in the recruitment process, more faculty telephone calls to students to whom the Institute offered admission, and publicity in the national media this year about the W. M. Keck Observatory on Mauna Kea, Hawaii.

"We feel convinced that the turndown in applications has stabilized," said Huntley. "Caltech's reputation, nationwide, is strong, and is becoming stronger."

He noted that the large freshman class will not place a strain on campus housing, because the two previous classes have been smaller than normal.

The number of women in the entering class (31) compares with 26 in 1984, 34 in 1983, 41 in 1982, and 36 in 1981.

Huntley pointed out that the Caltech student body is becoming increasingly geographically diverse as more students are from outside the state. In 1975, 40 percent of the entering freshmen came from California; in 1985, 33 percent are Californians. This year 21 percent of the entering freshmen are from other Western states, 13 percent are from the Midwest, 13 percent are from the South, 13 percent are from the Northeast, and 7 percent are from overseas schools.

Among the foreign students are four from Pakistan, two from Greece, two from Hong Kong, two from Thailand, and one each from Israel, Korea, Taiwan, Great Britain, West Germany, Japan, Indonesia, West Indonesia, and Singapore.

A foreign applicant who was not admitted, a student from Pakistan, contacted the Institute a second time asking to be reconsidered, enclosing letters from 29 other universities—including many prestigious ones—that had admitted him. But his admission was again denied.

In addition to the freshmen, 22 students transferred to the Institute from other schools.

Efforts to attract as many strong applicants as possible will continue. According to Huntley, next year more alumni will visit schools to talk to teachers and students. In addition, for the first time in Caltech's history, members of the admissions office staff will visit schools to talk to students, counselors, and teachers, to help them become more familiar with Caltech and its programs.

The staff plans to visit high schools that, over the years, have sent substantial numbers of good students to the Institute, and schools that have produced a high percentage of National Merit Scholars.

A real genius?

The 1985 freshman class is academically as impressive as ever, with SAT scores in the top two percent of the nation. In choosing its students, the Institute continues to look for a commitment to science and technology, and for an enthusiasm for these fields that transcends good academic performance.

This excerpt from a letter to the Admissions Committee proves that the sought-after enthusiasm is alive and well among the new students:

"For the past nine years I have been fascinated by theoretical physics. In the third grade, when I was first introduced to Einstein's special theory of relativity, I rapidly devoured many popular accounts of the theory and a biography of Albert Einstein. I was soon entrenched in personal research. My main interest became the nature of time and its manipulation in accordance with the Lorentz transformations.

"I was using up resources at school, and finding new resources in public libraries. My elementary teacher arranged for me to talk to several high school teachers in physics and, on occasion, professors of physics at the University of Washington. My interests continued into junior high school . . . .

"Recently my interests have turned toward quantum mechanics, quantum electrodynamics, the black hole mechanics of Steven Hawking, and the possibility of combining gravitation and electromagnetism into a unified field theory.

"At the college level, I hope to broaden my background and pursue these subjects in much greater depth . . . ."

The student was admitted.

Summer SURFing: the Caltech way

Under sterile conditions, Santosh Krishnan injects cells into a culture medium. His research involves developing conditions within the culture that will allow him to grow immature precursors to immune cells outside of the body. A SURF (Summer Undergraduate Research Fellowship) student, Krishnan's work has been in the laboratory of Ellen Rothenberg, assistant professor of biology.

Students pick five on faculty for teaching honors

Caltech students have named five faculty members as recipients of 1984-85 ASCIT awards for excellence in undergraduate teaching. They are Eric Herbolzheimer, assistant professor of chemical engineering; James Knowles, professor of applied mechanics; Robert J. McEliece, professor of electrical engineering; P. P. Vaidyanathan, assistant professor of electrical engineering; and Richard M. Wilson, professor of mathematics.

Awardees are selected on the basis of questionnaire responses to the *Teaching Quality Feedback Report (TQFR)*, through which students are given the opportunity to evaluate their courses.

Calder Arches:

A Caltech link to a rich local heritage

A unique part of Caltech's architectural heritage—neglected and deteriorating since Throop Hall was demolished—is returning to a place of honor on campus. The Calder arches that crowned the west front of Throop languished for more than a dozen years outdoors in a Pasadena storage yard. Soon they will grace the facade of the newly created Arnold and Mabel Beckman Laboratory of Chemical Synthesis at the span that connects Crellin and Church laboratories.

The arches rank as a notable example of the great art of Pasadena's past and of the Craftsman Movement central to the city's heritage. The history of the arches began as the patrons of Throop Polytechnic Institute (later to become the California Institute of Technology) contemplated Throop's future on its new 20-acre campus east of Pasadena.

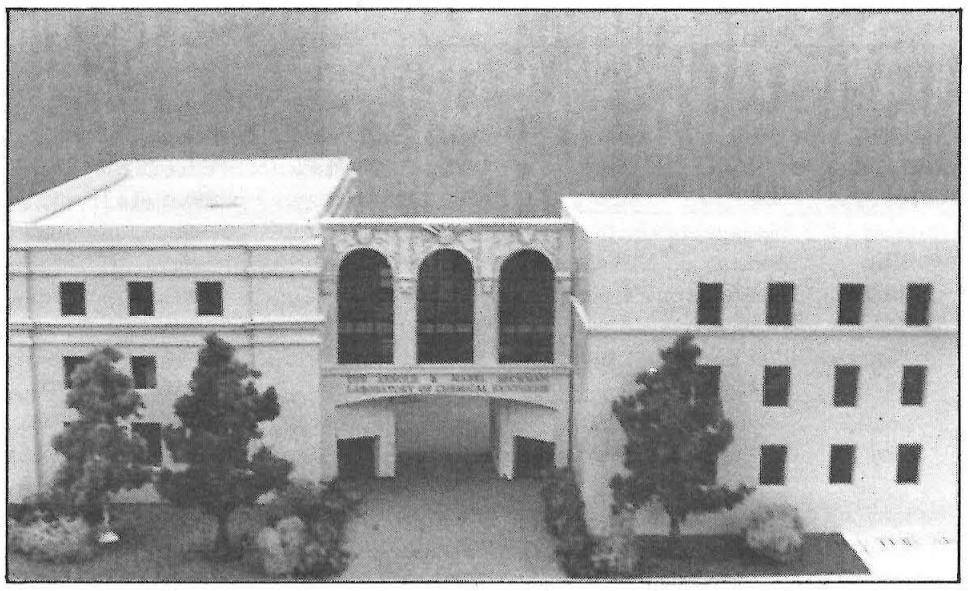
Throop Hall, the first building on the campus, must be symbolic of the glorious future of the institution, trustees insisted. An imposing entrance must be created as part of this symbol.

A widely known sculptor, Alexander Stirling Calder, then a Pasadena resident, was commissioned in 1908 to design something worthy of the building and what it symbolized. Calder thought of sculptured arches gracing the entrance porch, and, over the protests of several trustees who thought the idea too grandiose, the concept was accepted. The generous financial support for the project from Norman Bridge, president of the Board of Trustees, played no small part in their decision.

The unveiling and dedication of the arches in February 1910 was an important occasion for the artistically conscious in southern California. David Starr Jordan, president of Stanford University, gave the dedication address, remarking that future generations would be "amazed to find an achievement of this magnitude in this city on the outermost Western coast, far removed from all art centers."

Henry Van Dyke, a favorite poet of the era, was also on hand, with verses especially written about "the flowery Southland fair, with sweet and crystal air."

As the theme for his creation, Calder chose modern education,

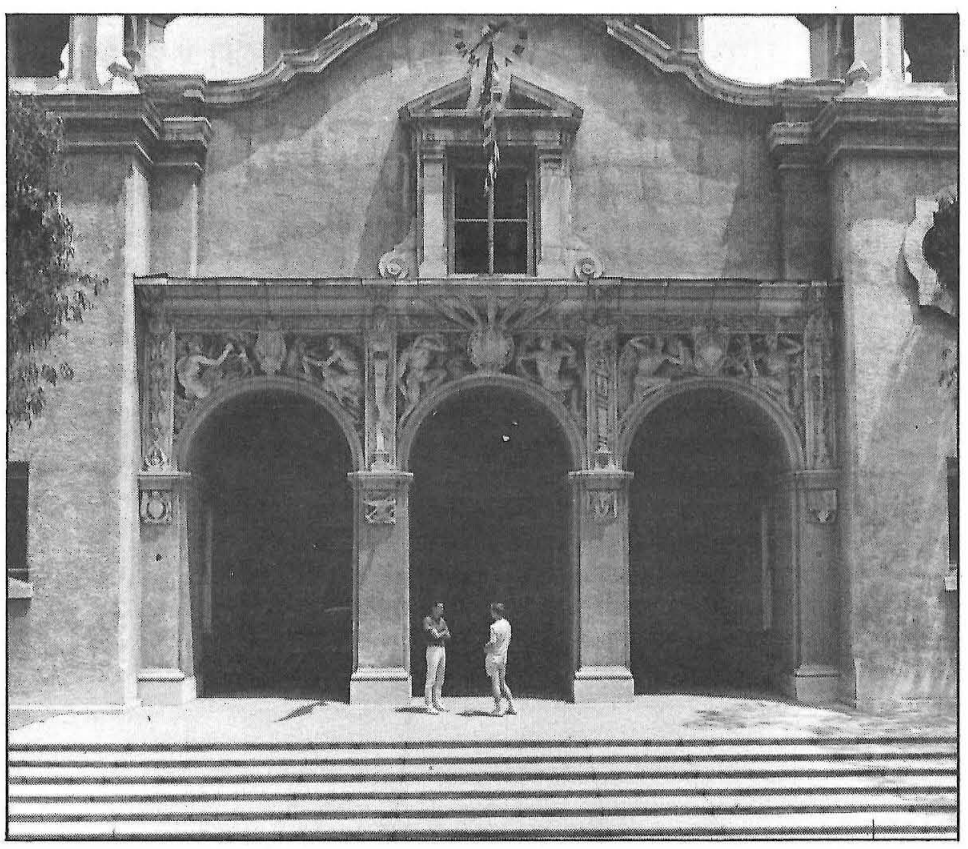


The Calder Arches will once more find a place of honor on the campus when they are installed atop the span between Crellin and Church laboratories as part of the Arnold and Mabel Beckman Laboratory of Chemical Synthesis.

symbolized by six Greek figures. In the left spandrel, Nature, in the guise of the god Pan, is flanked by Art as a poet, composing a solution to the riddle of life. In the center, Energy bears the dead away from birds of prey while Science lights his torch at the sun. Imagination dreams of new possibilities in the right spandrel, and Mercy clings to a figure of Law.

The sun appears in the central cartouche surrounded by signs of the zodiac. The cartouche on the left is a lyre, and on the right is a diamond in a setting of lilies and pearls. In the pilasters between the arches, Minerva protects the Arts and Mercury looks out for Science. A composition below the sunflower pilaster on the far left represents life, death, and eternity; a hammer and anvil are below the Science pilaster. A mask is below the Arts, and below Law is an open book grasped in a hand.

Removing the arches from Throop Hall in 1973, before it was demolished due to earthquake damage, would take three days, experts estimated, but all except one of the 46 pieces were down by mid-afternoon of the first day of the effort. They were then stacked in a truck and delivered to the city of Pasadena, which had agreed to preserve them.



For 63 years, the arches created an imposing entryway for Throop Hall, first building on campus. Throop was demolished in 1973 because of earthquake damage.

There was some discussion about placing them in the city's new retail center, the Plaza Pasadena, but other works were commissioned for the center instead, and no use for them was ever found.

Meanwhile, friends of the arches on campus—and in particular Robert Fort, director of Caltech's physical plant department—continued to look for a way to return them to Caltech. The span connecting Crellin and Church was the right size, and the members of the Caltech administration liked the idea of incorporating the arches there. Funds from the gift to create the laboratories are being used to restore the arches, a task that involves filling and refinishing cracks and chips in the cast-stone pieces.

Thus, an important Caltech landmark once more assumes a proud place on campus, and historians may reflect on the words of Throop President James A. B. Scherer at the arches' dedication: "This sculpture is one of the rare and precious things of life because it speaks forever of the spirit to a world that is weary with care. The tired eyes of age will look to it and renew their youth; youth will see it and take hope; manhood and womanhood will pause beside it for refreshment."

The arches may not evoke such a dramatic effect in the consciousness of citizens of the 1980s, but their return to crown the facade of the new Beckman Laboratory of Chemical Synthesis is a welcome addition to a proud new center for research.

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New method facilitates DNA construction

A new method that makes it easier for scientists to construct long strands of genetic material (DNA) has been developed by chemists at Caltech.

According to John H. Richards, professor of organic chemistry, the technique represents a flexible, expandable, controllable approach to designing new genes. He explained the method at the annual meeting of the American Association for the Advancement of Science in Los Angeles.

Genes consist of double-stranded DNA molecules whose chemical structure is similar to that of a ladder. The two strands of DNA molecules adhere to one another because the units that make up the strands, called nucleotides, are attracted to one another by their complementary chemical forms.

Until now, chemists attempting to build long DNA molecules of hundreds of units have synthesized short stretches of single-stranded DNA that correspond to pieces of the "ladder rails."

Each rail of the ladder was designed to compliment an opposing rail, but with an extra piece extending beyond that segment. This piece complemented still another extended piece. When all the segments were mixed together, they tended to form into double-straded DNA with the desired sequence. Once joined, the rails were stitched together using DNA-joining enzymes.

Using this approach, genetic engineers have been able to join up to 14 segments of DNA at once before the level of misjoining became too high.

Now Richards and his colleagues have developed a way of building large genes, chunk by chunk, from the outside in. First they join a small stretch of the desired gene—comprising the beginning and end pieces—to a large circular piece of DNA called a vector. Between the beginning and end pieces is a "restriction site" where enzymes can be used to cut the pieces apart.

Vectors are specially built pieces of DNA that are widely used in genetic engineering. They can carry attached DNA into a living cell; there the cell can be induced to make multiple copies of the DNA that invaded it.

Scientists use bacteria to make copies of the vector that carries the gene segment. Then they extract the vector copies and chemically snip out the inserted DNA, thus separating the beginning and end pieces. Between these pieces they insert another segment of the desired gene with a restriction site between them. Once more a vector is inserted into bacteria to copy the resulting longer stretch of DNA.

The process of cutting, inserting, and copying continues until the desired gene has been produced.

So far, the Caltech scientists have used the new technique to build a 600-unit gene—long, but not the longest gene yet constructed. According to Richards, however, there is no limit to the length of gene that can be assembled by this method.

Anson honored for electroanalytical chemical research

Fred C. Anson (BS '54) is recipient of the 1986 C. N. Reilly Award in Electroanalytical Chemistry from the Society for Electroanalytical Chemistry. Anson is professor of chemistry at Caltech and chairman of the Institute's Division of Chemistry and Chemical Engineering.

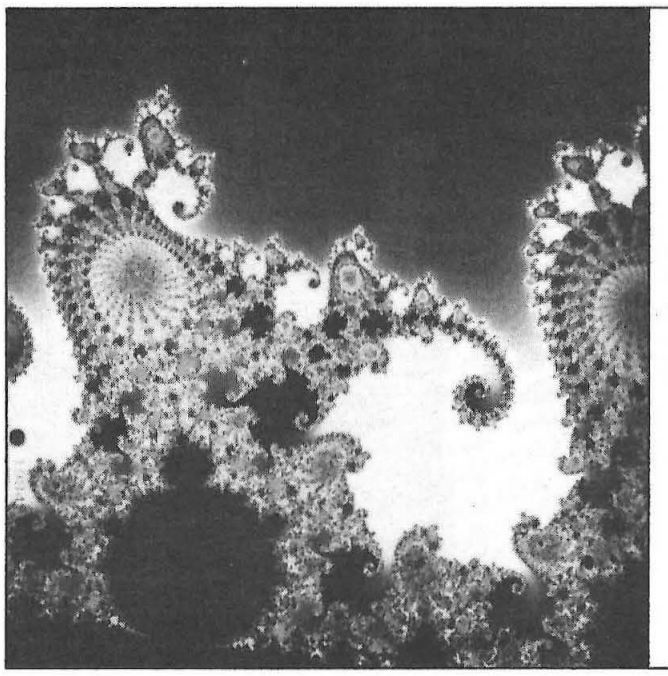
The Reilly Award is presented annually to a researcher for a major contribution to the theory, instrumentation, or applications of electroanalytical chemistry. Anson earned his PhD from Harvard in 1957, the same year he joined the Caltech faculty.

Zewail receives ACS award

Ahmed Zewail, professor of chemical physics, has been awarded the 1985 Buck-Whitney Medal of the eastern New York section of the American Chemical Society, for his "seminal contribution to laser spectroscopy and supersonic beams, and the development of multiple pulse optical techniques." He will receive the medal and honorarium this October in New York City.

Zewail has pioneered in the development of laser techniques for selectively cracking molecular bonds in both simple and complex molecules, and in the design of ultra-high-speed optical devices for recording this process. His research is providing new insights into the dynamics of molecular behavior, enabling scientists to create customized molecules in the laboratory.

New geometric theory yields insight into forms in nature



This computer-generated image was developed by IBM. It shows that fractal geometry not only provides a means to investigate physics topics, but also has the potential to generate unique, visually interesting shapes.

Many mathematicians value the aesthetic potentials of the symmetry and balance in their work, but few have seen this beauty illustrated in such a graphic way as has Benoit Mandelbrot (MS '48, Eng '49).

Mandelbrot recently was awarded the Barnard Medal for Meritorious Service to Science by Columbia University for the origination of a major development in 20th-century mathematics. An IBM Fellow at the Thomas J. Watson Research Center in Yorktown Heights, New York, Mandelbrot has worked with colleagues who use computer-generated images to bring his theories to dramatic visibility (above).

Mandelbrot's contribution is called "the theory of the fractal geometry of nature." His work gives insight into the complex shape and structure of the natural world: the turbulence of liquids, the symmetry of living forms, the branching of crystals or rivers, the fluctuations of radio static and of the stock market.

Unlike conventional geometry, which deals with triangles, cones, circles, spheres, and lines, fractal geometry deals with broken or "fractured" shapes. Clouds are not spheres, mountains are not cones, coastlines are not circles, and rivers do not run straight.

Mandelbrot began his research in this field some 20 years ago, as he began to investigate apparently unrelated elements discovered by mathematicians of the past, unifying the elements into a new geometry. For example, lines so convoluted that they are more than one-dimensional and surfaces so jagged that they have more than two dimensions were regarded in conventional mathematical thinking as "mathematical monsters" that defied common sense.

Fractal geometry, on the other hand, uses these and other irregular shapes as the starting point for a new mathematics of form, as well as the starting point of many specific theories that find a measure of order in areas previously reputed to be thoroughly chaotic.

Fractal geometry embodies the notion of geometric self-similarity—the tendency of natural forms to repeat themselves—for example, as in the resemblance in shape between a tree's large branches and small twigs. The new geometry is being applied in varied fields—aerodynamics, art, astronomy, biology, chemistry, linguistics, meteorology, metallurgy, physics, and physiology.

In receiving the Barnard Medal—which is awarded every five years on the recommendation of the National Academy of Sciences—Mandelbrot has had his name added to a select list of previous medalists, including Albert Einstein, Enrico Fermi, and others, whose work helped to shape modern science. William A. Fowler (the Institute Professor of Physics, Emeritus) received the medal in 1965.

The medal is awarded every five years ". . . to such person, whether a citizen of the United States or any other country, as shall . . . have made such discovery in physical or astronomical science, or such novel application of science to purposes beneficial to the human race, as in the judgment of the National Academy of Sciences . . . shall be deemed worthy of the honor."

A real Techer gives her views on *Real Genius*

The school may be called Pacific Tech, *and Occidental and Pomona colleges may provide the sets, but the spirit of the place—and of its innovative and irreverent students—is definitely Caltech. To give an undergraduate's view on how accurately the movie* Real Genius *captures the feeling of the place, Diana Foss (a senior majoring in astronomy), agreed to review the film for campus publications.*

By Diana Foss

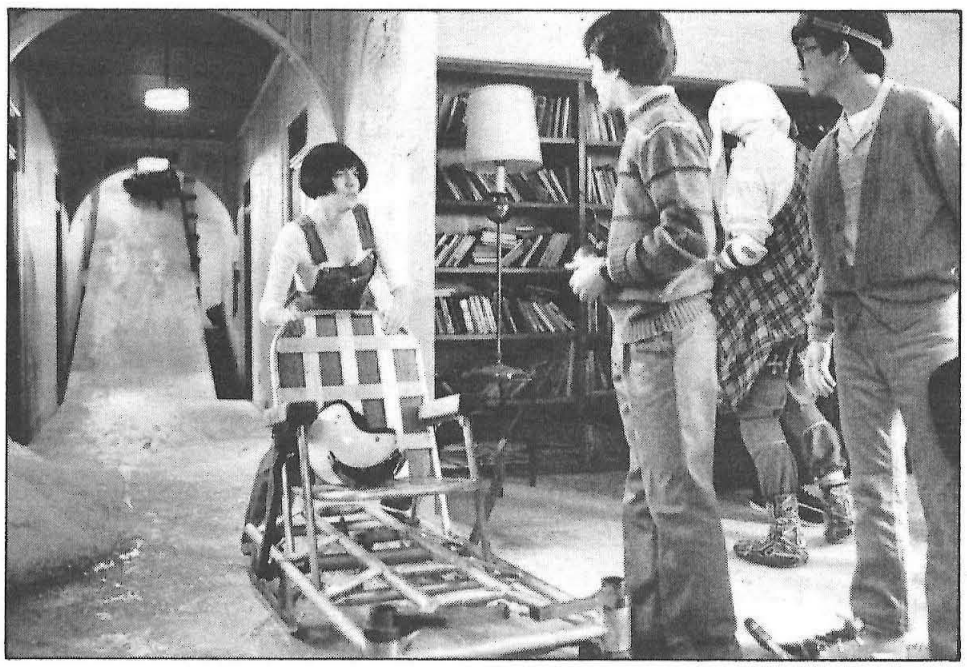
Ask any Techer his or her opinion of The Real World, and you're likely to get an answer that lies somewhere between mild scorn and open derision. The vast wastelands which surround Caltech are merely distances which must be traversed in order to get a Tommy's burger or to see the latest *Star Trek* movie, scarcely climes hospitable to the rare intelligence of the typical Caltech undergraduate.

Yet scratch this contemptuous exterior, and you'll find another person entirely: someone who wishes that others really *could* see what a blast going to school here can be.

So it was when the making of the movie *Real Genius* was announced. On the surface, there was widespread doubt that anyone trying to capture the spirit of Caltech on film could do anything but fail utterly.

"They'll make us look like complete nerds," rang the cry. "They'll never get it right." But underneath ran a current of gleeful hope. "Wouldn't it be great if they *did* get it right!"

Well, *Real Genius* has hit the theaters, and Techers everywhere may rest assured that the movie does them proud. The Tri-Star release, directed by Martha Coolidge (of *Valley Girl* fame), manages to convey perfectly how much fun it is possible to have at the California Institute of Technology. In this the movie really shines: most of the people I know who have seen it were engrossed in looking for all the little details of Caltech life, and were delighted when they found them.



Mich Taylor (Gabe Jarret) and Ick (Mark Kamiyama) watch as Jordan Cochran (Michelle Meyrink) sleigh rides through their student house during Pacific Tech's "Winter Carnival" —one of the many pranks devised by students in Real Genius *to relieve tensions created by academic pressure.*

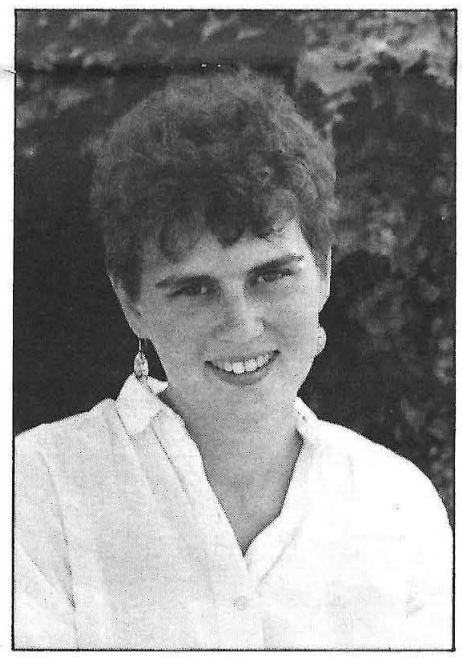
The story concerns a boy who comes to "Pacific Tech" as a 15-year-old freshman, the only student ever to be admitted winter term. Mitch Taylor has come to school with the express purpose of working on Professor Jerry Hathaway's laser project; Taylor's high school science fair project involved a molecular iodine laser. (Needless to say, he won first place.)

The young, eager frosh is assigned to live with another of Hathaway's proteges, Chris Knight, the "real genius" of the title. Despite the contrasts offered by Mitch's squeaky neatness and Chris's bunny slippers and less than orthodox behavior, the two hit it off and proceed to make the six-megawatt laser a reality.

What they don't know, of course, is that Hathaway's project is part of a government project that rivals the Strategic Defense Initiative in wackiness: a space laser that can burn down a man but leave intact the wicker chair he's sitting in.

When they finally realize the actual purpose of their research, after the government has taken the laser away for testing, well, as the ad says, "they don't get even, they get creative."

For a Techer, the "creativity" is more interesting than the plot itself. Working on Hathaway's laser is certainly not the only thing Chris and Mitch do with their time. In fact,



Real Techer Diana Foss, who believes Techers everywhere can rest assured that Real Genius *"does them proud."*

Chris spends as little time as possible in the lab, preferring instead to mastermind such diversions as the Madame Curie Look-Alike Contest, the Mutant Hamster Races, and the Tanning Invitational.

As Chris Knight, "one of the ten finest minds in the country," Val Kilmer really shines. He's crazy, as all Techers try to be crazy, but he's smart, too. We have very little trouble believing that he really knows what he's talking about.

As Mitch Taylor, another one of the ten finest minds, Gabe Jarret is the perfect frosh: shy, haunted by pushy parents who substitute sewing labels on his underwear for understanding, and convinced, at first, that science is the only thing there is to life.

The two roommates are joined by "Ick" Ikagami (Mark Kamiyama), who turns their alley into a sledding hill, and Jordan Cochran (Michelle Meyrink), a hyperkinetic young woman of tremendous intelligence who provides a welcome contrast to the mindless beauticians from the Wanda Trossler School of Beauty whom Chris invites to the Tanning Invitational, the film's only descent into the realm of "teen summer moviedom."

The student houses where the friends live is almost frighteningly recognizable. The familiar arched hallways, the psychedelic graffiti on the walls, the built-in drawers and closets—the set is an almost-exact replica of an old house alley.

Other Caltechisms grace the background of the film. The sponsor of Hathaway's science TV show is *D*arlington *E*lectronics *I*ncorporated; Lazlo Hollyfield, a resident of the steam tunnels, is trying to scoop the pot in the Frito-Lay Sweepstakes (shades of the assault on the McDonald's contest).

Perhaps most recognizable are the faces of the real Caltech undergrads which appear throughout the movie. Dave Marvit (BS '84), who was a technical consultant in the film, appears everywhere. Nathan Hurvitz's face floats in the background, amusingly out of focus, all through one scene at the president's freshman tea, and Rodney Kinney is one of a group of students who are studying, and who watch as one of their number cracks under the strain of finals.

Real Genius is a terrifically enjoyable film; the jokes are all funny, the dialogue is snappy, and the plot, while far-fetched, is pleasantly zany. Of course, to this undergraduate, the real reason to see *Real Genius* is that it's about Caltech. Maybe people will finally understand why I like it here so much.

Caltech pools entice swimmers to take the plunge

For southern Californians, the old swimming hole seems as remote and rare as the corner soda fountain and the five-cent Coke. But swimmers who can take the plunge into one of Caltech's two swimming pools have little reason to long for that rural pleasure.

This summer, some 1,400 of them —faculty, students, alumni, staff, JPL employees, Associates, and their families—enrolled for recreational swimming or for instruction. (A small fee is charged users during the summer season; there is no charge at other times.) More than 300 signed up for classes in advanced, intermediate, and beginning swimming and diving, and many of them—adults and children—took part in a water show in August.

A staff of five instructors helped students hone their skills while nine lifeguards watched over those who swam for fitness and recreation—from earnest individuals swimming laps with the intensity of Olympics trainees to kids jumping into the family section with the zest of young porpoises.

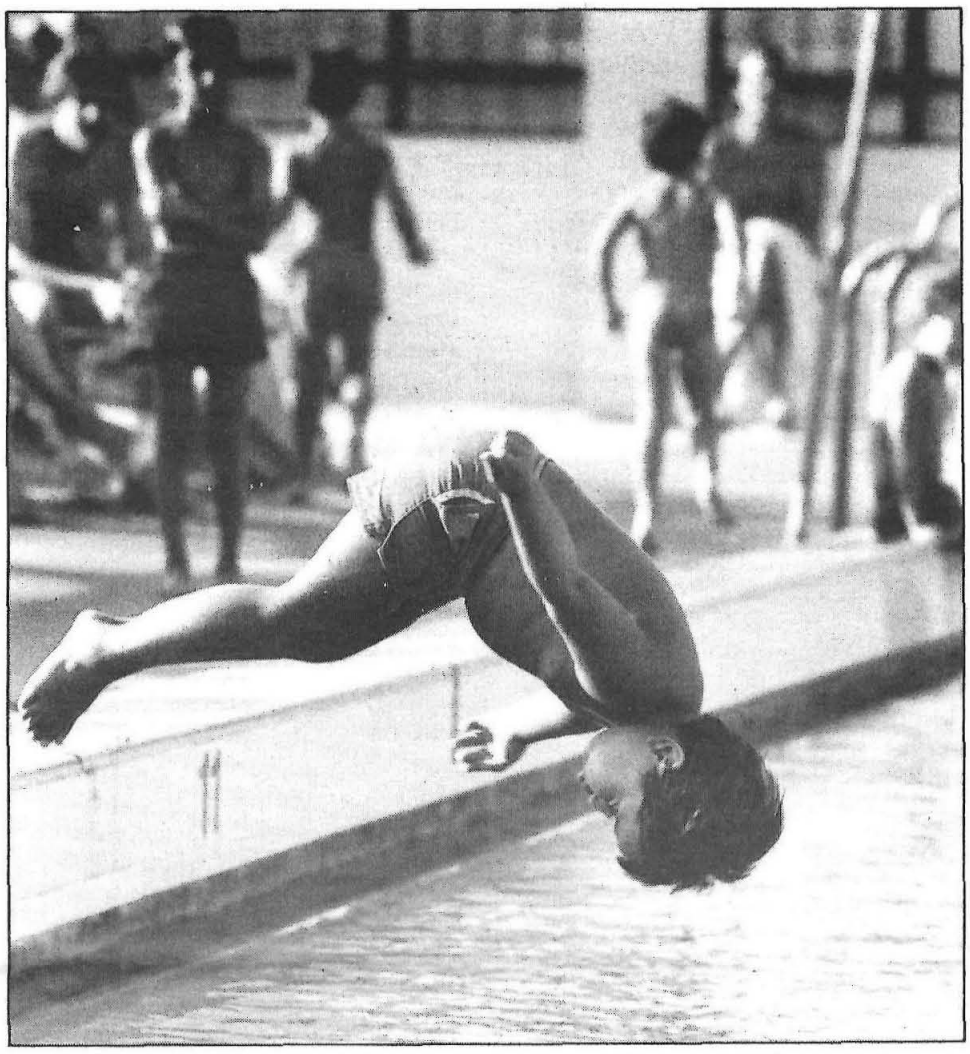
For an hour each morning, 120 masters program participants—many of them past and present competitive swimmers—train under the direction of a coach in a year-round program open to Caltech people (55 of them participate) and to others in the community. One of these is John Nabor of the 1976 U.S. Olympic team.

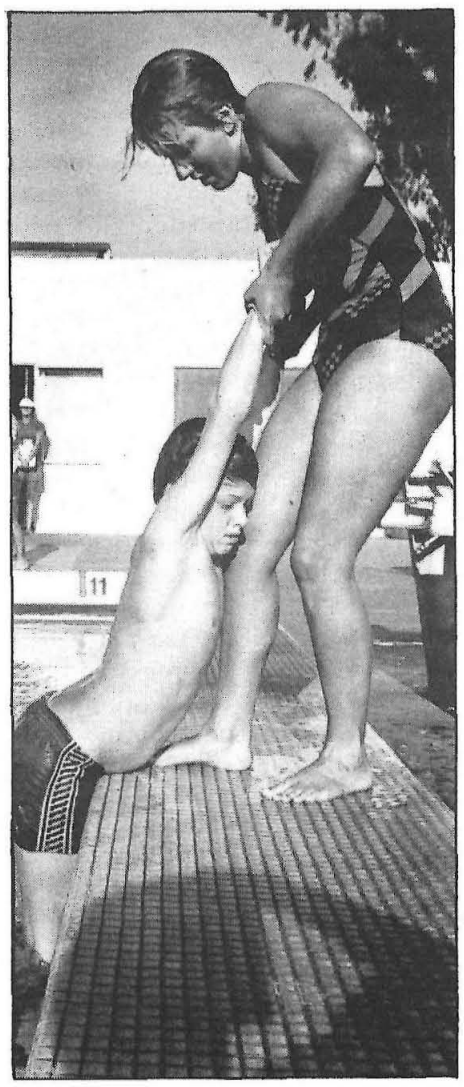
Some 1,200 alumni who live in the local area received announcements of the summer program, according to Warren Emery, director of athletics.

No separate record was kept of the number who enrolled. But Emery says that many alumni who live in the area—especially recent graduates —continue to make use of the gymnasium, weight room, and pool. Some of these have passed up weight rooms at commercial facilities to use the one at Caltech because they feel it is better.

Caltech's recreation program received a gigantic boost in late 1983 upon completion of the new pool, women's locker room, and weight room. These were built through a $700,000 grant from the Carl F Braun Trust and the Braun Foundation. The pool, 60×70 feet, is immediately west of the Alumni Pool. Its depth gives Caltech a regulation-size water polo facility. The original pool, along with Scott Brown Gymnasium, celebrated its 30th anniversary earlier this year.

Its early decades saw a steady increase in use of the pool over the summer months when such records are kept. During the summer of 1955, it was used 15,102 times. That number had climbed by 1971 to 40,612, but dropped by 1982 to 22,912—perhaps due to the discontinuation of the family swimming membership, reinstated this year.





Edgar Gomez tests his diving skills, above. Below: Linda Pine drags her brother, Sam Pine, from the Caltech pool in a lifesaving exercise.

Now usage is climbing again. During the first week of 1985 the pools were used 2,922 times, compared with 1,354 during the first week of 1984.

For swimmers, the recreation program creates a sense of community where other categories—of division, faculty, staff, or student—give way. "Kids meet at the pool and get acquainted and this pulls their parents together," says Emery. "People become friends who would never have known each other without the recreation program."

Although participants can bring guests, they cannot bring the same guest more than once a week, points out John Ray, a junior high school mathematics teacher who has directed the summer program for six years. Thus the facility retains its campus-JPL focus.

For the 1,400 recreation fans in the Caltech community, that focus is just fine. And the local swimming hole is one of the best parts of their summer.

Unique interior of Robinson Library refurbished

The astrophysics library in Robinson Laboratory has undergone a refurbishing of its unique interior, thanks to Friends of Caltech Libraries and to the astronomy department. Both groups shared in the funding.

The Robinson Laboratory was designed in the 1930s and reflected the tastes of Caltech astronomer George Ellery Hale. Hale liked the early California Spanish colonial style with its solid oak refectory tables, hand-painted cowhide lampshades on brass lamps, leather-covered and brass-studded chairs, and hand-rubbed antiqued walls. The effect achieved was one of venerable, comfortable, and timeless sturdiness.

But time took its toll and a need had emerged for renewing and reinforcing. The walls have been repainted in their original cream color, the chairs recovered, the wiring in solid brass lamps replaced. The restoration succeeded in its goal: to restore the library to a condition as close to the original as possible, and to avoid any startling change in decor.

A special challenge was posed by the drapes: custom-woven from heavy cotton and wool yarns, their dyes natural in tone, they featured earth colors that matched the early California Indian designs and the library ceiling decorations.

Reproducing the original drapes would have been prohibitively expensive, but a compromise was reached when a shop was found that would weave fabric to order—with a computer that would match color dominance to design.

A background shade of eggshell was selected, and from several dozen yarns, four colors were chosen to match the dominant four colors in the ceiling designs—with colors listed in order of their dominance in the new drapes. A computer then instructed the weaving machines to use the correct colors in the desired proportions as the fabric was created. The new drapes emerged satisfyingly close in feeling to the originals.

Rudolph Peterson named Life Trustee

Rudolph A. Peterson of the Caltech Board of Trustees has attained the status of Life Trustee and will continue as a permanent member of the Board on that basis. Peterson has been a member of the Board since 1967.

Alumnus taps a rich vein

The kitchen: its science and lore

By Winifred Veronda

Harold McGee's 684-page volume *On Food and Cooking: The Science and Lore of the Kitchen*, now in its fourth printing, has been termed a "minor masterpiece" by a *Time* magazine book reviewer. And the *New York Times Book Review* section called it "the kind of book that will bring the food lover back again and again—the way a paella does—in search of another morsel."

The book is the work of a rare breed of Caltech graduate—one who earned his degree in literature. And since any humanities major at the Institute takes a minimum of two years of science courses, McGee (BS '73) was well equipped to handle the science—as well as the lore—of his subject.

The book—handsomely illustrated with drawings and diagrams—answers such basic questions as whether it helps to add salt to egg whites before beating them, whether searing meat seals in juices during roasting, and why the differences between the muscle fibers of fish and those of meat make seafood naturally tender.

McGee has supplied detailed diagrams of molecular structures and cross sections of tissues that relate to cooking and eating problems. He has also crammed the book full of culinary anecdotes—such as the one about Sir Francis Bacon, the "father" of experimental science, who, in 1625 while on his way from London to Highgate, bought a chicken, stuffed it with snow to study the preservative effects of freezing, and caught a fatal case of bronchitis in the process.

The son of a Caltech alumnus, Charles McGee (BS '43), McGee grew up in Elmhurst, Illinois, in a home where "there were always Caltech annual reports and copies of *Engineering & Science* lying around."

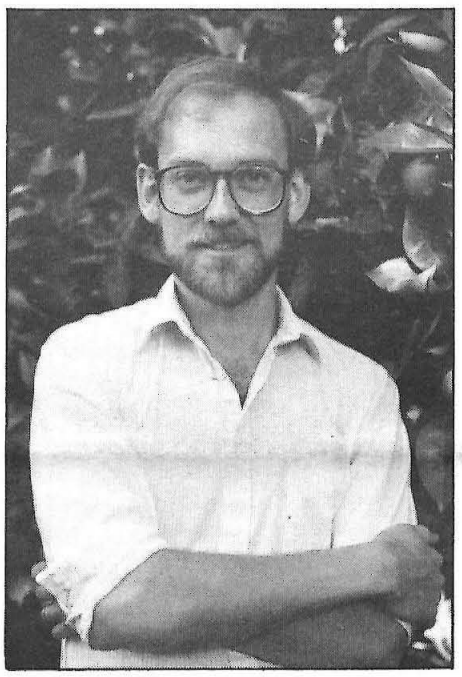
Interested during high school in both literature and astronomy, McGee—lured by the institution itself and by the 200-inch telescope at Palomar—decided to come to Caltech and become a scientist.

But by his sophomore year, he had decided that his interest in literature was stronger.

McGee decided to transfer to a liberal arts institution and was accepted by two such universities. But David Smith, associate professor of English, who was McGee's adviser and instructor in a course in the 20th-century novel, convinced McGee that he could do very well as a literature major at the Institute.

Smith pointed out that the literature faculty was excellent, the number of students small, and that McGee would have unique opportunities here for close interaction with his teachers.

It worked out well, says McGee, whose tutorials and courses brought him into close contact with faculty members like George Mayhew, Hallett Smith, and Stuart Ende. The latter awakened his interest in the English Romantic poets—an interest



The book is the work of a rare breed of Caltech graduate — one who earned his degree in literature.

that blossomed in his dissertation on this subject in graduate school.

The early '70s was a good time to be a literature major at Caltech, McGee believes. Quite a few people were taking double majors in science and the humanities, and there were four literature majors the year he graduated, out of 180 who were awarded BS degrees.

Background support for McGee's future career in writing came through a stint as head of the student Cinematech program that let him explore the world of film, and a year's employment in the Office of Public Events, writing under supervision of the late Pearl Fles, media coordinator for the office.

"For the first time," he says, "I had to write concisely and under pressure, and with a general audience in mind. This experience meant a lot to me later."

At Caltech McGee lived in Blacker House, and his sophomore year he met, and several years later married, another sophomore, Sharon Long—a transfer student from Harvey Mudd College and an independent studies major who would be one of the first four women to earn BS degrees from the Institute. Long, who received the Hinrichs Award for contributions to student life, also had a keen interest in the humanities and was chosen as one of two Caltech undergraduates to attend a summer program at the Institute for Humanistic Studies at Aspen.

After graduating from Caltech, McGee went on to get his PhD at Yale, where Long also went to do graduate work in biology. He completed his PhD on the Romantic poets and continued at Yale as a full-time instructor.

By this time, Long had completed her PhD, and her postdoctoral work took the couple to Boston where she did research at Harvard. Meanwhile, McGee was finding the late '70s a difficult time for a PhD in literature. "I decided that if I relied on the job market in my field and on Yale's placement office, my future wouldn't be in my own hands," he says.

Back at Yale, an idea had come to McGee for a book about the lore of cooking. He traveled in literary circles; his wife, in biological circles. His friends were bemused that she was writing her dissertation on the development of bean seeds. This led to discussions about the science behind everyday phenomena—why green beans turn to such an unpalatable color when they're cooked too long, for example.

The discussions started McGee poring over reference books in the library, and he found "an amazingly large body of information on the science behind cooking." He decided to write a sample chapter (on meat) and submit it to publishers.

Meanwhile, McGee received a call from Scribners. A recently employed talent scout for the publishing firm, with a particular interest in scientific projects for the general reader, had met someone at a party who had known Sharon Long at Yale and had heard of her husband's project. A little detective work led the scout to the prospective author's wife and then on to the author.

The Scribners representative showed McGee's chapter to the company's editorial board, and Charles Scribner, Jr., accompanied the scout to lunch with McGee and Long in Boston. Scribner, a great aficionado of science, takes special pride in the works for the general reader that his firm had published in this field.

McGee has no memory of what anyone ate for lunch that day. But over dessert, Scribner said simply, "I'd like to publish this book. What are your needs?"

McGee asked for the equivalent of a year's teaching salary, and said he could have the book ready in a year.

"As it turned out, I was wrong by a factor of 3.5," he says.

By the time the project was complete, three and a half years after the luncheon, the McGees were living in Palo Alto where Long is an assistant professor in the department of biological sciences at Stanford. (Two years ago, in recognition of her research achievements, she was named one of the first group of Presidential Young Investigators.) McGee's manuscript, which he typed himself to save money, was 1,200 pages long.

The results of the experiment appeared in *Nature* under the title, "Why Whip Egg Whites in Copper Bowls?" The story was picked up everywhere from the local press to the *Bangkok Sun Times*.

A new Scribners editor was now in charge of the project, and she was determined that the book would be either a history of cooking or a science of cooking—not both.

"I told them the book was intended as a blend and that it would be published in that form or that I would pay back the advance and take it elsewhere," says McGee. He suggested that the editor talk to Charles Scribner, who had made the original commitment, and things proceeded more smoothly after that.

The book appeared in print in November 1984. Scribners' initial plan was to print 3,000 copies and market it as a reference book—which meant that it would be less attractive for book dealers to handle than if it were a standard publication.

A bit of serendipity changed all this. In the process of writing the book, McGee had become interested in why cooks, for hundreds of years, have called for copper bowls when whipping egg whites. He had a theory about the reason. He, Long, and a friend, Stanford colleague, Winslow Briggs, created a chemistry laboratory in the McGees' kitchen, testing the copper-bowl-egg-white whipping process with the most advanced instrumentation possible.

Continued on page 11

"Land of Shining Mountains" lures 40 to come explore

Joanna Muir and her husband, Downie D. Muir III, are members of the President's Circle.

By Joanna Muir

"Where can I go now and view nature undisturbed?" the ornithologist, naturalist, and painter John James Audubon asked in 1846.

Almost 140 years later, the President's Circle of Caltech elected Robert Sharp, Sharp Professor of Geology, Emeritus, to introduce 40 fortunate members of the group to the charm and majestic scenery of Glacier Park—a region that early adventurers called "the land of shining mountains."

The four-day geological expedition began in Missoula, Montana. A delightful and enthusiastic group gathered for cocktails and dinner at the Village Red Lion Motor Inn. Dessert was enhanced by Bob Sharp's promise that our excursion would give us "a look at nature and the world with a new pair of eyes." That promise would be fulfilled.

Sunday was called a "warm-up calisthenics day." Sharp guided the bus driver north across Missoula Valley toward the National Bison Range. Once, between 13 and 18 thousand years ago, this valley was a closed depression forming Lake Missoula, 1,000 feet deep. Today the range, located in Flathead Valley, protects one of the most important remaining bison herds and serves as an outdoor laboratory for research in wildlife and range management.

During the morning Sharp talked about the geologic processes that have been operating since the earth's formation. Almost all of the rocks exposed in the cliffs and roadcuts of Glacier Park began as layers of sand, mud, and lime mud, deposited 1.6 billion to 1 billion years ago. These Precambrian formations rank among the oldest well-preserved sedimentary rocks in the country. They contain a record of the environment in which the original sand and mud accumulated—a marvelous glimpse into the remote geologic past.

That evening, on the shore of Lake McDonald, Caltech Associate John Wheeler welcomed the group to his homesteaded property where his family has been vacationing since 1915. A huge bonfire burned while he introduced park superintendent Robert C. Haraden, who talked about this special park, the "Crown of the Continent," and how it is preserved.

Bob Sharp (front center) describes geological history of the surrounding region for members of the President's Circle. Photo by Philip G. Cook (MS '50).

Glacier and its Canadian counterpart, Waterton Lakes National Park, were designated as the Waterton-Glacier International Peace Park in 1932. The parks are a symbol of friendship between Canada and the United States.

The rock formations of the park are few in number, very thick, and appear as broad bands of distinctive color. Many stops along the way helped us learn to recognize them. The oldest Precambrian formation is the Altyn limestone, and above this is the Appekunny Formation (mudstone), easily recognizable on distant mountainsides as a broad band of greenish gray rock.

As the frequency of red layers increases, the upper part of the Appekunny Formation passes into the Grinnell Formation, composed mostly of red mudstones. Fossil blue-green algae are abundant in the Helena Formation or Siyeh limestone, and the group stopped on Going-to-the-Sun Highway to view and touch these ancient stromatolites.

This highway has been described as the most beautiful 50-mile drive in North America. From a forested glaciated valley, it climbs the sheer cliffs of the Garden Wall. Four red park buses with open roofs transported the group on this exhilarating drive. Towering Bird-Woman Falls could be seen at a distance, dropping several hundred feet into the valley below. The highway reaches its highest point as it crosses the Continental Divide at spectacular Logan Pass.

The trip continued with many memorable experiences. Some of these included:

- A hike through natural terrain off the trail that leads from the visitor center at Logan Pass to Hidden Lake.
- A view of Sunrift Gorge. Here, Baring Creek bounces down the mountainside for 800 feet through a narrow gorge and, finding an old fault line, makes a sharp right angle to follow it. The stream has eroded the gorge to a depth of approximately 80 feet.
- Canoeing, for those so inclined, in Swiftcurrent Lake at the foot of Grinnell Glacier, site of our alpine hostelry, Many Glacier Hotel.
- An early-morning motor boat trip past a beaver habitat on the lake in Grinnell Valley with its 400-year-old spruce and fir forest, and a walk along a wooded trail to aqua-green Josephine Lake.
- An overnight stay in the Glacier Park Lodge, built almost half a century ago. Sixty gigantic fir and cedar columns, retaining their original bark, support the lobby and verandas of this structure that the Indians named "Big Tree Lodge."

"Thanks for the red-carpet treatment" was the tribute on our final evening to Jeanne Coombs and Nancy York, the past and present executive directors of The Associates, from Caltech Trustee Howard Vesper (BS '22) and Frances Vesper. The group dined at picnic tables on a promontory on the shore of Swan Lake in a spectacular setting amid the Rocky Mountains.

Nancy York presented Bob Sharp with a gift certificate to his favorite sports equipment store. Fishing in the streams near Silvergate and his Montana cabin would complete his August vacation.

A sing-along provided the finale during the bus ride back to Missoula. The camaraderie, joy, and enthusiasm were shared by everyone. Sharp's solo, "I'm Looking Over a Four Leaf Clover," was the highlight of the evening.

The many letters received by The Associates staff expressed glowing comments for those involved in planning and executing the trip. Commented one writer, "Be sure to have a repeat on that trip for 40 more fortunate people!"

And what glorious weather! Except for a few raindrops at the Trail of the Cedars nature walk, Caltech's guardian angel was a protective umbrella. Altogether, it was an extraordinary educational adventure into "Glacier Country, Montana's Wonderland."

356 high school students study science, math in summer program

Burnham Greeley knew a lot about Newtonian mechanics and electricity before this summer began, but by the summer's end his mastery of the subjects was even more complete.

A senior physics major, Greeley taught physics for seven weeks this summer to 32 high school students who enrolled in the Institute's Summer Secondary School Science Project.

"The course is pretty rough," Greeley acknowledged during a break in his course in the Noyes Laboratory lecture hall. "This is designed to be a high school course, but I'm giving them some things I never saw in high school—vector calculus, for example."

In its tenth year on campus, the program this year enrolled 356 high school students from throughout southern California and from as far away as France and Italy, and from Florida, South Carolina, Maryland, New York, New Jersey, the Virgin Islands, and Hawaii.

Tuition free, the project is open to any high school or junior high school student. There are no entrance exams, although there is a mathematics prerequisite for each class.

"The program is self-selective," says Lee Browne, head of the Institute's Secondary School Relations Program. "Any young person willing to be in a science class four days a week from 9 a.m. to 3:30 p.m. for seven weeks during the summer is a good bet for success."

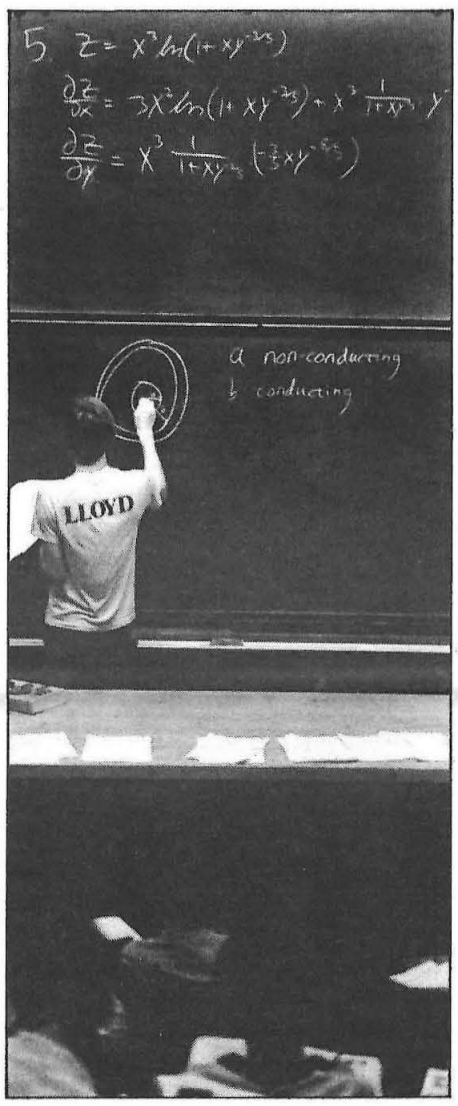
The project began in 1976 with 75 students and four classes. This year there were 11 classes—three levels of molecular biology, three levels of physics with trigonometry, three levels of chemistry, and two levels of physics with calculus.

The project has also metamorphosed from a day school to an optional resident program. This year about 200 of the participants lived on campus in the student houses, paying room and board.

After-class and weekend recreational activities for the live-in summer students—and their general supervision—was under direction of Bernie Santarsiero, who is deputy master of student houses and coordinator of crystallographic research in the Division of Chemistry and Chemical Engineering.

Why does Caltech do it? Browne believes that the outreach to local communities is of tremendous value and that through the project, Caltech provides a much-needed educational service.

"There are 1,634 school districts in the United States that have an average of only one teacher per district who is certified by a degree in math," he says. "The average number of teachers certified in chemistry and physics is even lower. In the summer program we provide the students with teachers (upper division Caltech undergraduates) who can do all of the problems at the end of the chapters."



Caltech senior Burnham Greeley explains physics intricacies to high school students in Caltech's summer program for high school students.

Additionally, Browne believes, there is a special benefit for the students because the teachers are close to their own ages.

Of course, one benefit to Caltech is the students that the program attracts to the Institute as potential undergraduates. Browne notes that an average of about 18 a year apply for admission.

Another reward is the training the program gives the Caltech students who teach. Some, who have never been in front of a classroom before, will be teaching assistants in the years ahead, and will find the experience particularly valuable.

A number of those who have taught in the program have found their careers through it: Browne points out that 30 teaching "alumni" of the project are currently teaching science in the California public and private schools.

Typical of the teachers is Paul Stankus, a senior two summers ago when he decided to try his hand as an instructor. "I had always enjoyed helping people with homework assignments," he says, "so I took the next step."

Stankus adds, "I liked the idea of figuring out how to prepare 'reasonable' courses—of how to present things clearly."

Stankus found that it was fun to watch young people learn. So, with a new BS degree in physics, he joined the summer program to offer quality instruction in an environment where quality science is a byword.

Funding comes from the Birley Foundation, the Fusenot Foundation, the Galster Foundation, General Electric, IBM, and Caltech, as well as from a few individual donors, including parents.

SSO experiments scheduled for fall Space Shuttle flight

If all goes according to NASA schedule, members of the Student Space Organization (SSO) will try again next month to send two experiments into space aboard the Space Shuttle.

The experiments, conceived and created by earlier SSO members, are in Getaway Specials—small, self-contained payload canisters that NASA made available to anyone with a legitimate research purpose and $10,000 to rent the five cubic feet of canister space.

The canisters went aloft aboard the seventh Space Shuttle mission in June 1983, but the experiments were aborted because of a blown fuse. A three-amp fuse necessary to carry current to the flight computer and thus activate the experiments was replaced with a one-amp fuse—apparently during a safety check at NASA shortly before launch.

NASA requires that all experiments be disassembled and reassembled at the Cape under its supervision. It appears that during this inspection, a fuse had been damaged, and an SSO member had replaced it with a fuse too weak to do the job.

Aboard the shuttle, the two experiments will investigate (1) how radish seeds perceive and respond to the direction of gravity in darkness and under conditions of very low artificial gravity (produced by the spinning of their growth chambers), and (2) how alloys form away from the earth's gravity.

Scientists hope that in space, alloys can be created of metals that would not combine on earth and that these alloys might possess superior properties of strength and superconductivity. Caltech students will probe this question by analyzing and photographing how stirred oil and water separate under zero gravity conditions. Connie Bennit, now a graduate student at the University of Washington, is project manager. Her predecessor in this role, Kirk Haselton, is a graduate student at Cornell.

SSO members say that the two experiments are in far better shape, in terms of engineering and electronics, than in 1983 because of additional time to refine and perfect them. To guard against another fuse failure, members visited JPL and learned how to "derate" fuses for space work. For example, the work of a 2-amp fuse on earth must be done in space by a 3-amp fuse.

November 1985 is not the first date given the SSO for the second launch of its canisters. Earlier launch dates were cancelled. Getaway Specials are at the bottom of the NASA list in priority, and are the first Space Shuttle contents to be bumped.

But the members are hoping that this time, their experiments will be part of the space-borne cargo. They've been given 50 tickets for the launch, and about 12 members plan to be there—joined by several SSO members from earlier years who want to celebrate the long overdue culmination of their efforts.

A new experiment involving crystal growth from solution under low gravity conditions is being developed by the SSO for a future Space Shuttle flight, as is a further experiment involving the creation of alloys in space. Tom Wahl, a junior majoring in physics, is the project manager.

Note: The article on Halley's Comet in August *Caltech News* erroneously stated that the comet would make one of its closest approaches to the earth on April 22, 1986. The correct date is April 11, 1986.

Alumnus to explore heritage in People's Republic

From the rock music of Bruce Springsteen and the Eagles, from the *California Tech* editorship and lasagna and pizza, from computer science classes at Caltech, Lily Wu took a long step this summer into the world of the Ching Dynasty, Sun Yat-sen, the Japanese occupation of China, and the Chinese Cultural Revolution.

Wu (BS '85, E&AS) is spending a year in China—her parents' homeland—on a T. J. Watson Fellowship for travel and study abroad. Fellows are selected for their commitment to a field of interest not necessarily related to their college studies, and for their intelligence, integrity, capacity for leadership, and potential for creative achievement. (Wu this spring was awarded an AT&T Information Systems Prize for academic, campus, and community service. She was selected for the honor by the deans.)

Wu's future parents left China as young people in 1949 to go to Taiwan, while their families stayed behind (two of Wu's uncles were the only relatives to leave the country). They met in Taiwan and married there, migrating to the United States 17 years later, when Wu was two years old. Wu's father returned to China for a visit four years ago; her mother has never been back.

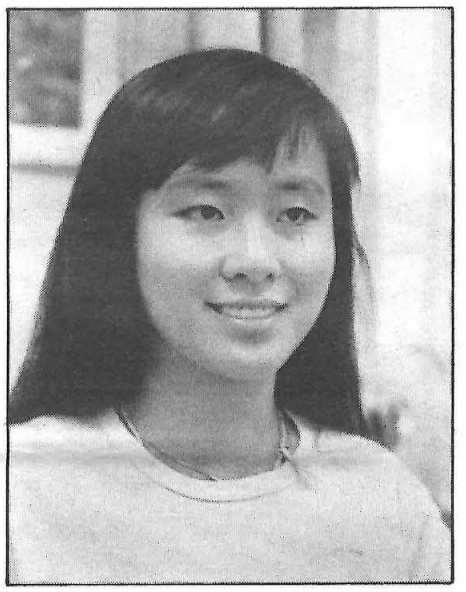
Her parents live in New York City, where her father is a civil engineer and her mother works as an accountant. Wu's older sister, Dolly Wu, is a Caltech graduate student in physics.

Wu, who speaks fluent Mandarin and who is learning to write Chinese, began her year in late August by traveling to Beijing, where her mother's family lives. Her mother is the youngest of six brothers and sisters, and an older generation of her mother's family worked in bureaucratic positions in the Ching Dynasty Court, the last imperial dynasty before the revolution led by Sun Yat-sen. Over three generations, her relatives in the capital city lived through the dynasty overthrow, the Sun Yat-sen era, the Japanese occupation, the Chinese Communist revolution, the Cultural Revolution, and the post-Mao era.

"A lot of what happened during this period—especially in terms of social history—has never been written down," says Wu. "It only exists as oral tradition, kept through stories that family members have passed on to one another."

Wu wants to tap into the rich vein of stories within her own family—stories that span 70 years of political upheaval and social change. She particularly wants to talk with people her own age about their dreams, and what they hope for in their personal and professional lives. Then she would like to organize the material—perhaps as a book—and make it available to others who are interested.

Her experience as editor of the *California Tech* during her senior year and as a columnist for it as a junior ("The Gadfly," about social and academic conditions on campus) should give her useful background for this project.



Lily Wu

Living in a foreign student dormitory in Beijing, Wu will audit courses for several months at the University of Beijing, studying Chinese for foreigners and Chinese history and anthropology, and becoming proficient at riding a bicycle. She plans to work for a few weeks in a visitor worker program, then to travel throughout the country by train for several months, visiting her father's family in the Anhui Province, an inland farming area, and several other provinces.

China is a safe country for a woman alone, says Wu, and she has no worries about her personal safety while traveling. More relevant are concerns about physical difficulties—slow trains, poor service, unsafe water in outlying areas, lack of U.S. medicines (her father has used some traditional Chinese medicines, but Wu is skeptical), and problems in communicating in areas where she doesn't know the dialect. (All Chinese young people are taught Mandarin in school, but many older people don't speak it.)

In larger towns she will stay in hotels; smaller towns offer rooms for rent in private homes.

After completing her travels in China, Wu plans to visit an uncle who teaches at the University of Melbourne, Australia, to consult with him on the book she hopes to write and on how to "put it all together."

Then it's back home—back to the world of Bruce Springsteen and the Eagles and to a job with GTE in the firm's engineering associates program. For the initial phase of her work, Wu will be given six three-month assignments in different GTE facilities around the country.

How will she be different when she comes home? Wu can't be sure, of course. But she will be much more aware of global politics and of how people in a non-Western country view themselves and their world. And because of this, her own world will seem a little different than it was when she left it.

Science in the kitchen subject of "minor masterpiece"

Continued from page 9

The three went on to submit a paper on their results to *Nature*, and it was accepted under the title, "Why Whip Egg Whites in Copper Bowls?" The story was picked up everywhere from the local press to the *Bangkok Sun Times*, and Scribners held a second meeting on the project.

They doubled the printing, redesigned the jacket, tripled the length of the index, and changed the book's classification. It sold to food scholars first and now knowledge of it has filtered down to everyday cooks.

Scribners limited its publicity on the book to three ads in the *New York Times* during a three-week period, and McGee feels gratified that the publication has made its own way. His time on the TV talk-show circuit has been limited to appearances on two television shows—one on AM LA, where he shared the stage with Dr. Joyce Brothers and a lingerie fashion parade, and a second —Morning Live in Boston.

Despite this limited publicity campaign, McGee's creation has been chosen the main selection of the Natural Science Book Club, and as one of the three best reference books of 1984 by the *Library Journal*. It was the subject of a spread in *People* magazine—and it led to an invitation to McGee to give the keynote address at the 1985 Oxford Symposium on Food. The author was also interviewed on National Public Radio's "All Things Considered."

Early in the project, McGee says he had to make a choice between a "quick and easy job on an ordinary reference" or an authoritative work that would be a landmark in the literature of cooking. "Mr. Scribner said that the book could become a standard and could make a difference in its field," McGee observes, "and this is what I decided to go for." There seems little doubt that his goal has been achieved. One reviewer says the work will "stand as the best research on food chemistry and cooking that's been done."

Meanwhile, McGee has been working on free-lance writing projects for Silicon Valley firms and for the Stanford biology department. He's also working on the idea for another book involving the way living things move.

"There are only a few mechanisms by which nature can produce movement," he says. "The history of research in this area is very venerable. Some very fine work on this subject was done in Hungary during the occupation, when scientists were cut off from the rest of the world and limited in their resources.

"I'm interested in the science of everyday life—in the things that happen to us regularly whose surfaces we don't see beyond."

McGee's book on movement—as did his book on cooking—would get well beyond those surfaces.

Wu honored for fluid mechanics contributions

Theodore Y. Wu, professor of engineering science, has been elected to membership in the Academica Sinica of Taiwan, in recognition of his wide-ranging contributions to the study of fluid mechanics.

Wu's research in fluid mechanics includes cavity and wake flow, ship hydrodynamics, hydrofoil propulsion, slender-body theory, locomotion in fish and microorganisms, long waves in the ocean, tsunamis, and energy extraction from wind and ocean currents.

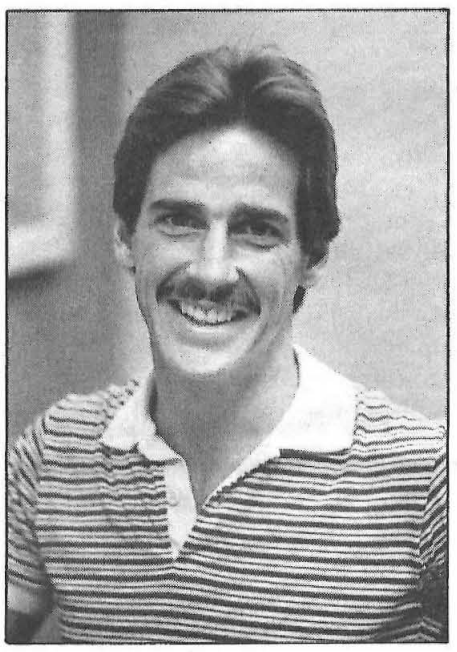
Wu also studies the phenomena of swimming and flying in nature, and their relevance to various kinds of engineering problems.

James O'Brien to coach track, cross country

James O'Brien joined the Caltech athletic department staff this fall as track and cross country coach.

O'Brien will also teach a badminton class and direct the employee noon fitness program, and will monitor the fitness programs that students design for themselves for physical education credit.

Before coming to the Institute he was cross country coach at the University of San Diego and track coach at Southwestern College in San Diego. He also worked for three



James O'Brien

years for the San Diego Naval Station on a project for the station's Naval Health Research Center. The goal was to develop and test fitness programs for the station's Naval Training Center personnel and to find ways to improve the fitness of Naval personnel in general.

O'Brien received a BA degree in 1979 and an MA degree in 1985, both in physical education from San Diego State University.

Correction: Class of 1935

We regret that two anecdotes in the story on the class of 1935's 50-year reunion (in the August 1985 *Caltech News* issue) were attributed to the wrong individuals. Jack Nethercutt, not Daniel Miller, is president and chairman of Merle Norman Cosmetics, Inc. Harry Estes, not Norman Dewees, has retired to Sea Ranch and thrown away his razor.

Donald Wilkinson:

Association president stresses stronger alumni-student ties

By Winifred Veronda

Donald P. Wilkinson (BS '48), the 1985-86 Alumni Association president, would like to see a stronger relationship between Caltech students and alumni. "As I look at it, Caltech students and alumni form a continuum," he says. "They're parts of the same group and there should be an ongoing relationship between both phases of the continuum."

Seeking ways to foster a closer relationship between the Caltech people still on campus and those who have left it for the "outer world" will be an important concern for Wilkinson during his year as president. He notes that last year, Ricketts House invited alumni to an afternoon of bridge and a barbecue, and he hopes to encourage more events of this kind this year.

Wilkinson will also put emphasis on the growth of chapters outside Los Angeles, and on continuing "the strong assortment of programs" already being offered by the association. And he would like to see the quality of alumni reunions improved by involving more alumni in their planning.

A native of Los Angeles, Wilkinson entered Caltech in 1940. Here he was a member of Dabney House and was manager of the track team. War intervened, and Wilkinson, who could not be in armed service because of a physical disability, went to work for General Motors in aerodynamics and flight testing as a junior engineer.

He returned to Pasadena to finish his studies in mechanical engineering in 1946. Here he worked part time in the laboratory of David S. Wood (BS '41, MS '46, PhD '49). Wood at that time was in the process of earning his PhD degree under the late Donald S. Clark, then associate professor of mechanical engineering

Influenced in his interests by his father, who was a history buff, Wilkinson remembers with particular pleasure "the fine history people in the humanities department"—people like J. E. Wallace Sterling and William B. Munro.

After graduation, Wilkinson worked for two years in Seattle for Boeing Aircraft. Observing the effects of a downturn in the company's work force during a recession, he says, "I realized that in Seattle, engineers during hard times have so few other employment options."

So Wilkinson returned to Los Angeles, working first for Marquardt and then for the Propulsion Research Corporation.

Then in 1955 he began what was to become a 30-year career with Hughes

Donald Wilkinson

Aircraft. In 1961 he earned a master of engineering degree at UCLA through the university's executive engineering program.

At Hughes, where he started as a member of the technical staff, Wilkinson was most recently manager of administration and operations for product effectiveness with Hughes' Missile Systems Group.

It was at work that Wilkinson met, and 14 years ago married, the former Carol Jordan, a mathematician who works in the company's Electro-Optical and Data Systems Group as associate manager of the Systems Engineering Laboratory. Wilkinson brought three children to the marriage, two sons and a daughter, and Mrs. Wilkinson brought two sons by her former marriage.

This fall, Wilkinson ended his career with Hughes when he retired in September. One of the interests he would like to pursue after retirement involves helping people become more aware of the importance of technology to our culture and our civilization.

"Some people have been very critical of technology during the last few years," he says. "I believe technology helps people realize the best part of themselves."

In addition to pursuing this interest and others he should find, giving leadership to the Alumni Association seems destined to assure a productive and fruitful year—for Wilkinson, and for the organization.

Mechanical Universe now on television

The Mechanical Universe, Caltech's college-level introduction to the history, laws, and applications of classical mechanics, made its debut in September on broadcast and cable television. The first segment of the 26-part series premiered in Los Angeles on KCET (educational channel 28) on September 7.

The series, which combines the visual techniques of modern television with the rigors of a college-level physics course, was developed for both teachers and students. Its creators hope it will make a significant contribution to better scientific education in the country.

Fowler Seminar Day lecture available on videotape

A videotape of the 1985 Seminar Day general session is available through the Alumni Association. The tape features Nobel Laureate William A. Fowler (PhD '36), Institute Professor of Physics, Emeritus, in a modified version of his 1983 Nobel lecture.

In the videotape, Fowler discusses 50 years of research by faculty and students in the W. K. Kellogg Radiation Laboratory, and elsewhere, on the nuclear processes that generate energy in the sun and other stars, and those that have synthesized chemical elements in the universe. Interspersed with the science are slides and anecdotes of the Nobel award ceremonies in Stockholm.

Copies of the videotape can be purchased from the Alumni Association (1-97, Pasadena 91125) for $20 per copy in VHS or Beta format and can be used as the focus for an alumni meeting. Alumni who would like help in arranging such a gathering should contact Janet Davis at the Alumni Association office by mail or telephone (818/356-6594).

Chuck McDougall

Momentum, leadership: key to sustaining Fund successes

By Winifred Veronda

Charles H. McDougall (BS '47) faces a tough test as national campaign chairman for the 1985-86 Alumni Fund. In 1984-85, the Fund exceeded its goals and earned the largest grant possible from the Irvine Foundation through the three-year Irvine Challenge Campaign. Gifts for the year totaled $2,212,750, exceeding a goal of $1,800,000.

"To achieve this level of giving, many donors generously responded with a second contribution during the last half of the campaign," says McDougall. Nevertheless, the new chairman is optimistic that the Fund can maintain the pace it has set.

"We don't anticipate any falloff this year," he says. "Our successes have given us momentum and we have a dynamic organization of volunteers and professional staff. If we set reasonable goals and define them clearly, I believe that we can meet them."

McDougall says he was recruited to his role by G. Stan Holditch (BS '48), the 1984-85 national campaign chairman, a former Caltech football teammate. McDougall had become known to many alumni during the 12 years that he offered the Sears telephone facility for the Fund's nationwide telephone campaign. He went to work as a statistical analyst in the mail order business for Sears in 1947, the same year he earned his BS degree from Caltech. In 1982 he retired as western territorial manager of data processing and communications, after 35 years with Sears in numerous capacities in California and the Chicago headquarters.

"I was one of only three Caltech graduates among 450,000 Sears employees," he says.

McDougall, who grew up in Chicago, enrolled in the Institute in 1939 because "it had a good reputation, its tuition was half of MIT's in those days, and I thought the weather would be a plus."

With Robert Densmore (BS '42), he edited the 1941 *Big T*, dedicating it to "the men of the class of '41. Prepared to face the problems of a changing world, they face the future with steady assurance. The world welcomes them. The Institute will miss them."

McDougall was also active in track and football, wrote for the *California Tech*, and was elected athletic manager, a student body office. For contributions to student life, he received two honor keys and he was chosen a member of the Beavers.

After three years at the Institute, the war interrupted his career and he went into the Navy, piloting lighter-than-air ships in the North and South Atlantic on convoy and anti-submarine patrol. Meanwhile, he had

Chuck McDougall

married Jean Herzberger, whom he met when she, a PCC student, attended a Caltech dance as another Techer's date.

Back at Caltech after the war, the McDougalls lived with their young daughter in married student housing in Temple City. "We knew a lot of people there," he says. "It was like old home week."

McDougall had entered the Institute as a geology major but he finished with a degree in math. "Geology usually meant working in Venezuela or in Saudi Arabia," he says, "and with a family, I wasn't interested in working abroad." Sears provided a close-to-home professional opportunity—and a lifetime career.

In his leisure time, McDougall plays golf, enjoys the theater, and likes to travel—particularly to Europe. There, his favorite destination is France, and Mrs. McDougall's is Italy. The couple's son lives in Boise, Idaho, and their daughter in Hillsborough, California. They have five grandchildren, including two that McDougall says "are taller than I am."

During 1985-86, the Alumni Fund will continue to rely heavily on the dedicated volunteer organization that has been developed over the years, McDougall says. "The regional and area chairmen and workers have the most important job," he observes. "My job is easy, compared with theirs."

The biggest challenge will be to increase participation—essential if the fund is to maintain its level of giving, according to McDougall.

New graduates form a growing body of contributors—a change since McDougall's days as a young alumnus. "When I graduated from Caltech, nobody suggested that I contribute," he says. "Today, that's changed, and many students and young graduates are working for and giving to the Fund.

"Their support—as workers and donors—has been of tremendous help in building a strong, broad-based organization."

McDougall would also like to increase support from alumni who earned graduate degrees at the Institute but whose first degree was taken at other institutions.

"Because of its unique value to science and society," he says, "Caltech receives support from many sources—individuals, foundations, corporations, and government. Much of this aid, however, is given for specific projects, or as grants to specific individuals.

"Contributions to the Alumni Fund are unrestricted, and help to assure that no potential applicant will be denied attendance because of a lack of funds. Although contributions to the Fund have risen from about one third of the alumni to about half—making Caltech among the top universities in participation—I believe we can do even better.

"A Caltech degree and the Caltech experience have their own meanings for each alumnus. We want those whose memories are positive to give —not 'til it hurts. Just 'til it feels good."

Outstanding Alumni Fund leaders honored

Four regional and ten area chairmen have received special recognition from Alumni Fund leadership for achieving high levels of participation.

The regional chairmen are: Don Stewart, Jr. (BS '47), Region 2, South Coast Counties, 59.8 percent; E. T. Grinthal (PhD '69), Region 11, Mid-Atlantic, 57.3 percent; Carleton Moore (PhD '60), Region 7, Southwestern Sun Belt, 56.5 percent; and Robert O'Connell (BS '51), Region 4, Central Coast Counties, 56 percent.

Area chairmen include: Paul Dergarabedian (PhD '52), Area 120, the Aerospace Corporation, 75 percent; George Harr (BS '41), Area 75, Newport Beach, 72.5 percent; David McCarroll (BS '66), Area 95, Covina, 70.2 percent; Calvin Kempton, (BS '46), Area 60, Laguna Beach, 69.8 percent; Raymond Cromley (BS '33), Area 515, Northeast Virginia, 69.4 percent; George Beardsley (MS '39), Area 290, Rancho Santa Fe, 69.3 percent; James Higgins (BS '56), Area 61, South Laguna Beach, 69 percent; Edward A. Hayes (BS '33), Area 325, Tucson, 66.6 percent; J. Greg Bourque (BS '68), Area 380, South Colorado, 65.5 percent; and Harold Crockett (MS '40), Area 45, La Canada/Crescenta Valley, 64.2 percent.

Alumni Fund workers needed

After meeting the Irvine Challenge, Caltech alumni face a difficult task: to maintain and build on the gains achieved.

During September and October, many alumni are being asked to do more than renew their financial commitment; they are also being asked to become workers. To make their assignment as easy as possible, only a few prospective donors are assigned to each volunteer.

Alumni need not wait to be called. Many potential volunteers are overlooked each year because there isn't enough time to ask everyone to help. If you can spare a few hours, please contact: Bedford McIntosh, director of annual giving, at Caltech 1-97, Pasadena 91125, or at (818) 356-6285.

Sharp to lead alumni on Death Valley trek

A trip to Death Valley with Robert P. Sharp (the Sharp Professor of Geology, Emeritus) as guide is planned for Alumni Association members from January 30 to February 2.

The trip will begin with lunch at the Athenaeum and an overnight stay in Apple Valley. En route, participants will hear a discussion of the geology of the eastern San Gabriel Mountains and, in Cajon Pass, of two of southern California's largest and most active faults—the San Jacinto and San Andreas.

During the second day, the group will pass through the southern part of Death Valley over the Jubilee and Salisbury Passes and along the east side of the valley through Badwater to Furnace Creek Ranch.

Evidences of ancient lakes and rivers, sand dunes, major fault zones, and complex structures such as turtle backs and chaoses, will be given special attention.

The third day will focus on features of central Death Valley, including badlands in the Furnace Creek Formation, borax mining, Salt Creek and pup fish, and the rocks and sand dunes of Mesquite Flat. The alumni will stay overnight at Stove Pipe Wells.

The group will return on February 2 to Caltech, over Immigrant Pass into Panamint Valley, crossing the Slate Range into the Searles Lake Basin to view the tufa pinnacles at the south end of the lake. This landscape has been described as one of the most unusual in North America. After stopping for dinner, the group will return to Caltech at approximately 9 p.m.

Cost of the trip is $375 per person, double occupancy, and $450 per person, single occupancy, including meals, hotels, and bus transportation. Reservations may be made through a $100 deposit to the Caltech Alumni Association, 1-97, Pasadena 91125.

ALUMNI ACTIVITIES

For more information about any event listed below, please call Janet Davis, executive director of the Alumni Association, at (818) 356-6594.

OCTOBER 12, 1985 *Norton Simon Museum tour*, 10:20 a.m.-12 noon, $15.00 per person. Reservations required.

NOVEMBER 4, 1985 *Private viewing of the Baxter Art Gallery exhibit*, 25 Years of Space Photography, *5:30 to 7:30 p.m. in the IBM Gallery of Science and Art* at Madison and 57th Street in Manhattan. The exhibit, which will remain at the IBM gallery through January 4, 1986, features JPL's contribution to space photography, beginning with photographs taken in the early 1950s.

DECEMBER 7, 1985 *Alumni basketball games* in Scott Brown Gymnasium. Alumni versus varsity, 2 p.m.; alumni versus junior varsity, 4 p.m. Refreshments afterward at the Alumni House for participants and their families.

JANUARY 1, 1986 *Rose Parade program* including breakfast, Rose Parade seats, luncheon buffet in the Athenaeum, and box lunches with bus transportation for those with tickets to the Rose Bowl game. Price to be announced. Open to Alumni Association members and their guests. Reservations required.

JANUARY 30 - FEBRUARY 2, 1986 *Death Valley Trip* with Robert P. Sharp (the Sharp Professor of Geology, emeritus). See story in left column.

MARCH 14 & MARCH 21, 1986 *Wine tastings* at 7 p.m. in the Athenaeum featuring a selection of more than 16 vintage wines from four major wine producing regions of California—including Napa, Sonoma, Santa Barbara, and Monterey. Open to Alumni Association members and their guests. Reservations required. Cost: $20 per person.

MAY 17, 1986 *Seminar Day*, the Caltech campus, featuring research seminars and exhibits. Open to all alumni, their families and guests.

JUNE 7, 1986 *Half-Century Club luncheon*, the Athenaeum. Details to be announced.

JUNE 13, 1986 *Commencement*, the Caltech campus.

JUNE 19, 1986 *Alumni Association annual meeting* and dinner honoring new honorary alumni and new officers, the Athenaeum.

AREA LUNCHEONS

Santa Cruz chapter meetings. Second Thursday of each month, 12 noon at Hollins House on the Pasatiempo Golf Course. Contact Don Cleveland (408) 429-9322 for reservations.

San Francisco Peninsula meetings. Third Thursday of each month, 12 noon, Ming's Restaurant in Palo Alto. Contact Hugh Dubb (415) 362-3800 or (408) 287-8278 for reservations.

Caltech Alumni Association
Death Valley Trip — January 30 - February 2, 1986

Please make _____ reservations for the alumni trip to Death Valley

Name(s) _____ Class year _____

_____

Address _____

_____ Phone _____

I enclose a check for $ _____ ($100 per person) as a deposit.
(Make check payable to the Caltech Alumni Association.)

You're wanted at this waltz party

When graduate students Ruth Erlanson (electrical engineering) and Dawn Meredith (physics) looked at the beautiful hardwood floor in Dabney Lounge, they decided that what Caltech needed was a waltz party—and they proceeded to create one.

The dance—open to everyone in the Caltech community—is scheduled for 8 p.m. on Saturday, October 19, in Dabney Lounge and will feature the music of the Caltech-Occidental Orchestra. All alumni are invited—particularly those from the era when a good waltz step was standard in one's dance repertoire. Formal attire will be welcome but is not required. Refreshments will be served. Everything is free.

For those who need pre-party help with their waltz step, two classes have been scheduled—in Dabney Lounge at 7:30 p.m. on October 8 and October 15. Members of the Caltech chapter of the International Folk Dance Association will give instruction.

Financial support for the waltz party is provided by the Alumni Association, the Caltech Y, the Office of Student Affairs, the Graduate Student Council, and the Master of Student Houses' Office.

Personals

1941

HAROLD K. FINK, MS, has moved from Oahu to Maui, Hawaii, where he is an intake clinical psychologist with the Maui Community Mental Health Center in Wailuku. In addition, he continues his private practice, part-time, in Kihei, Maui. Prior to moving, he was an intake clinical psychologist at Hawaii State Hospital in Kaneohe.

1943

ALBERT O. GROTE, MS '51, writes from Colma, California, that he retired on May 31 as city engineer in Daly City. He was remarried in December 1983 to Elaine Hawthorne.

ARTHUR HILSENROD, MS, retired on March 2, 1984, from the FAA after 24 years as research meteorologist and 40 years of government service. While with the FAA, he was involved with meteorological investigations to improve the safety and efficiency of aircraft operations. His projects included the sonic boom, icing environment, short range forecasts, and dispersion of fog. In addition to the FAA, he worked for the U.S. Army-U.S. Army Air Force, Army Chemical Center, and Air Force Cambridge Research Laboratories. Since retiring, he has "enjoyed relaxing in travels, visits to friends in faraway places, swimming and other sports, and attending more concerts and shows and political functions." He resides in McLean, Virginia, with his wife, Frances.

1948

WELKO E. GASICH, Eng, has been named executive vice president for program management at Northrop Corp., where he is responsible for corporate-wide review of major programs and technologies. He is also involved in the development of Northrop's business interests in the Pacific Basin. Gasich joined Northrop in 1953 and most recently served as senior vice president for advanced projects. A member of the original design team for the company's T-38 Talon supersonic trainer and F-5 series of tactical fighters, he also worked on the Cobra tactical fighter program and the F-20 Tigershark tactical fighter. Before joining Northrop, he worked at the Rand Corp., Douglas Aircraft, and the NACA Aero Laboratory at Moffett Field.

KENNETH W. HEDBERG, PhD, professor of chemistry at Oregon State University, has been elected a Fellow of the AAAS. A recipient of the OSU Alumni Distinguished Professor Award, as well as many other awards for his research and teaching, Hedberg has been at OSU since 1956.

1949

STANLEY C. PACE, MS, retired as vice chairman from TRW on May 31, to join General Dynamics as vice chairman. He is expected to become chairman "not later than January 1, 1986." Pace, who had been with TRW for more than 30 years, also is chairman of the National Association of Manufacturers.

1953

IRVIN R. KOBSA, MS, of San Jose, writes "In August, I will have been with General Electric's Commercial Nuclear Energy Operation for 29 years. I am currently chairman of the joint G.E., Hitachi, Ltd., and Toshiba Corp. group designing an advanced BWR to be built in Japan for

Tokyo Electric Power Co. The project has resulted in my visiting Japan several times lately. My two daughters are planning a double wedding in September."

1957
GERALD KLAZ writes from Culver City, "After almost 25 years of practicing (medicine) as a general practitioner in the Los Angeles area, I am retiring. I look forward to some well-earned travel and relaxation, as well as learning how to conquer the intricacies of a computer."

1959
JAMES S. SOMBERG has been named vice president of contracts at Aerojet Ordnance Co. in Tustin, where he is responsible for establishing contract administration plans and policies, managing company legal matters, participating in all marketing strategy programs, and coordinating contracts and legal activities. Before joining Aerojet, he was assistant general attorney for Western Gear.

1961
PETER I. LIPPMAN, an attorney with the Los Angeles law firm Romney Golant Martin & Ashen, has been appointed an adjunct faculty member at UCLA School of Law where he is teaching patent law. Lippman, who practices patent, trade secret, trademark, and other technology-related law, writes that he works "with some very bright Harvard types who hate science and love knotty business problems. It is a nice collaboration."

1963
ALVIN L. KWIRAM, PhD, professor and chair of chemistry at the University of Washington, has been elected a Fellow of the AAAS. A UW faculty member since 1970, Kwiram specializes in molecular structure and dynamics. He lives in Seattle.

CHARLES P. WANG, MS, PhD '67, is program chairman of the LASERS '85 Conference, the Eighth International Conference on Lasers and Applications, which will be held in Las Vegas in early December. This year's program focuses on lasers in the Strategic Defense Initiative Program. Dr. Wang, who is senior scientist at The Aerospace Corporation in Los Angeles, is an adjunct professor at UC San Diego and a Fellow of the Optical Society of America. Author of more than 70 publications and inventions, his work involves laser development and applications.

1966
H. GERARD SCHWARTZ, JR., PhD, has been elected president of the Water Pollution Control Federation. Schwartz, who has been a corporate principal and member of the board of directors of Sverdrup Corporation since 1978, joined the company in 1966 as a project manager and head of the environmental section—in charge of environmental engineering projects. Those projects included waste treatment studies, municipal wastewater collection and treatment, and design of air pollution systems. He was chairman of the Technical Practices Committee from 1976 to 1981 and served on the WPCF Board of Control from 1977-1980 and on the executive committee in 1978-1979. He received the WPCF Bedell Award in 1975.

1967
KIMBERLY R. GLEASON writes from Portland, Oregon, "I have started a business with two others—Cascade Microtech—which manufactures microwave equipment for the high speed silicon and GaAs integrated circuit industry."

MICHAEL R. HESS recently received the Meritorious Civilian Service Award from the Naval Air Development Center (NADC) for his contributions to sensor technology, which ". . . have set the direction for the next decade of research and development . . ."

BOB H. SUZUKI, PhD, has been named vice president for academic affairs at Cal State Northridge. Prior to his new position, he was dean of graduate studies and research at Cal State L.A. He lives in Alhambra.

1968
ALLEN J. SCHWENK has been appointed professor of mathematics at Western Michigan University in Kalamazoo. The recipient of research grants from NSF and the Naval Academy Research Council, Schwenk was previously program director for discrete mathematics at the Office of Naval Research in Arlington, Virginia. He has also taught at the U.S. Naval Academy and Michigan State University. He is the author of many articles for professional journals, and has served on the board and as associate editor for the *Journal of Graph Theory.*

1969
W. DONALD DRESSER has been elected vice president for business development and general counsel at United Foods, Inc., in Bells, Tennessee. Before joining United, he was a partner in the Washington, D.C., law firm Howrey and Simon.

1974
DANIEL B. PEARSON III, MS, recently received his MD in psychiatry at the University of Texas Health Science Center at San Antonio.

KENNETH S. SUSLICK has been promoted to associate professor at the University of Illinois at Urbana-Champaign. He has also received a Sloan Research Fellowship and NIH Research Career Development Award.

1976
MONTY KRIEGER, PhD, has been promoted to associate professor of molecular genetics at MIT, where he holds joint appointments in the department of biology and in the school's Whitaker College of Health Sciences, Technology, and Management. Krieger, who recently received MIT's 1985 Science Council Prize for excellence in teaching undergraduates, was also the recipient of the 1985 Graduate Student Council Award for Teaching in Biology. His current research involves low density lipoprotein and receptormediated endocytosis.

1978
FRED M. DYCUS, JR., MS, has been named to the engineering staff of JBF Associates, Inc., a Tennessee firm that is recognized for its work in the theory and practice of hazards evaluation and risk assessment for the nuclear, chemical, petroleum, and aerospace industries. Dycus specializes in energy systems, stress analysis, and thermal hydraulics, as well as project management and mechanical and electrical design.

1980
RICHARD SCHELLER, PhD, has been selected by The Pew Memorial Trust of Philadelphia as one of 20 "outstanding young medical researchers" for the Pew Scholars Program in the Biomedical Sciences. An assistant professor of microbiology at Stanford University, Scheller will receive a total of $200,000 with annual stipends of $50,000 during the next four years. Scheller's research involves using recombinant DNA techniques to analyze the nervous system of Aplysia, a dark brown sea snail that has only about 20,000 central nervous system cells. His goal is to find out how genes are expressed in the nerve cells and eventually to understand what molecular changes occur in the nervous system to make learning and memory possible. Scheller has also received a $500,000 Presidential Young Investigator Award, the Esther A. and Joseph Klingenstin Fellowship in the Neurosciences, and a Young Investigator Award from the Society of Neuroscience.

1981
MARK DAVIS, PhD, assistant professor of medical microbiology at Stanford, was also selected for the 1985 Pew Scholars Program in the Biomedical Sciences. Davis will also receive $200,000 during the next four years. He is using modern molecular techniques, including recombinant DNA methods, to isolate genes that help control the immune system. His research centers on the gene family that codes for receptor proteins on cells of the immune system. He and his associates were the first to find a T-cell receptor gene. Davis's other honors include a Mellon Foundation Fellowship in 1983 and the 1985 Passano Foundation Young Scientist Award. Last year, he was named one of the country's top 100 young scientists by *Science Digest.*

GRACE H. MAH received an MS at UC Berkeley and is now working in product engineering at Hewlett-Packard's Cupertino IC Division. She and her husband DON CHIN (BS '78) live in Palo Alto.

1983
VINCENT M. POWERS, graduate student in pharmaceutical chemistry at the University of California San Francisco, has received the 1984-85 Long Foundation Award for Excellence in Teaching. One of seven recipients of the prestigious award, Powers will receive $4,000 for recognition of his work as a teaching assistant in medicinal chemistry.

1984
DANIEL A. BUTTRY, PhD, is living in Laramie, Wyoming, where he is assistant professor of chemistry at the University of Wyoming. He and his wife, Kathie, had a daughter, Clare Elaine, on April 24.

Obituaries

1925
PAUL H. EMMETT, PhD, at age 84, in April. A nationally recognized scientist and consultant in the field of catalysis, he had been a research professor of chemistry at Portland State University for the last ten years. He studied heterogeneous catalysis for 60 years at the Fixed Nitrogen Research Laboratory, the Mellon Institute, and at Johns Hopkins University in the department of chemistry and as W. R. Grace Professor of Chemistry. He was a member of the National Academy of Sciences, a life member of the American Institute of Sciences, and the American Chemical Society. He is survived by his wife, Pauline, and a stepson.

1943
ROBERT F. McLEAN, Eng '48, at age 64, on April 18. A resident of West Bloomfield, Michigan, he had retired in 1970 as executive engineer from General Motors Corp., where he had worked for 23 years. He was honored in 1978 by the National Safety Society for his airbag design. He is survived by his wife, Dorothy, three daughters, two sons, a grandson, a brother, and a sister.

1949
JOHN A. DODGE, MS, of Wayne, Pennsylvania, on May 9. He retired in 1982 as a self-employed management consultant.

1950
CHUNG H. LI, of Xian, China, in the spring of 1984. Dr. Li had served as head of the department of biology of Northwestern University in Xian since 1981. He is survived by his son, Li Rong.

1963
WILLIAM H. BETTES, MS, at age 56, on July 16, 1984. He had worked at Caltech for 27 years, most recently as director of the GALCIT experimental facilities and as a member of the professional staff. While at Caltech, he also served as a wind tunnel project engineer, supervisor of the 10-foot wind tunnel group, and as assistant director and director of the low-speed wind tunnels. He wrote more than 200 reports related to the wind tunnel model requirements, data acquisition techniques, facility requirements, test techniques, and data presentation and analysis for these bodies. In addition to acting as a major consultant to the Summers brothers world land speed record project, he also consulted with many major corporations. He was a member of AIAA, chairman of the Subsonic Aerodynamic Testing Assn., a member of the Society of Automotive Engineers, and chairman of the SAE Advisory Committee for the DOT Truck and Bus Fuel Economy Measurement Study. The William H. Bettes Memorial Tree was planted on the north side of Millikan Library on October 24, 1984. He is survived by his wife, Valerie, and five children.

1984
TAK LEUK DAVID KWOK, of Cambridge, Massachusetts, on June 16, while running in a marathon. He had been a graduate student in physics at Harvard.

HONORARY ALUMNUS

J.E. WALLACE STERLING, on July 1, at age 78, in Woodside, after a long battle with cancer. He was named Stanford University Chancellor for life in 1968 after taking early retirement as university president, a position he had held since 1949. A member of dozens of academic and public service committees, he also served on the boards of directors of four major corporations and five of California's most prestigious clubs. He was the recipient of many major awards, including the Order of Merit of the Federal Republic of Germany, the Legion d'Honneur of France, and the Order of the British Empire. He joined Caltech in 1937 as assistant professor of history and served as department chairman from 1944 to 1946. While at Caltech, he also did a nightly broadcast on CBS radio in Los Angeles as a news commentator. He became director of the Huntington Library and Art Gallery in 1948 before assuming the Stanford presidency in 1949. He is survived by his wife, Ann Marie, a son, and two daughters.

Raymond Mak adjusts a valve that will allow a stream of salt water to flow into a water tank and mix with its contents. As a SURF (Summer Undergraduate Research Fellowship) student, Mak has been studying the mixing process that occurs when such a turbulent plume enters a tank already filled with liquid. His faculty adviser: Edward E. Zukoski, professor of jet propulsion and mechanical engineering.

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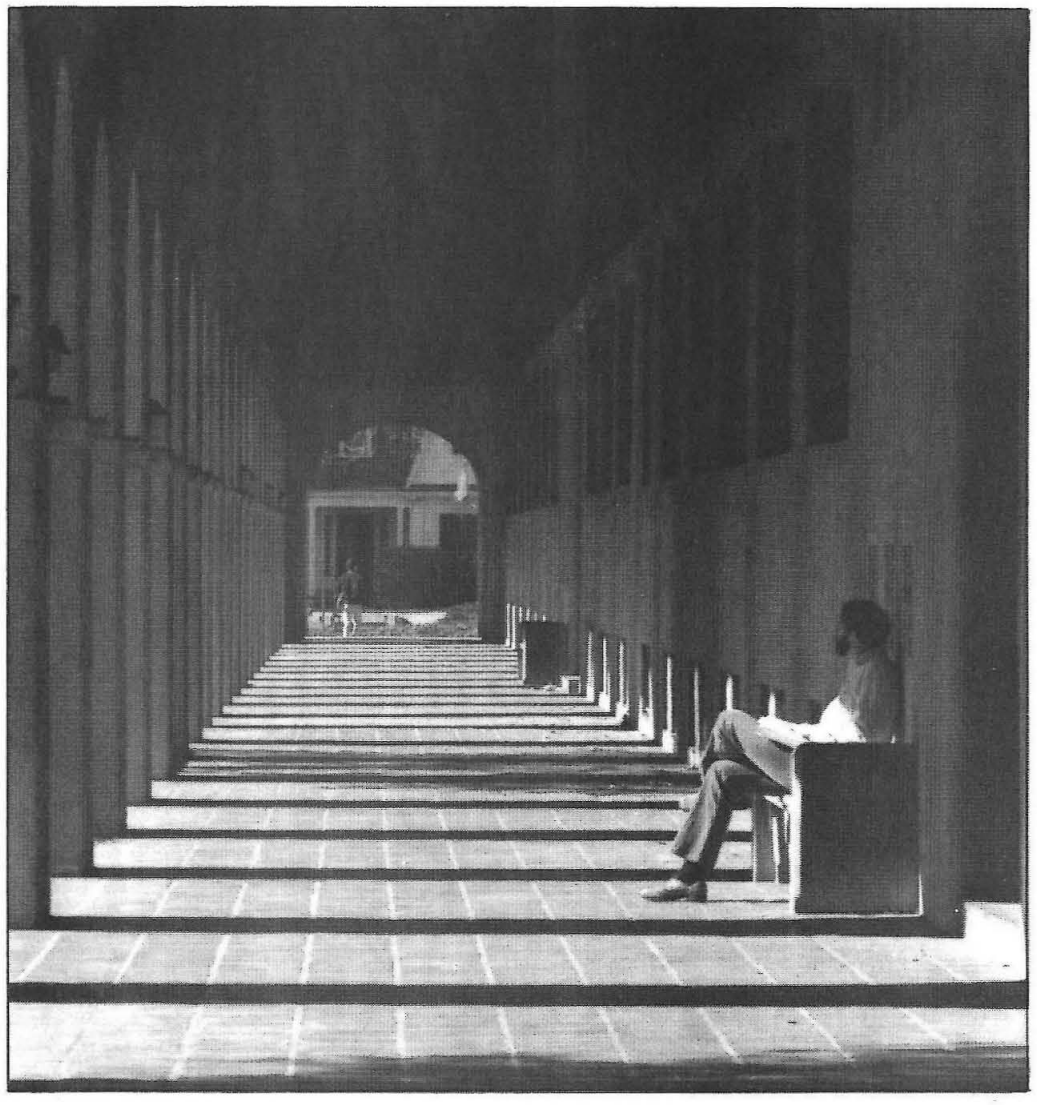

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