

CALTECH NEWS

A "little bang" may have launched the solar system

Our solar system may have begun in a "little bang" with all the planets condensing at once out of a great cloud of gas and dust. Professor of Planetary Science Andrew P. Ingersoll said that evidence from the Pioneer and Voyager spacecraft lends support to this theory.

If such a "little bang" did in fact occur, it would have left a residue of heat from the formation in the interiors of the planets, Ingersoll said. The small planets, including Earth, would have lost most of their formation heat long ago, but, like immense thermos bottles, the giant planets would have retained much of their internal heat.

Ingersoll said Jupiter has the correct amount of internal heat to have been produced by a "little bang," according to information relayed by Voyager, and to other studies. He noted that Jupiter has the amount of heat we would expect it to have if the solar system were formed four and a half billion years ago—the age of the oldest rocks yet found on earth.

However, Ingersoll added that data from the infrared radiometer on board the Pioneer spacecraft indicated last September that Saturn's internal heat is too high to fit the theory. But by combining material from the infrared studies of Ingersoll and his colleagues with information from other Pioneer instruments, the scientists soon found a key to the discrepancy. The data indicated that helium rain was falling deep inside Saturn's super-hot, superdense atmosphere, and that the energy released by the rain could account for the extra heat.

The Voyager I encounter with Saturn later this year will provide further insight into Saturn's atmosphere and internal heat—data that should offer valuable corroboration for the "little bang" theory.



Cathy Watts, a seismology research assistant, examines a seismogram that records a temblor in the Mammoth Lakes area. Over 100 aftershocks above magnitude 4, and countless smaller ones, occurred in the wake of three quakes registering above 6.0 in the Mammoth Lakes area on May 25 and 27—activity that raised questions about a possible connection with volcanic activity at Mt. St. Helens.

Earthquakes and volcanism: Is there a connection?

With Mt. St. Helens periodically blowing its stack and Californians being regularly jiggled over the last few months by an unusual number of medium-sized earthquakes, the big question being asked of Caltech seismologists these days is whether all the bumpings and spewings are somehow related.

It turns out that they may be, and that Mother Nature is giving earth scientists a profound lesson in humility. The widespread rash of

magnitude 6 earthquakes in the Imperial Valley, near Mammoth Lakes, and in northern Mexico over the last year has led scientists to a new realization that seismic activity can rise and fall in cycles throughout a region. And now the latest piece of intelligence, the result of historical studies by Don L. Anderson, brings volcanoes into the picture.

Anderson, professor of geophysics and director of Caltech's

Seismological Laboratory, has examined both Mexican and U.S. records of eruptions, and has discovered that volcanic activity in the Cascade Mountain Range (the site of Mt. St. Helens) and in Mexico have tended to occur at about the same time. What's more, increased earthquake activity, especially large earthquakes in Mexico and California, have also tended to occur during these periods.

According to Anderson, the findings are not necessarily useful in predicting where a large earthquake is likely to happen. But such correlations may enable seismologists to make general forecasts of periods when a large quake is more likely to occur.

The correlation between large earthquakes and volcanism confirms the regional nature of seismic activity, Anderson said. The recent increase in the number of moderate earthquakes throughout California has led seismologists to a new awareness that quakes are reflections of large-scale pressures exerted on the earth's crust by the flowing mantle beneath it, and that large areas can be affected by these motions.

"The record is incomplete and not very long, and we're dealing with a rather small number of events," Anderson stressed, "but at the moment we can't rule out possible connections between volcanic eruptions in the Cascades and earthquakes in California."

Anderson cited these periods when volcanic activity was occurring in both the Cascades and Mexico: the mid-1700s, 1795-1802, 1854-1857, 1869-1872, 1882-1885, 1913-1917, and 1941. In all but possibly one of these periods, seismic activity was also high in

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California and northern Mexico, according to Anderson, although the earlier record is incomplete.

The earliest correlation found by Anderson was in the mid-1700s. Mexican records of that era showed several large eruptions occurring at about the same time, including activity at a volcano in Baja California called Tres Vírgenes, in 1746, and the coastal Mexico volcano Colima, one of the most active in that country, in 1749. There were also reports of a volcanic eruption in the northern Cascades in British Columbia in 1750.

Around 1746, a large earthquake also occurred in southern California along the San Andreas Fault, according to studies by Kerry Sieh, Caltech assistant professor of geology. Sieh examined layers of a marsh straddling the fault, which revealed the dates of ancient quakes.

The next major seismic episode occurred in the early 1800s. In 1801-1802 there were reports of fuming from both Mt. St. Helens and Mt. Hood in the Cascades, and during 1795-1809 Colima was active. Correspondingly, between 1800 and 1808 Anderson found six earthquakes reported in California.

The 1840s and 1850s saw considerable activity in the Cascades, including venting from Mt. St. Helens, Mt. Lassen, Mt. Baker, and Mt. Shasta. The year 1857 also saw the last great earthquake in southern California along the San Andreas Fault, estimated at over 8 on the Richter scale. The years 1869-1872 bracketed a period of high volcanic activity that preceded the 1872 quake of about magnitude 8.5 in the California Owens Valley.

In 1911, an earthquake of about magnitude 7.2 in the Sea of Cortez was followed by eruptions at Colima in 1913 and Mt. Lassen in 1914. Lassen continued to be active until 1921, just before two large 7.3-plus earthquakes in northern California in 1922-1923.

In 1940-1941 there was another coincidence between eruptions at Mt. St. Helens and Colima, and earthquakes in California and Mexico. During those years there were five magnitude 6-plus earthquakes in California and northern Baja, and three magnitude 7.5-plus earthquakes in Mexico.

In general, Anderson noted that each one of the large earthquakes in southern California occurred at about the same time as increased volcanic activity in the Cascade regions and in central Mexico. The Kern County quake of 1952 was an exception. There was volcanic activity at Parícuton in central Mexico and at Barcena, a volcano off the tip of Baja California, but no reported activity in the Cascades.

Most recently, of course, the eruption of Mt. St. Helens has coincided with a spate of medium-sized earthquakes in California's Imperial Valley, northern Mexico, the Mammoth Lakes area, and northern California.

Anderson explained that although the regional eruption-earthquake association is not useful for predicting when a specific fault will produce an earthquake, it might possibly be useful for forecasting general increases in seismic activity. "Volcanoes act as giant pressure gauges," he said. "They reflect pressures produced by motions in the upper mantle. These same pressures produce regional crustal strains that are expressed as earthquakes."

The recent increase in both seismicity and vulcanism in the western U.S. is changing fundamental ideas about the flow of the upper mantle (the region of semi-molten material just beneath the crust), Anderson added. While it was previously believed that mantle flow was slow and steady, the recent upsurge in vulcanism and seismicity has suggested that the mantle may periodically undergo episodes of anomalous flow.

The freshman class: a quick preview

A young woman from Italy who speaks five languages, a young man from Massachusetts who designed a new lobster trapping system for the family business (including boat, traps, feeder, and marketing system), and an Orange County student who won a science sweepstakes prize for discovering 28 new mathematical theorems are among the 215 young men and women in Caltech's freshman class. As in previous years, the average achievement scores of the new freshmen fell within the top two percent in the nation.

This year's class includes 34 women—the same number as last year. Its members come from 32 states and 21 foreign countries; 44 percent are from California. A 15- and a 16-year-old girl and two 15-year-old boys are among the entrants. Of the new freshmen, 21 percent earned straight As in high school.

Included in the group are three students who will join siblings who are already members of the student body. One of these, John Krehbiel, is also the son of an alumnus—Edward Krehbiel (BS '58). Another entering student, Eliza Sutton, is the granddaughter of alumnus and former Caltech faculty member Richard A. Sutton (BS '43, MS '47).

The distribution of option choices among the new students reflects the continuing interest among college students throughout the country in careers in engineering: 41 percent prefer engineering, 51

percent plan careers in science, and 8 percent are undecided.

In addition to the 215 freshmen, 33 transfer students will enter Caltech this fall. Among the transfers are four women, as well as two Vietnam refugees, a Russian emigree, a student transferring from a university in Yugoslavia, and three students from the People's Republic of China as well as one each from Sweden and the Philippines.

Chan: new master of student houses

Sunney I. Chan, professor of chemical physics and biophysical chemistry, is Caltech's new master of student houses, succeeding James W. Mayer, professor of electrical engineering, who has joined the faculty at Cornell University.

Chan came to Caltech in 1963, and has been executive officer for chemistry for the past three and a half years, a post he relinquished to become master. He will continue to teach and to conduct research on the structure and function of biological membranes, particularly proteins involved in biological energy transduction.

Luxemburg awarded Humboldt Fellowship

Wilhelmus A. J. Luxemburg, professor of mathematics and executive officer for mathematics at Caltech, is recipient of a Humboldt Senior Scientist Award from the Humboldt Foundation in West Germany. Funded by the West German government, Humboldt Fellowships are awarded to U.S. senior scientists for excellence in research.

As a Humboldt Award recipient, Luxemburg is spending six months at the University of Tübingen in Tübingen, West Germany, where he is conducting research. He specializes in mathematical analysis and has been a pioneer in developing methods for applying certain techniques of model theory to mathematics, and, in particular, to the infinitesimal calculus known as nonstandard analysis.

Guests of honor: the President's Circle



Mr. and Mrs. John B. Callery at a luncheon at the home of Caltech President and Mrs. Marvin L. Goldberger honoring members of the President's Circle of The Associates of Caltech—individuals who contribute at least \$5,000 a year to the Institute. (The clown in the background doubles as a Caltech undergraduate).

A tall, lean, and handsome Texan, Jim Hall fits the archetypal image of the American cowboy like a spur on a boot. But horses are passé in the 20th-century West, and Hall has made his mark in history via a faster and more streamlined mode of transportation: the race car.

Combining his Caltech engineering training (BS '57) and his knowledge of the sport through his career as a driver, Hall has achieved a reputation in the race car industry for innovations that are far ahead in the field, and for successes that are legendary. In 1978, the first year that he competed in National Championship racing, his Lola Chaparral achieved a first by winning the mythical triple crown: The Chaparral rolled to victory in all three of the U.S. Auto Club's 500-mile races—Indianapolis, Pocono, and Ontario.

May 1980 brought another major triumph, as the Pennzoil Chaparral 2K (built and prepared by Hall and driven by Johnny Rutherford) took first place at Indianapolis. By mid-August, the car had won five of the eight races in which it participated, and had finished second in three. It had finished every scheduled racing lap—a remarkable feat.

Hall's Chaparral was so easy to drive at the Indy that Rutherford, who was never passed except when he was pitting, gave a little wave to the other drivers each time he passed them. "It was my way of thanking them for not getting in my way," he commented.

Described by his colleagues as dedicated, intense, quiet, and trustworthy, Hall is also known for generosity in helping others in his profession. Modest in discussing his accomplishments, he would rather solve an engineering problem than talk about himself.

Nevertheless, in his office at Chaparral Cars on the outskirts of Midland on the plains of West Texas—a copy of Feynman's *Lectures in Physics* on the bookshelves behind him—Hall described the career that began during his days as a Caltech student. After going to high school in Albuquerque, he entered Caltech shortly after personal tragedy—a plane crash that killed his parents and two sisters. Married to his high school sweetheart before he enrolled at Caltech, his exposure to life in the undergraduate houses was limited to a term in Fleming House while his wife was visiting in Texas.

At Tech he initially intended to major in geology—an area complementary to the family's oil business—but he switched after a



Jim Hall, builder of the car that won the 1980 Indy, with driver Johnny Rutherford.

Jim Hall: His engineering feats create a racing legend

by Winifred Veronda

year to mechanical engineering. Meanwhile, he became involved in racing through what he terms "a kind of hot rod interest in automobiles." He first raced in 1954 as a Sports Car Club of America amateur, driving an Austin-Healey owned by his older brother.

After graduating from Caltech, Hall went to work with his brother, who headed a languishing sports car business in Dallas, and who continued to foster Hall's racing interest. "I didn't help the business," Hall says. "I stayed with it about a year, and it continued to go down hill. But I learned a lot about racing in the meantime."

In 1959 Hall and his two brothers bought a small oil company in Odessa, Texas, and Hall began to manage it, continuing racing as what he terms a "hobby." His first marriage ended not long after graduation from Caltech; he has been married to Sandra Hall since 1960. Hall is the father of three children—Linda, age 26; Sharee, 24; and Jimmy, 22.

In 1961 Hall raced his first car named the Chaparral. It was built by Troutman-Barnes in Culver City,

California. He named the car for the fast road-running bird that feeds on rattlesnake eggs, and has kept the name for all his race cars since then.

But Hall found he wasn't satisfied driving a car that was one of the pack; he decided he could design a better one himself. The result, created by Hall and his then-partner, Hap Sharp, was unveiled as Chaparral 2 in 1963. It was Chevrolet-powered and attracted widespread attention because of its lightweight fiberglass-reinforced plastic chassis and its lack of a conventional frame. The public was getting its first look at Hall's unique approach to design.

By 1963, Hall's racing "hobby" was becoming a full-time endeavor as he piled up successes as a driver. He won the U.S. Road Racing title in 1964 and narrowly missed a second win in 1965. He won the Sebring 12-hour with Hap Sharp in 1965, the 1965 Road American 500, the 1966 Nurburgring 10 1000-K, and more than a score of other major events. Because of his showing in racing in the early 1960s, he was invited to drive on the British Racing Partnership Grand Prix Formula 1 Stirling Moss team in 1963. He finished 12th that season

in world championship driver standings.

It was after his successful showing in Grand Prix racing that Hall made a decision that would be central to his continuing career: He would focus on race car engineering and design as intensively as on driving. "I decided that by combining the two I could create a career that would be much more interesting," he says.

Hall has applied his ideas about race car engines, chassis, and aerodynamics via Chaparral Cars, Inc., in Midland. Here he and Hap Sharp began during the 1960s to share testing time on a track built by a group of racing enthusiasts on a brushy tract of land outside the city. On the course they implemented Hall's idea that they should test each car carefully and dispassionately on the same stretch of road to build a set of statistics over the years, for comparison purposes.

Eventually Chaparral Cars bought the entire 320-acre property and now owns the eight-turn, two-mile road course that is complete with 14 sets of photo-electric timers and a skid pad with sprinklers to simulate rain conditions. Dubbed Rattlesnake Raceway, the winding asphalt road is one of the world's few personal testing tracks. On it Hall has tested innovations that on occasion have been ruled illegal on the grounds that they were so far ahead of the field that competitors felt they would give the Chaparral an unfair advantage.

One of the first innovations was an automatic transmission—then unheard of on a race car. This device eliminated the possibility of human error and confounded other drivers who for several races didn't catch on to why the Chaparral drivers seemed to have both hands free during crucial moments in acceleration.

Next came the reverse airfoil, an adjustable wing-like-feature that cut through the air like a knife down the straightaway when the driver stepped on a pedal to trim the wing. He released the pedal to lift the back of the wing for use in braking and better traction on corners. Under protest from competition the device was outlawed but versions of the wings would eventually become standard on most race cars.

In 1970 Hall introduced another revolution in design via the Chaparral 2-J model with a device dubbed

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the "vacuum cleaner." In addition to various aerodynamic fixtures, this car introduced "ground effects" to the racing world. Fans sucked air out from under the car and thus produced a down force to hold it tightly to the pavement. The car set records in tryouts but was banned in 1971 as competitors insisted that Hall's ground effects would give him an unfair edge.

Hall left racing for two years at this juncture, returning to Formula 5000 racing in 1973. His Chaparrals won three F-5000 championships in 1974, 1975, and 1976, and Canadian-American titles in 1977, 1978, and 1979. By now, ground effects had become standard race car fixtures.

Meanwhile, Hall's determination to focus on designing race cars rather than solely on racing had taken on new meaning. In 1968 he spent four months in hospitals after a near-fatal crash in a Las Vegas Can-Am race, very nearly losing one of his legs. At first doctors told him he probably would never walk again. "But I'm a pretty determined guy," he says, "and I was way ahead of schedule during the entire recovery."

Determined to return to racing, Hall started test driving in the summer of 1969 but was seriously burned in a second accident late that year. He again started driving in 1970 but "I didn't enjoy it very much," he says. "The guys I had been used to beating had been getting better while I was lying in the hospital. Racing is a commercial business; you have to think of your sponsors and of the other team members. I knew it would take a couple of years to get back to where I was before the accident and so I replaced myself."

Did he have any regrets? "I had a lot of them," he says. "And every once in a while for a couple of years I thought about going back to racing. But I decided—everything considered—that it wouldn't be worth it."

Making history by winning all three of the U.S. Auto Club's 500-mile races in 1978 helped to make up for that decision. Hall's 1979 Pennzoil Chaparral, with ground effects deemed the most advanced in the country, seemed destined to repeat that performance. It led during 85 of the first 100 laps in the 1979 Indy. Then a faulty transmission part failed, putting the car out of commission. But in spite of its failure to repeat the achievement of the 1978 Chaparral, the 1979 Pennzoil Chaparral won the 1979 Louis Schwitzer Award for excellence in design.

Throughout his career, Jim Hall has raced ahead of the field in automotive engineering expertise, and he believes his Caltech education helped to put him there. "My whole career . . . my whole life . . . is based on understanding the world around me, and my physics and engineering have been a great help in that respect," he says. "At Caltech I got an extremely good background in the basics—force-fed knowledge that equipped me to go on my own in almost any direction, and that's what I needed."

As he considers the future of auto racing, Hall wonders how the energy crisis will affect it and whether racing can help alleviate the crisis. "Maybe racing needs to change its focus," he muses. "Historically it has contributed to automotive design; many good ideas for commercial autos have come out of racing. But now maybe we ought to be attacking economy rather than focusing on performance. Another way we might contribute is by increasing the public's acceptance of alternative fuels. The Indy runs on methanol and maybe we could help by making this better known."

Reflecting on a career filled with triumphs, Hall—with characteristic modesty—recalls two that stand out as highlights. "I have to consider winning the Indianapolis to be a major accomplishment," he says. "After all, it is the biggest sporting event in the world. And then I remember 1963 when I drove the Grand Prix circuit. After all, if you can finish 12th in the world in anything you've got to consider it an accomplishment."

And now, as the 1980 season is proving, there are a lot more accomplishments for Hall further down the track.

Downward mobile



Caltech student Rick Walker rappels down Millikan Library to pick up a note taped to a fourth floor window. The note provided a clue to room entry on Ditch Day.

John Benton claims professional honors

John Benton, professor of history at Caltech, has received two recent honors. The medieval historian was elected honorary president of the International Courtly Literature Society at the organization's August meeting in Liverpool, England, and he has been chosen vice president of the Medieval Association of the Pacific. This office will automatically carry him to a two-year term as president of the association beginning in the spring of 1982.

Lowenstam elected AAAS Fellow

Heinz Lowenstam, professor of paleoecology at Caltech, has been elected a fellow of the American Academy of Arts and Sciences.

Lowenstam, 67, received his PhD degree from the University of Chicago. Before coming to Caltech in 1952 he was a geologist for the Illinois State Geological Survey and then a faculty member at the University of Chicago. He was elected this spring to membership in the National Academy of Sciences.

Blandford awarded Sloan Fellowship

Roger D. Blandford, professor of theoretical astrophysics at Caltech, is the recipient of a Sloan Fellowship for Basic Research by the Alfred P. Sloan Foundation of New York. Blandford is one of 78 recipients of two-year, \$20,000 fellowships that are awarded to young scientists "on the basis of their exceptional potential to make creative contributions to scientific knowledge early in their careers," according to the foundation.

Blandford came to Caltech as an assistant professor in 1976. He has studied many of the exotic objects discovered by astronomers, including quasars, pulsars, and the gigantic jets of matter and energy, many millions of light years long, that emanate from certain galaxies.

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The 1980-81 national Alumni Fund chairman is one of those rather rare individuals in southern California who is actually a native of the town where he lives. Andrew B. Campbell (BS '46) grew up in San Marino, just two miles south of Caltech, and today his home is only a few lots away from his childhood residence.

Caltech was familiar to Campbell as he grew up, not only because it was in a neighboring town but because his uncle, solar astronomer Charles St. John, was a staff member of the Hale Observatories. Still, he came to the Institute by an indirect route; he spent two years at Stanford before arriving at Caltech as a junior in the World War II V-12 Program. He lived in Blacker House and found time — besides mastering an accelerated program — to play in the band and study banjo, guitar, and trombone.

Earning his degree in 1946, Campbell went to work for four years for a large construction firm that was building a dam on the Columbia River. Later he worked for a small manufacturing company in Monrovia for Hillman-Kelly of Los Angeles, which later was acquired by Joy Manufacturing Company. Campbell has been with Varco International, manufacturer of oil drilling equipment, in Orange, California, since 1970; he is its principal engineer.

Meanwhile, he married Rhonda Salter, a native of Tasmania, and the Campbells have two children: Jennifer, 21, and Andrew, Jr., 16. Caltech is a family matter for the Campbells, because Mrs. Campbell is the coordinator of nursing services at the Student Health Center on campus. They are members of The Associates.

As a neighbor of Caltech, Campbell found it easy to get involved in campus musical activities. He participated in two recent student musicals — *Fiorello* and *Fiddler on the Roof*. In the first he played the banjo part; in the second, the mandolin part in the orchestra. He is a member of the Caltech Jazz Band, the San Marino Dad's Band, and the Los Angeles Mandolin Orchestra.

Campbell also found it easy to get involved in Alumni Fund work. He was San Marino area chairman for three years and last year he was regional chairman for South Pasadena, La Canada, San Marino, and Pasadena, and chairman of the

This Alumni Fund chairman is doubly instrumental

Alumni Fund Leadership Conference. He was honored for high achievement each year that he participated.

He also has been working through people he knows in the oil industry to develop major gift prospects for the Institute. With this reputation for hard work and



Andy Campbell

effective service, it's no wonder that this year he was asked to be the fund's national chairman.

When Campbell talks about the fund and its work, he likes to stress a sometimes overlooked function that it fills, and that's to maintain a link between the Institute and its graduates. "When we talk with alumni we don't merely ask for financial support; we talk about old times and we bring them up to date on what's happening on campus and to people they know," he says. "It's easy for a graduate to lose touch with Caltech. The fund renders an important outreach service, helping to keep that contact alive and vital."

As he formulates plans for the coming year, Campbell takes pride in a strong and successful fund

program which this year won a fourth successive award for sustained excellence from the Council for the Advancement and Support of Education. But more can be done to make the program increasingly productive, Campbell believes, and he is filled with ideas for just what that "more" may consist of.

For example, Campbell would like to see the fund propose guidelines on how much alumni can give, based on income, and he would like to see fund workers equipped with tax tables so they can counsel alumni as to how much their gifts actually cost relative to tax rates. He also would like to introduce the fund to Caltech students, perhaps through an interview in *The California Tech*, so they will begin to become aware of what it contributes to the Institute.

Campbell believes participation in
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Three organizations honor Rod Paul

Rodman W. Paul (the Edward S. Harkness Professor of History) has received honors from three scholarly organizations in his field. He has been named a Fellow of the California Historical Society, elected to membership in the 168-year-old American Antiquarian Society, and chosen vice president of the American Historical Association's Pacific Coast branch—an office that will move him into the presidency in 1981.

Huntley elected NAFSA president

Stirling L. Huntley, Caltech's director of admissions and associate dean of graduate studies, has been elected 1980-81 president of the National Association for Foreign Student Affairs. The NAFSA is a non-profit organization involved with international educational exchange of students and scholars. As its president, Huntley will administer its \$1 million annual budget and its 22-member staff, and will be responsible for the program that provides service to the 3,400 individuals and institutions that are NAFSA members.

the fund can be increased among Caltech staff members who are alumni. As still another objective, he wants to make Institute graduates more aware of The Associates and what this organization offers. Noting that about a third of The Associates are alumni, Campbell says that he and Hunt Holladay (BS '56), The Associates treasurer, will work together this year to bring the two groups into a closer relationship.

"Participation in the Alumni Fund is above average," says Campbell in conclusion, "but we can do better. Our alumni form a highly successful group of people who appreciate what Caltech has contributed to their achievements, and they respond positively to our efforts."

And with Campbell hard at work to meet his goals, there's even more reason to believe they will.

Mellon grant to support humanities scholars

An eight-year grant of \$480,000 has been awarded Caltech by The Andrew W. Mellon Foundation of New York to support postdoctoral fellowships in the humanities.

The grant will be used to award two-year appointments at the Institute to outstanding new recipients of doctoral degrees in the humanities, to allow them to develop teaching and research skills.

In commenting on the grant, President Marvin L. Goldberger said, "We believe Caltech's extremely able student body and its outstanding faculty—along with its access to such institutions as the Huntington Library—make it a stimulating place for young humanities scholars. And in turn, these promising young people will widen the scope of our humanities teaching and research."

The grant will increase from two to five the number of postdoctoral fellows in the humanities at Caltech that are supported by the Mellon Foundation.

OF SPECIAL INTEREST TO ALUMNI

Electrical engineers plan reunion

Seventy years of electrical engineering research and education at Caltech will be celebrated with a symposium on November 6 and 7 for alumni of the department. Caltech President Emeritus Lee A. DuBridge will give the welcoming address.

A surprise evening presentation by Simon Ramo (PhD '36), director, TRW Inc. and chairman of the board, The TRW-Fujitsu Company, and a reminiscence, "Fifty Years Ago," by William H. Pickering (BS '32, MS '33, PhD '36) will be among the program features.

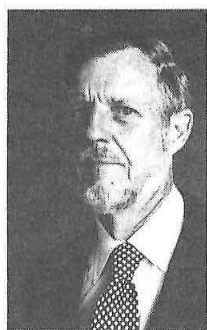
The late Royal W. Sorensen, founder of the department, will be remembered in a luncheon talk on November 6 by Frederick A. Lindvall (PhD '28), professor of engineering, emeritus, and former chairman of the Division of Engineering and Applied Science. Roy W. Gould (BS '49, PhD '56), chairman of the division, will speak at lunch on November 7 on "Electric Power from Fusion—Will it be Possible?"

Taking the podium on November 6 will be several alumni of the division: Bernard Oliver (MS '36, PhD '40), vice president, Hewlett Packard Corporation; Louis T. Rader (MS '35, PhD '38), professor of electrical engineering, the University of Virginia; Robert R. Johnson (PhD '56), vice president, Advanced Technology, the Burroughs Corporation; and Victor Wouk (MS '40, PhD '42), president, Victor Wouk Associates.

Electrical engineering research at Caltech today will be the focus of talks on November 7, as several departmental faculty members describe their work. After lunch, guests will tour electrical engineering research laboratories.

New Fund Council members named

Six new members have been named to the Alumni Fund Council. They are pictured below.



Lee T. Carleton,
BS '33



Douglas R. Christman,
BS '59



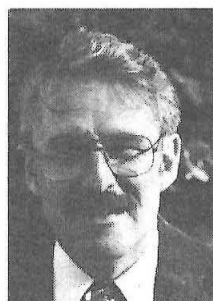
Harold B. Crockett,
MS '40



David L. Hanna,
BS '52



Douglas C. Strain,
BS '48



James W. Workman,
BS '57 MS '58

Fund-raising drive creates scholarships for Chinese students

Caltech alumni in the United States and Taiwan have launched a drive for scholarship funds for Caltech students of Chinese descent, according to Theodore Y. Wu (PhD '52), professor of engineering science at the Institute.

Li-San Hwang (PhD '65) is chairman of the Committee for Caltech Chinese Students Scholarship Funds; Jiin-Jen Lee (PhD '70) is secretary; I-Min Yang (MS '65, PhD '70) is treasurer; and Wu is coordinator.

A fund raising effort in Taiwan in 1978-79 concluded with the presentation to Caltech of \$100,000 for general operating expenses. The effort was led by local alumni and joined by other individuals, private organizations, and government agencies. The government in Taiwan cooperated in granting tax exempt status to contributions and by matching gifts from private sources. This was in appreciation of Caltech's role in educating scientists and engineers "of outstanding value to the Republic of China." The project in Taiwan was led by Ting L. Liu (MS '69, Eng. '71).

The ongoing fund drive in the United States has raised \$3,000 in scholarship funds. Individuals contribute through the Alumni Fund office on campus.

The ongoing fund drive in the United States has raised \$3,000 in scholarship funds. Individuals may contribute through the Alumni Fund office on campus.

Placement Assistance To Caltech Alumni

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

- (1) Help you when you become unemployed or need to change employment.
- (2) Inform you of possible opportunities from time to time.

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

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

Caltech Placement Service
California Institute of Technology
Pasadena, California 91125

Please send me: (Check one)

- ☐ An application for placement assistance.
- ☐ A form indicating a desire to keep watch for opportunities although I am not contemplating a change.

Name

Degree(s) Year(s)

Address

.....

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Meetings: Engineers' Club, 16th Floor, Hong Kong Bank Bldg., San Francisco. Informal luncheons every first Thursday at 11:45 a.m. Contact Chip Smith, 415/781-4211, ext. 2507 or 2221.

San Francisco Peninsula luncheons: Ming's Restaurant, Palo Alto. Luncheons third Thursday of every month at 12 noon. Call Hugh Dubb, 415/421-2674, for information or reservations.

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MacCready: Speaker at San Francisco Seminar Day

Paul MacCready, whose creations won two Kremer Prizes for man-powered flight, will be the luncheon speaker at Alumni Seminar Day in the San Francisco Bay Area on October 11. Four other faculty members will speak during the morning and afternoon.

Sponsored by the San Francisco alumni chapter, Seminar Day will be in the Dunfey Hotel, 1770 South Amphlett Boulevard, in San Mateo. Events will begin with coffee at 9 a.m. and conclude with a reception at 3:30 p.m. Reservations can be made through the Alumni Office.

Obituaries

1912

NORMAN E. HUMPHREY. He had owned the Norman E. Humphrey Scale Service in El Centro, California, and was living at the Masonic Home in Union City, California, at the time of his death.

1922

ROBERT GILLIES on April 21. Retired and living in Berkeley, California, he had been a material and research engineer for the state of California.

1925

EDMOND E. WINCKEL on March 24. A retired petroleum engineer, he is survived by his wife, who lives in Walnut Creek, California.

1930

CHARLES M. HERD, Ex, on June 16. He was a self-employed consulting engineer and lived in Jamestown, California. He is survived by his wife, Meredith.

1931

LOWELL F. GREEN on October 14, 1979, of brain cancer. He had been an operations research analyst with the U.S. Naval Surface Weapons Center in Silver Spring, Maryland. He is survived by his wife, Catherine.

1933

LAWRENCE O. BROCKWAY, PhD. Professor emeritus at the University of Michigan, he had been living in Jackson, New Jersey.

PHILIP H. CRAIG. A retired U.S. Navy commander, Craig had been an industrial engineer with McClellan Air Force Base in Sacramento. Retired again, he lived in Santa Rosa, California.

1941

NEWELL BALLREICH on August 23, 1979. He had retired from work as a chemist with the Shell Chemical Company and was living in Santa Monica, California. He is survived by his wife.

THOMAS D. TYRA, Eng, in June 1979. A retired Navy captain, he was an assistant professor at Pensacola Junior College in Pensacola, Florida. He is survived by his wife.

1942

ALLAN L. GROSSBERG, MS '44. He was associate chief of cancer research science at Roswell Park Memorial Institute in Buffalo, New York.

HAROLD A. RICHARDSON, JR., MS '46, PhD '52, on March 25 of leukemia. A self-employed researcher, he had been living in Hollywood, California.

1944

CLARENCE H. GRASSO, MS, on April 5. He was the owner of the H. Rilling Leather Company in San Antonio, Texas, where his wife, Holly, still lives.

1946

LLOYD W. CHAMBERLAIN in April 1979. He was a meteorologist with the U.S. Weather Bureau in Wallops Island, Virginia. He is survived by his wife.

1968

DAVID S. GILBERT, PhD, in the fall of 1979 of pneumonia. He was the director of research in the biology department of Queen Mary College in London, England.

Personals

1926

VICTOR F. HANSON writes from Greenville, Delaware, "I was recently honored as the founder and director of du Pont's Engineering Physics Laboratories at a special celebration for its 35th anniversary. These laboratories pioneered development of instrumentation for control of company manufacturing processes, including the two major nuclear plants at Hanford, Washington, and Savannah River that du Pont built and operated for the government. After retirement in 1969, I set up a program at The Henry Francis du Pont Winterthur Museum to determine the chemical composition of the thousands of objects in its famous collection as an aid in identification and in detecting frauds. Since that program is nearly completed, I am now in the middle of a National Science Foundation project at Winterthur to correlate the trace elements in paper and documents of historical interest to their physical state as an aid to their preservation."

1936

RICHARD J. PETERSEN reports, "I am no longer associated with Central Metal Products. Last July, the Blower Products division of CMP was spun off into a new corporation known as Central Blower Company. I am president and sole owner of the new company with office and plant located in Commerce, California.

SIMON RAMO, PhD, has been elected to honorary membership in the Society of Manufacturing Engineers. His citation reads, "Engineering scholar, research scientist, and co-founder of two of America's great high-technology corporations. In the classroom, the laboratory, the lecture hall, and in the quiet of his study, he has successfully endeavored to make science a better, more faithful servant of man." Ramo, a Caltech trustee, is a director of TRW Inc. and chairman of the board of the TRW-Fujitsu Company.

1942

CHARLES M. SEIBEL, MS '43, was appointed director of the New Product Development Center of Bell Helicopter Company in Richland Hills, Texas.

1946

E. RICHARD COHEN, MS, PhD '49, member of the technical staff at Rockwell International Science Center in Thousand Oaks, California, has been elected a fellow of the American Association for the Advancement of Science. He was cited "for contributions to nuclear reactor theory and continued analyses of the consistency of, and best values for, the fundamental physical constants."

F. W. MAXWELL, JR., MS, Eng, of Seattle, Washington, has been named president of the Boeing Engineering and Construction Company (BOECON), a subsidiary of The Boeing Company.

1952

RAYMOND L. HEACOCK, MS '53, one of the project managers for JPL's Voyager program, has been chosen to receive the James Watt International Medal by the Institution of Mechanical Engineers in England. He won the medal for "outstanding achievements in leading the team responsible for shaping the development and execution of the technically advanced spacecraft used in exploration of the outer planets of the solar system."

1953

WILLIAM GARDNER writes, "My wife and I are living in—and putting the finishing touches on—a house that we started four and a half years ago. Several friends have asked, 'Would you do it again?' and I say yes, which proves what they said when we started—I'm crazy! Actually, we've enjoyed it tremendously. Jobwise, I'm chief public works engineer for the city of Riverside (California), where I've been for (egad!) twenty-three years now!

1954

HOWARD L. CROSWHITE reports, "After all these years I think I have found a Class of '54 'first' that I can claim—first one to retire. The effective date was the end of April 1980. Actually, I am not retiring, just changing employers. I plan to do consulting and other part-time work for many years to come. Currently I'm working part-time with Bodine Soundrive Company of Van Nuys and will be in southern California about every other week this summer. If I can find a house with a price that isn't too inflated, my wife and I plan to move back to stay." The Croswhites live in Livonia, Michigan.

1960

BRIGADIER GENERAL DELBERT H. JACOBS, MS, Eng '61, and his wife, Shirley, have moved to Andrews Air Force Base, Maryland, where Jacobs is the new director of Plans and Programs for the U.S. Air Force Systems Command.

1961

GEORGE S. ARGYROPOULOS, MS, PhD '65, has assumed leading roles in energy research in Greece since his return to that country in 1976. In that year he became deputy executive secretary of the Greek National Energy Council at the Ministry of Coordination. Since October 1977 he has headed the Scientific Research and Development Agency at the same ministry. He is also a member of the board of the Greek National Research Foundation and the National Energy Council.

1962

JOHN A. NEWMAYER, director of the Haight-Ashbury Free Medical Clinic in San Francisco, writes, "We purchased a ranch in Napa Valley, where we are raising Simmental cattle and white wine grapes; at last I can put Professor Bonner's teachings to good use!"

1963

JOHN S. LETCHER, JR., MS '64, PhD '66, reports from Southwest Harbor, Maine, "Letcher Offshore Design is doing an increasing business in yacht design and technical services. For the past two years we have been technical consultants to the U.S. Yacht Racing Union and the Offshore Rating Council, developing theory and software that may be the basis for a new, technically based international handicapping system for ocean racing. Lately we are doing interesting work for Wind Ships Development Corporation on mathematical modeling of large commercial sailing ships—an idea whose time may have returned. Patty and I have two little girls now—Lucy is four and Susan is one, both good sailors."

1968

ROBERT D. CAMPBELL was named vice president in charge of finance and corporate development of Dionex Corporation in Sunnyvale, California. Dionex manufactures ion chromatography systems, amino acid analyzers, and rapid kinetics systems. Campbell has previously been director of the firm's gas plasma division.

1969

LAWRENCE SHIRLEY writes from Zaria, Nigeria, "My 'business' in mathematics education at Ahmadu Belle University is constantly busy—especially since the ever-present shortage of staff in math education from primary schools on up also extends to my own math education section in the Department of Education. But even with the workload I'm still trying to squeeze in time to continue my work toward a PhD . . . about special problems of introducing new math curricula in West Africa. My family and I will take "home leave" this year with stops in Amsterdam, Boston, East Lansing, Phoenix, Berkeley, Yosemite, and Los Angeles-Pasadena."

1970

THALIS PAPAOGLOU, MS, reports from Iraklion, Crete, "On July 28, 1979, I was married to Vappu Paunonen, in Finland. On February 20, 1980, I was elected head of the Department of Education and Academic Planning at KATEE College of Iraklion-Crete. On May 30, 1980, my first baby girl was born, healthy and beautiful."

BRUCE SAMUELSON, and his wife, Beth, are members of Wycliffe Bible Translators in Dallas, Texas. Their tentative plans are to go to Sydney, Australia, to teach linguistics in summer school in November 1980 and to start their training as linguistic consultants in Papua, New Guinea, in January 1981.

1973

HAROLD J. MCGEE, a free-lance writer living in Somerville, Massachusetts, is writing a book, *The Nature of Food*, which will be published by Charles Scribner & Sons in the fall or in early 1981. He married SHARON LONG, BS '73, a research fellow at Harvard, last fall.

JAMES NATION, PhD, visiting assistant professor in the mathematics department at the University of Hawaii writes, "RALPH FREESE (PhD '72) came to Vanderbilt to visit for the fall semester of '78. In exchange I came here for the fall semester of '79. It worked out so well that I decided to stay when the opportunity arose. Ralph and I have written four papers together (starting in '72), so that was a big factor. Also, it's a great place to run all year long, and I live right on the water."

1978

WILLIAM REX CLINGAN reports, "I am truly pleased to report the birth of a daughter, Camille Elaine, to my wife, Celeste, and myself November 16, 1979. At nearly six months she has her front teeth and is doing very well. After joining Mallinckrodt, Inc., in St. Louis, Missouri, and a year's assignment as a process engineer in the Specialty Chemical Division, I am currently working for the Drug Chemical Project Department of the Corporate Engineering Division."

THOMAS J. McDONNELL has been elected chairman of the Graduate Student Council at Harvard University.

New era of fuel-efficient flight a decade away

Advanced technologies for both aircraft and ground control will spawn a new era of fuel-efficient flight to combat sky-high fuel costs, according to Caltech professor of environmental engineering and aeronautics Lester Lees.

Drastic increases in fuel economy will *have* to be made if the airline industry is to remain viable and ticket prices affordable, Lees said. This is because fuel costs, which increased fivefold between 1975 and 1980, are expected to double again in the next five years, reaching about \$2 per gallon in 1985. By 1987, fuel will represent 70 percent of an airline's operating costs compared with 50 to 60 percent today.

Lees believes engine improvements can result in fuel savings of from 5 to 10 percent—for example, systems for controlling the temperatures of turbine blades in existing engines and the introduction of new fuel-efficient turbofan engines.

Considerably increased fuel efficiency can also result from improved aerodynamics that would enable an airplane to slip through the air with less drag. For example, wings that are less swept back and that have small upturned winglets at the tip to decrease vortex drag, and other new wing designs, will be on future planes—at possible 10 percent increases in fuel economy.

Another important aerodynamic development may be the introduction of "laminar flow control," in which compressors draw air in through small slots or holes on the

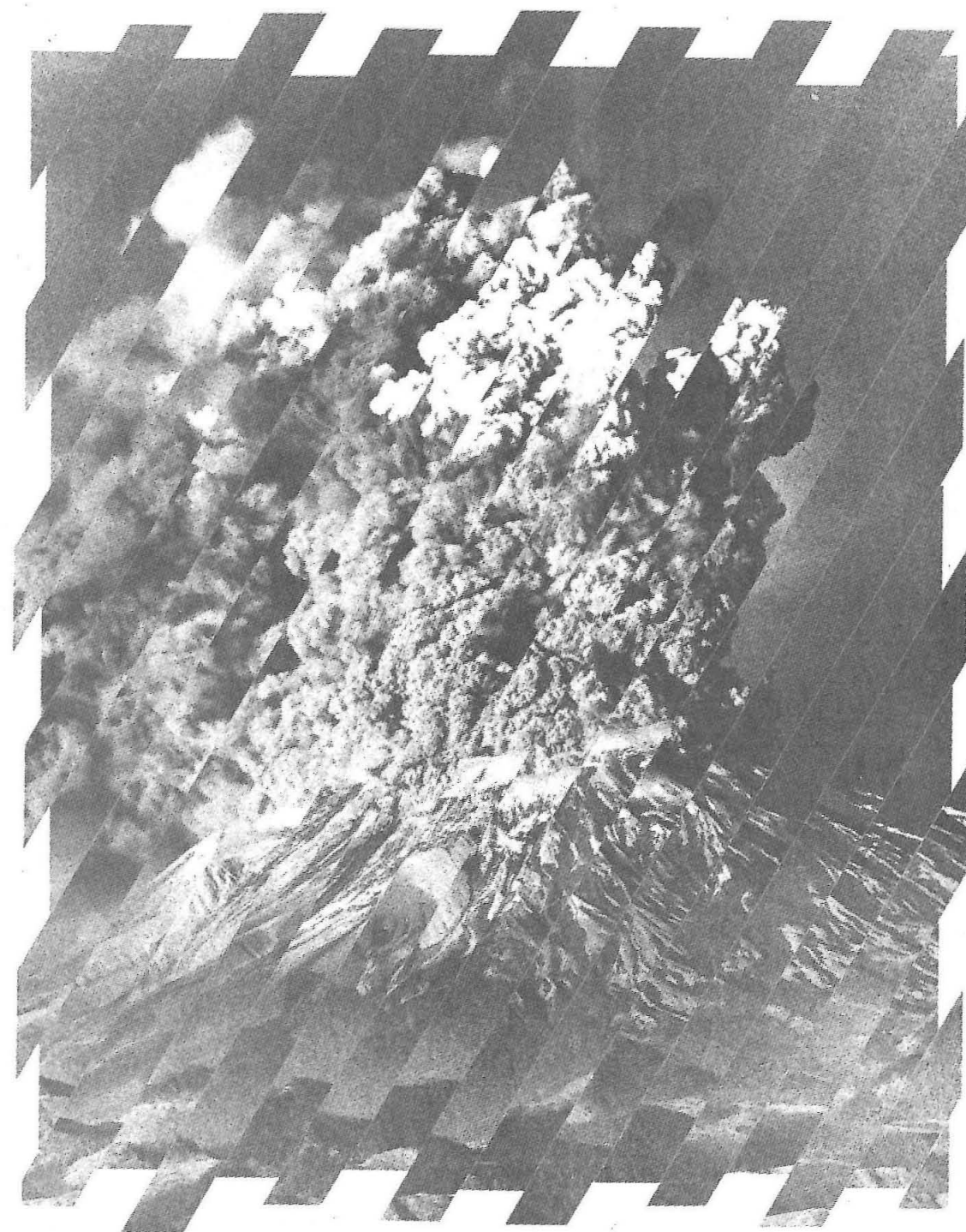
wing surface. This suction would reduce drag by changing the nature of the boundary layer of air rushing past the wing. Laminar flow control can increase fuel efficiency by 15 to 20 percent, Lees believes. Lighter materials—composites of epoxy and carbon fibers, for example, and improved alloys—also will contribute by saving large amounts of weight on future aircraft.

Other contributions to fuel savings will be made via new ground control technology as computer systems allow more efficient ground and air management of air traffic. For example, a more efficient landing arrangement than the current stacking procedure would be "4-D landing patterns" in which landing airplanes are arrayed around an airport and approach runways from the side, turning into line with the runway as they approach landing.

This type of navigation system could reduce circling time and greatly increase the capacity of existing airports, a necessary move considering the current resistance to new airport construction.

As promising as the new technologies are, Lees said many of them will not significantly affect fuel efficiency until the 1990s because of the necessary lead time for introducing new aircraft. In the meantime, the airline industry will have to emphasize such short-term fuel-saving measures as reducing competing flights, increasing load factors, and reducing speeds on existing aircraft.

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Earthquakes and volcanism: Is there a connection? See story on page 1.