

U.S., China to collaborate in monitoring strong earthquakes

U.S. and Chinese earthquake scientists have begun a joint research program to install an array of strong-motion earthquake-measuring instruments in the People's Republic. The principal U.S. investigators will be Caltech Professor of Applied Mechanics Wilfred D. Iwan, David Boore of the U.S. Geological Survey, and Tailing Teng of USC. The project is sponsored by the National Science Foundation; its aim is to obtain systematic ground-motion data for strong earthquakes.

Under the terms of the cooperative project, the U.S. will fund the purchase of the strong-motion instruments, and the Chinese researchers of the State Seismological Bureau will install and operate the array. Installation will be carried out over the next two years under a \$350,000 NSF grant.

The array will consist of approximately 35 modern ground-motion measuring instruments that will be installed in a "parking array" in the Beijing-Tianjing region in Northern China—an area chosen for its high seismicity. The devastating 1976 Tangshan earthquake, magnitude 7.8, occurred in this region where there have been six major earthquakes since 1966. Many Chinese scientists studying past earthquake cycles believe that the region's largest earthquake is still to come.

A special feature of the array will be the ease with which it can be uprooted and redeployed as a "mobile array" in the event of a

Continued on page 4



Playing an important research role are these owl monkeys in John Allman's laboratory. Work with the monkeys is helping biologists learn more about the way the brain works with visual images.

Biological mystery: how the brain turns visual images into thought

By Dennis Meredith

Biologists have long pondered the almost miraculous way the brain sorts through the flood of images seen by the eye and transforms this flow into useful "thought." Now, with only recently developed chemical and electrical methods of studying the living brain, that fascination is yielding understanding.

Among these new results are those obtained by Associate Professor of Biology John Allman and his colleagues, who have just

completed an elegant mapping job that has led to important insights into how the brain processes visual information.

The Caltech researchers have found important clues as to how the brain divides up the labor of processing visual data—discovering an array of discrete brain regions containing specialized neurons, each of which processes a certain kind of visual input.

The researchers chose the owl monkey as their principal research subject because its walnut-sized brain corresponds well to that of other higher primates, including man. Also, its smooth-surfaced

brain was easier to study than the intricately folded brain surfaces of other primates.

The scientists' research centered on the visual cortex of the owl monkey's brain—the posterior region of the brain that is the destination of the stream of nerve impulses from the eyes. In particular, the scientists sought to map the uncharted region known as the "association cortex"—the mysterious region in front of the visual cortex. It is here that raw visual information is somehow changed into what can legitimately be called "thought."

Scientists trying to map the brain are in much the same predicament as an alien from another planet trying to map our system of nations from earth orbit. Like the earth from several hundred miles, the brain offers few geographical guides to its organization. So, as an earth-mapping alien might do, brain-mapping neurophysiologists resort to special probes to reveal the brain's functional organization. They feed a stimulus or tracer into the system at one point and observe where the response to that stimulus shows up.

The basic experiment used by Allman to map the representations of the visual field consists of showing a subject monkey a simple pattern of bars or dots on a television screen. Then, using harmless, microscopically thin wire electrodes inserted into the brain, the scientists detect which nerve cells respond to that pattern with electrical activity. By meticulous experiments using this technique over several years, the scientists were able to map the association cortex in detail.

"We suspected that there were subdivisions in this system, but we were very surprised at the number of discrete regions that we found," Allman said. He added that nine subdivisions were detected.

Please turn the page

For example, the scientists found that "middle temporal" area neurons are selective for the direction of movement and that they respond particularly to visual textures—moving random dot arrays, for example. Thus, this area might be responsible for the guidance of movement, and could be the area of the brain that expanded when primates first took to the trees, enabling them to live in that constantly moving ecological niche.

Another tiny region known as the "dorsolateral area" responded selectively when the owl monkey was shown objects of certain size or form. Another region, the "dorsomedial area," was found to be especially sensitive to orientation—that is, when a bar pattern was flashed before the monkey, the neurons reacted well only to certain orientations of the bar, and poorly to others.

The researchers discovered that the "medial area" neurons emphasized the periphery of the visual field and may serve to "frame" the picture of the visual field.

All these areas feed into another nearby region called the infratemporal cortex, which is the center of high-level processing and visual learning. Experimenters at other institutions had found that when this area was removed from test animals, although the animals could see, they had great difficulty learning new visual discriminations.

Besides overall mapping of the association cortex, the Caltech scientists have studied the detailed wiring of the system. In these studies, they used tracer dyes that, when injected in tiny amounts into neurons at one point in the brain, spread inside those cells, revealing where the neural cells connect to other areas. Several of these tracers, with the unlikely names of horseradish peroxidase, true blue, and nuclear yellow, can be used simultaneously to give researchers a multicolored look at several pathways at once. Similar methods have also been used that involve radioactive tracers, whose path can be detected by exposing brain

sections to films, producing a sort of highway map of the brain structure.

Visiting Associate EveLynn McGuinness, working in Allman's lab, is using horseradish peroxidase to trace the nerve connections between the brain and the facial muscles. Such mapping is important because, in higher primates, including man, the facial muscles are the principal "social muscles" of the body, enabling both speech and facial expression to occur.

Thus, understanding how the cortex controls the facial muscles by way of the "facial nucleus" deep in the brainstem can give valuable clues to the brain function. McGuinness is currently using horseradish peroxidase to trace the connections between the facial nucleus and the cortex in the rat. Facial muscles are also important in the rat, but obviously not for smiling or talking; they control the important sensory system of the rat's whiskers.

After developing her techniques on the rat, McGuinness will proceed to study the connections in the macaque monkey, where she has already used electrical stimulation to trace the paths between the cortex and the facial muscles. In these experiments she used tiny electrodes to apply tickles of electricity to the areas of the cortex that control facial muscles, and observed which of the animal's facial muscles twitched in response.

Allman and his colleagues will soon graduate to studies of even higher visual processing in the brain, probing the infratemporal cortex and amygdala, a deep brain structure that controls the hormonal basis of emotion.

They are planning studies in which macaque monkeys will be presented with video pictures of the faces of other monkeys, and superfine electrical probes will detect where in the brain recognition of those faces occurs. The researchers will display faces showing rage, fear, and other emotions to determine where reaction to those images takes place, and will alter and degrade the images of the face to study how monkeys go about recognizing faces.

Allman's work is sponsored by the National Institutes of Health, the National Science Foundation, the Helen G. and Arthur McCallum Fund, and the Pew Memorial Trust.

War . . . and an alumni meeting

William J. Ellison, Jr., MS '37 (youngest full colonel in General MacArthur's ground forces in World War II) is trying to locate an alumnus that he met almost forty years ago. Here is his story:

"One day, while searching for a source of suitable rock for use as base course for a runway my battalion (808th Engs.) was building near Saidor, New Guinea, on the north side of the island and just east of the Mariquina River, I ran into a Japanese major about three miles upstream from my camp. I only had a trench knife to use in checking the hardness of the various rock deposits near the river bank, while I noticed that the Japanese major had a pistol in his holster. (We ran practically head on into one another as we were going around some very large boulders about ten feet in diameter.) I asked the major if he could speak English. He said, "Yes, I graduated from Caltech in 1936."

I then told him I had gotten my MS there in 1937. He asked me if I knew where a Japanese engineer battalion was building an air base. I asked him if he would become my prisoner, and told him I would insure that he got safely to the prison camp in Australia. He thanked me but wanted to find the Japanese battalion and take his chances on survival. I told him they were about two and a half miles west of the river near the seashore, gave him the lunch I had with me, and advised him of the only river crossing about one kilometer down

river from where we were at the time.

"As things later turned out, my battalion got our air base completed ahead of the Japanese base and our U.S.A. bombers bombed the Japanese base out before it was quite ready for use.

"When World War II was finally over, I was asked to go to Japan to manage the design and building of air bases for our planes there. The existing Japanese bases would not support our much heavier planes. While there I always hoped that I would again meet the man I have written about above, but it was not to be."

Caltech News research hasn't found anyone on the class list for 1936 who fits the description of the man Ellison is seeking. If any readers can help solve this mystery, please let us know.

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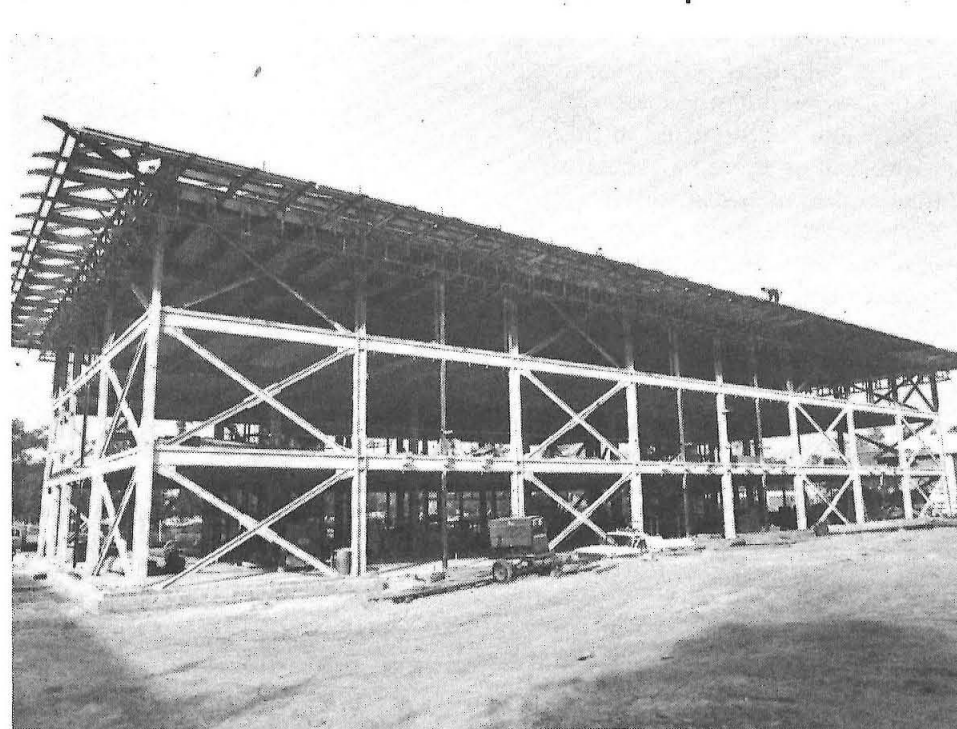
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The Braun Laboratories take shape



The Braun Laboratories of Cell Biology and Chemistry, just across from Church Laboratory, are slated for completion in early 1982. Incorporating about 82,000 square feet, the new facility will be used primarily for fundamental cancer and membrane research.

Lance Davis, Frank Marble named to Harkness, Hayman Professorships

Two Caltech faculty members have been named to endowed professorships at the Institute, according to President Marvin L. Goldberger. They are Professor of Economics Lance E. Davis, the first Mary Stillman Harkness Professor, and Professor of Jet Propulsion and Mechanical Engineering Frank Marble, the first Richard L. Hayman and Dorothy M. Hayman Professor of Mechanical Engineering.

The Harkness professorship is named in honor of the wife of the late Edward S. Harkness, whose donation of \$750,000 in 1937 is providing the source of funding for



Lance Davis

the new professorship. The Harkness contribution has also funded the Edward S. Harkness Professorship in History, established in 1940, and now held by historian Rod Paul.

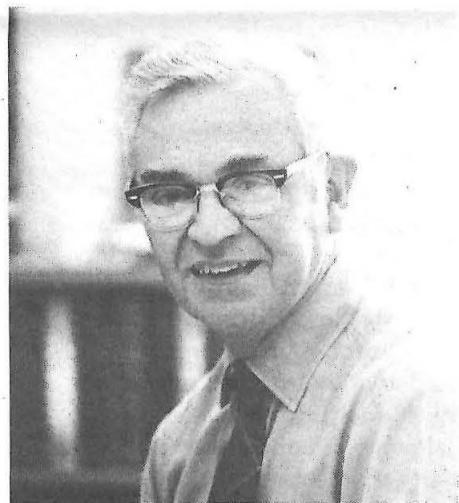
"In naming Lance Davis to this new post we honor one of the world's leading economic historians," said President Goldberger. "Lance has been of enormous service to Caltech in leading the development of the Institute's social science program and in serving selflessly on many faculty committees."

Davis, 52, received his BA degree magna cum laude from the University of Washington and his PhD from the Johns Hopkins University. He has taught at Johns Hopkins and at Purdue University, and he came to Caltech in 1968 as professor of economics. The author of five books on economics and several dozen other publications, he

is currently president of the Economic History Association.

His research interests include the impact of imperialism on economic growth and welfare, particularly in the British Empire between 1860 and 1912; how institutions adapt to pressures generated by economic developments; the economic aspects of professional sports; and the relationships between capital, financial intermediaries, money markets, and economic growth.

The Hayman professorship has been endowed by Richard Hayman, a Caltech alumnus who studied mechanical engineering at the Institute and who is chairman and chief executive officer of Haskel Engineering & Supply of Burbank, California.



Frank Marble

"Two major reasons for Caltech's continuing excellence have been the extremely high quality of its faculty and the strong support of its alumni," said President Goldberger. "Both these reasons are reflected in the appointment of Frank Marble to a professorship made possible by the generosity of Dick and Dottie Hayman, two cherished friends of the Institute."

Marble, 62, holds a BS degree in mechanical engineering and an MS

degree in applied mechanics from the Case Institute of Technology. He came to Caltech as a graduate student, receiving his PhD in aeronautics and mathematics in 1948 and joining the faculty the same year. In 1972-73, Marble held the Churchill Overseas Fellowship at Cambridge University, and in 1974 he was elected a Fellow of the National Academy of Engineering.

His research is concerned with turbulent combustion processes that relate to such diverse devices as chemical lasers, central power stations, and jet engines. He has studied how such turbulence produces noise in jet engines, and how noise can be attenuated by the vaporization of liquid droplets.

His studies of the behavior of large combustion systems have provided new insights into the problem of unstable oscillations in

combustion in large electric power generating plants — insights that could result in significant improvements in the power produced per dollar of capital investment in such plants.

Richard Hayman worked at Lockheed from 1936 to 1945 before founding his own company. The firm produces compressed air driven pumps and high temperature metal seals for the aviation and oil and gas industries. Hayman also is chairman of Haskel Energy Systems, Ltd., in England, the foreign subsidiary of his company.

He is a life member of the Caltech Alumni Association and he and Mrs. Hayman are members of The Associates. Hayman sponsored the construction of the Hayman Lounge in the Athenaeum, in memory of his brother.

IBM awards Caltech \$1 million

IBM has awarded Caltech a grant of \$1.5 million to be used as general support for the Institute, Caltech President Marvin L. Goldberger has announced. The contribution, to be paid over five years, is an unrestricted gift.

"For more than two decades, IBM has provided support to Caltech," Goldberger said, "and the result has been a mutually productive relationship of the highest order."

We're extremely appreciative of IBM's continued confidence."

Goldberger said that such funds for general support are essential if Caltech is to continue to conduct the increasingly complex operation of a modern research university in the face of inflation, to provide new learning and laboratory opportunities, and to sustain an atmosphere of intellectual vitality worthy of its student body and faculty.

The Associates' new officers



Newly elected as officers of The Caltech Associates are: Collis H. Holladay, Jr., (BS '56), first vice president; Charles F. Thomas (BS '35), treasurer; Hannah G. Bradley, who is serving her second term as president; Robert L. Zurbach, secretary. Oscar T. Lawler, not present for the picture is the second vice president. Elected this year as members of the Board of Directors were Harrison W. Sigworth (BS '44), and Walton A. Wickett (Ex '37), of the San Francisco Bay Area, and John U. Edwards and Ralph W. Jones (BS '38) of southern California.

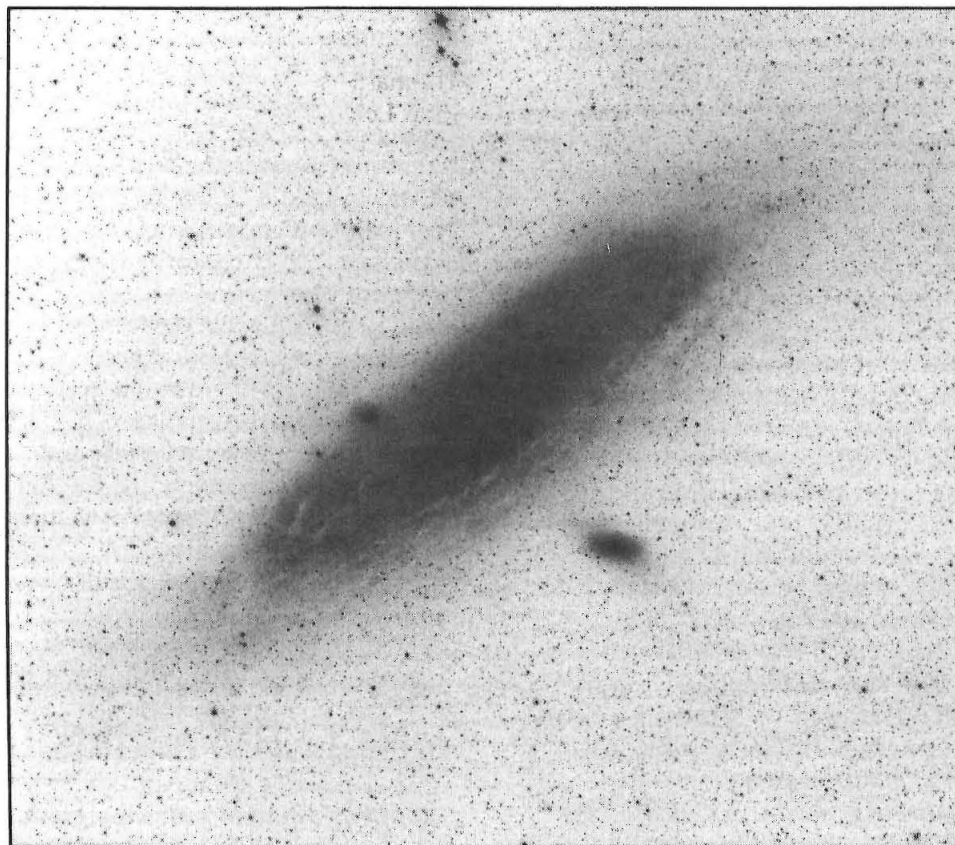
New survey to probe the northern sky

The sky survey photographed at Palomar Observatory in 1957, which has been a basic guide to the celestial objects north of the celestial equator, is soon to be supplanted. A new survey by the 48-inch Schmidt telescope will use film that is able to record stars and galaxies four times fainter than those photographed in 1957. Funds for the survey will be provided by the National Geographic Society, the Alfred P. Sloan Foundation, and Eastman Kodak.

The sky survey conducted between 1952 and 1957 was one of the most important astronomical developments of the 20th century, according to Caltech professor and executive officer for astronomy Wallace L. W. Sargent. Sargent, who will oversee the new survey, noted that without the effort in the 1950s, many of the most spectacular developments in contemporary astrophysics would have been impossible or seriously hindered.

"The sky survey made it possible to optically identify, very quickly, many interesting objects," he said. "Many of these were initially discovered because of their intense radiation at radio, x-ray, or infrared wavelengths." These objects included radio galaxies, for example, as well as quasars and clusters of galaxies.

The new effort will take several years and will require the photographing of some 700 overlapping areas of the sky north of the celestial equator, in both red and blue light wavelengths. Because of its large size, wide field, and ideal siting, the 48-inch Schmidt telescope at Palomar was selected for the survey. The project will complement a similar survey of the southern sky now under way at the European Southern Observatory in Chile and with the U.K. Schmidt telescope in Australia. Reproduction



Of all the galaxies within reach of smaller telescopes, the Andromeda Nebula is in size and structure closest to the system of our Milky Way. This photograph of the nebula was taken by the 200-inch Hale telescope at Palomar Observatory during the 1952-1957 sky survey—one of many photographs that helped to increase our knowledge of the cosmos. Now a new survey will yield further insight.

of the photographs will be made available to astronomers all over the world.

The basic reason for the new survey is the development of new films with finer grain emulsions and a higher storage capacity than the film used in 1957. Another survey of the sky will be carried out simultaneously in the infrared region of the spectrum.

The survey will be used to aid several other major astronomical efforts over the next decade. It will help guide the use of the space telescope to be launched in 1983,

and will be used to optically identify objects detected by ground-based radio telescopes and infrared- and x-ray-detecting satellites.

To fund the effort, the Sloan Foundation has granted \$350,000, the National Geographic Society \$300,000, and Eastman Kodak \$90,000, plus all the necessary photographic products. Part of these funds will be used to modernize the 48-inch Schmidt telescope. Caltech will contribute the cost of using the Schmidt for the approximately 700 nights of observing that will be required.

Liepmann wins fluid dynamics prize

Hans W. Liepmann, the Charles Lee Powell Professor of Fluid Mechanics and Thermodynamics at Caltech, is winner of the 1980 Fluid Dynamics Prize of the American Physical Society.

The \$3,000 prize, which is awarded for outstanding achievement in fluid dynamics research, went to Liepmann "for his numerous contributions in fluid mechanics covering a wide range of problem areas, such as flow instability and turbulence, gas kinetics, viscous compressible fluids, and liquid helium flow."

Liepmann, who is also director of GALCIT (Graduate Aeronautical Laboratories of the California

Institute of Technology), was presented the award at a recent meeting of the society's Division of Fluid Dynamics in Ithaca, New York.

Liepmann's early work has had considerable influence on the design of aircraft and missiles, and he is an authority on shock waves, plasmas, and the flow of rarefied gases. His present interests are in chemical reactions in turbulent mixing, a fundamental problem in combustion and chemical laser technology; in the fluid mechanics of superfluid liquid helium; and in the "similarity" laws of thermodynamics.

U.S., China join in earthquake research

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large earthquake or a valid earthquake prediction in another part of China.

"We're highly optimistic that this project will yield valuable data about the nature of strong ground motion during earthquakes," said Iwan. "China is one of the most seismically active regions in the world, and we're confident that researchers there have the technical expertise and commitment to support this work."

Despite the frequency of earthquakes worldwide, Iwan said that there are relatively few records of strong ground motion near epicenters of major earthquakes. These records are vitally important, not only to the study of the mechanisms for the release of energy in earthquakes, but also for the effective earthquake-resistant design of buildings, dams, power plants, and other structures.

According to Iwan, not many strong-motion records have been obtained in China, despite several accurate predictions of large earthquakes there. This lack of data can be partially traced to the scarcity of adequate strong-motion instruments. Other highly seismically active countries have a similar instrumentation problem. Iwan said that for this reason, in a recent International Workshop on Strong-Motion Earthquake Instrument Arrays, a high priority was assigned to cooperative international efforts to install arrays of this kind. The workshop was sponsored in 1978 by NSF and UNESCO.

Delegates to the workshop selected 28 sites throughout the world as promising for the installation of strong-motion earthquake instrument arrays. One of the sites selected was in the People's Republic of China. Since the workshop, major quakes have occurred at or near four of the sites that were selected: E. Tokoku, Japan, in 1978; Gonabad, Iran, in 1978; Oaxaca, Mexico, in 1978; and Yakutat, Alaska, in 1979.

On the cover

Debbie Loeppky painted this picture of an owl monkey while she was a student at Pasadena City College and working in the Beckman Laboratories of Behavioral Biology at Caltech. Here she helped to take care of the animals in the labs. Loeppky is now a student at UC Davis.

Tech coaches review the fall sports season

Men's cross country

The 1980 men's cross country team finished the season with a 3-win and 5-loss dual meet record, despite losing over half the runners from the varsity. The team showed tremendous spirit and improvement throughout the season, and may very well be ready by 1981 to exceed all previous successes.

Led by sophomore Karl Clausing, the team finished in a tie for 5th in the SCIAC championship, and then managed 6th place in the NAIA District 3 championship. Caltech's second highest team finish on record at this meet. Clausing, who demonstrated leadership and competitive drive all year long, was voted to receive the team's highest award, the Paul Barthel Trophy, as the outstanding member. Clausing's ability was demonstrated by his 11th-place finish at the district meet. His time was the third fastest ever by a Caltech runner, and his place on the all-district second team was the second highest individual finish ever achieved by a Caltech runner, a remarkable feat for only a sophomore.

Senior Eric Korevaar was a consistent contributor all year, and moved up from number seven on last year's team to the number two slot for 1980. Shawn Larsen was named most improved runner; his meteoric rise to become a letter winner was so dramatic that even he found it hard to believe. Other team members showing good potential and tremendous desire were Paul Eskridge, Steve Stahl, and Rob Murphy.

Women's cross country

The women's cross country team was forced to forfeit all its meets for failure to field the required five runners.

This was unfortunate, because the three Caltech runners proved to be tenacious competitors, capable of placing high in SCIAC and NAIA district championships.

The team leader for most of the year, until field trips and illness

interrupted her progress, was sophomore Julia Kornfield, who showed that she is capable of running with the best. She was closely followed by Karen Close, another sophomore. After an exceptionally successful season, Karen finished seventh in the NAIA District 3 championship meet and earned first team, all district, honors, finishing only 12 seconds behind the fourth-place runner.

The remaining team member, freshman Carlotta Paulsen, showed more potential and drive than even she expected. In her first race she ran more than five minutes behind the winning runner in a dual meet, but at the district championship she finished 15th, within two minutes of the winner and less than one minute behind teammate Karen Close. She missed all-district second team honors by only seven seconds.

Football

The 1980 football season began this year with new hopes, a new coach, and a new offensive and defensive system. The new coach, Lin Parker, brought to Caltech 14 years of high school coaching and 20 seasons of playing. Joined by veteran Caltech assistant coaches Dean Bond and Gene Renfroe, Parker guided the Beavers through eight competitive weeks. Victories came at the expense of the Simi Valley Warriors, 15-14, and the Mexicali Institute Spartans, 26-20.

The Beavers accepted a forfeit win from the Tijuana Tech Greyhounds who could not get documentation in time to travel to Pasadena. Another season highlight came as Caltech traveled to the California Correctional Facility at Tehachapi for the first time. Tehachapi took a hard-fought contest, 18-14.

Of the 28 Techers who began the season, 26 men celebrated its end with a dinner at the new Alumni House. Winning football awards were co-captains Terry Thomason and Charles O'Neil. Steve Martin won the outstanding freshman award, and Tim Brazy was chosen outstanding defender. The Irv Noren Trophy for the outstanding back went to Curt Trimble, and the Max West Award honoring Tech's outstanding lineman to Charlie O'Neil.

The top award, the Wheaton Trophy, was given to Terry Thomason. Thomason, Brazy, and John Lovberg were nominated for All-American selection to the National Collegiate Football Association; Brazy ended the 1980 season 7th ranked in the NCFA punting statistics with a seasonal average of 34.7 yards per kick.

Elsewhere in the SCIAC, Claremont-Mudd and Redlands battled down to the wire with Claremont emerging as conference champion. Football spirit at Tech remained high all season and high hopes are held for football endeavors here in the '80s.

Water polo

The young and talented Caltech water polo team proved to be a true force in the SCIAC conference championship. The team played a tough, competitive schedule, winning 4 and losing 14, and closing in on the top schools. In years past Caltech's competitors scored well ahead early in the games and could take out their first teams halfway through the matches. This season saw the opponents' first teams in for the whole game. Thus it may not be a coincidence that in the tournament at the end of the season, all the opponents lost the game following their game with Caltech: their first teams were tired.

Junior Matt Wette led the team in conference scoring, and freshman Don Hendrix in inside play. The speed and shooting ability of junior Arley Anderson and sophomore Chris McKinnon were important throughout the season.

In a season of total team effort, many key goals and plays came from sophomore Dave Huff, sophomore Steve Chin, sophomore Brent Stuart, and last year's goalie, sophomore Bjorn Matthias, who converted to field play this year. Early-season goalie and backup sophomore Greg Sayles did a fine job, along with field play freshman Eric Grannan and freshman Ken Gant.

Matt Wette was named to the second team All Conference, and Hendrix and McKinnon were given honorable mentions by the conference coaches. Hendrix won the Coaches' Cup, and freshman Reed Burkhart was named the most improved player at the awards dinner in the Alumni House.

The graduation of starter Todd Olson will hurt, but with the core of the team returning, the future looks very bright.

Soccer

The 1980 season was an exciting, and yet frustrating, one for the soccer team. Tech managed to lose seven (including two junior varsity) games by a single goal. Three games went into overtime, one of them ending in a tie with La Verne; the latter team finished second in the conference.

In spite of a poor overall record, however, the team played extremely well in almost all of the games.

Players who deserve special mention include Brad Axan, John McNally, Larry Friedrich, John Krehbiel, Bryan Dunkeld, Lance Dixon, Terry Barr, and Nick Gross.

During the season, the soccer team played its first game with the alumni; the alumni won, 5-4. Due to a shortage of players, several members of Tech's soccer club reinforced the alumni contingent. We are hoping for a better alumni turnout for next year's game.

John McNally was voted the most valuable team member, as well as all-conference. He and Lance Dixon (this year's leading scorer, with eight goals) will be co-captains next year.

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

OF SPECIAL INTEREST TO ALUMNI

ALUMNI ACTIVITIES

March 6 and 20

Annual wine tastings. Both programs will begin at 8 p.m. with a tasting of three Hans Kornell champagnes, followed by a lecture by Bruce Hotra, owner of the Huntington Market, on current trends in wine-making, and a briefing by winery owners. Then alumni will sample wines, cheese, and bread. The featured wineries will be the Clos du Bois Winery, Hacienda Winery, Joseph Phelps Winery, and Villa Mt. Eden.

April 10

Princeton, New Jersey chapter meeting. Details to be announced in a future issue.

April 20

Boston chapter meeting. Provost John D. Roberts, the Institute Professor of Chemistry, will be the speaker.

April 22

Philadelphia chapter meeting. Provost John D. Roberts, the Institute Professor of Chemistry, will be the speaker.

May 15

Reunion, class of 1956.

May 16

Seminar Day. Physicist and astronomer Sir Fred Hoyle will be the keynote speaker, discussing his work on the origin of the elements.

May 23

San Francisco chapter meeting. Details about this all-day event will be announced.

June 5

Reunions, classes of 1931, 1936, and 1941.

June 6

Reunions, classes of 1946 and 1951.

June 13

Reunions, classes of 1961, 1966, 1971, and 1976.

Frank Capra to speak to fellow Gnomes

Frank Capra, the Caltech graduate who became a Hollywood director and achieved the longest unbroken string of Motion Picture Academy Awards in history, will be the speaker at the

Gnome Club Founders' Day dinner.

Capra will address his fellow Gnomes on March 9 in the Athenaeum, after a ceremony of dedication for the Gnome Club room in the Alumni House. All Gnomes are invited.

The son of a Sicilian immigrant, Capra enlisted in the army after receiving his BS degree in 1918, and found no jobs waiting for young chemical engineers when he returned from the service. He entered the world of filmmaking and rose from a \$35-a-week gag writer for Mack Sennett to become Hollywood's most successful director, coming up with a string of hits including "It Happened One Night," "Lost Horizon," "Mr. Smith Goes to Washington," and "You Can't Take It With You." Capra made a major studio out of Columbia, and became the first director to have his name listed above the title of his pictures.

Tokyo alumni hear Clarence Allen on "great quakes"

The Alumni Association welcomed a new group to its ranks in February, as Tokyo alumni held their first chapter meeting. Clarence R. Allen, professor of geology and geophysics, on his way to China for two months, stopped in Tokyo to talk to the group about "Great Earthquakes, Great Faults." About 30 alumni attended. Thomas T. Hiyama, BS '30, and Hisayuki Kurihara, BS '36, MS '37, MS '38, helped to organize the meeting.

Hawaii volcano country beckons alumni, May 3-6

Names are being placed on a waiting list for the Alumni Association trip to the volcano country of Hawaii with Robert Sharp on May 3-6. Alumni and their guests will gather in Hilo on May 3 where they will spend their first and last nights at the Hilo Hawaiian, and their second and third nights at Volcano House on the rim of the Kilauea caldera. From the Volcano House, the group will explore volcanic sites including Mauna Ulu, Kilauea, and the Kau Desert.

Sharp also promises that the trip will include a look at the natural life and history of Hawaii. With him as guide will be Dan Dzurisin (MS '75, PhD '77). (Sharp, BS '34, MS '35, is Caltech's Sharp Professor of Geology, emeritus.)

The Alumni Association is offering several travel options to alumni who want to continue their visit in the Hawaiian Islands after the explorations on Hawaii. A maximum of 40 people will be included as participants. Cost is \$315 per person (\$360 single occupancy) plus airfare.

Scholarship award dinner honors students, donors

Recognizing outstanding students through scholarship grants is one of the Alumni Association's pleasant responsibilities. This year the association honored seven scholars—along with donors to the Alumni Scholarship Fund—at an award dinner in the Athenaeum during January.

The alumni donors and their firms were Michael Agabian, (MS '48) of Agabian Associates; Cydnor Biddison (BS '40) of Hillman, Biddison and Loevenguth; Albert Erkel (BS '45) of Erkel-Greenfield Associates; Carl B. Johnson (BS '37, MS '44, Eng '46) of Johnson & Nielsen Associates; and Return Moore (BS '47, MS '48) president, Moore & Taber.

The student awardees included John Faughnan, Raymond J. Gralak, Terry Grant, John Howley, Virginia Konikowski, Robert Manning, and Maclen Marvit. Alumni Association President James J. Workman, (BS '57, MS '58) made the presentations.

Sir Fred Hoyle: Seminar Day keynote speaker

Noted astronomer, physicist, and author Sir Fred Hoyle will be the keynote speaker on Alumni Seminar Day, May 16. Hoyle will discuss his work on the origin of the elements.

Hoyle, who was on the Caltech campus in 1975 as a Sherman Fairchild Scholar, is a fellow at St. John's College, Cambridge University. He is Cornell University's Andrew D. White

professor at large, and an honorary research professor with the University of Manchester. He has conducted research on the development and age of stars, and on exobiology and infrared astronomy, and he helped to formulate several major cosmological theories.

Much honored for his novels, television plays, and short stories, Hoyle is the author of such works as *The Nature of the Universe*, *Man and Materialism*, and *Rockets in Ursa Major*.

He is a Fellow of the Royal Society, and a member of the Royal Astronomical Society, the American Academy of Arts and Sciences, and the American National Academy.

Alumni share "Big T" memories

Responses to our story in the January issue about the Big T on the mountainside above Pasadena have begun to reveal more of its history. Roger Noll, BS '62, chairman of Caltech's Division of the Humanities and Social Sciences, comments: "[The T] seems to have been neglected since the 1950s? Humbug! The class of '62 cleaned the 'T' in the fall of 1958. I don't know how many times it was cleaned thereafter, but for my four years as an undergraduate it was always clearly visible. I suspect that the tradition of freshmen cleaning it died in the early 1960s, since by the time I returned to the faculty in 1965 it was quite faint."

A. J. Tickner, BS '32, called to report that it wasn't just a telescope that was mounted on Throop Hall, but a surveyor's transit that helped the brush cutters to get their perspective correct, through intelligence sent them via telegraph or telephone from the watchers on Throop. Tickner also described a memento of the Institute's early days that he had kept (and that he subsequently presented to the Archives). This bulletin board notice states: **IMPORTANT NOTICE:** To prevent defacing the outside walls of the building, chemicals or solutions must under no circumstances be placed on the window-sills or thrown out of the windows. Failure to observe this rule may make it necessary to lock the windows. Arthur A. Noyes

Other letters about the "T" are arriving and will be shared in future issues.

Obituaries

1924

ARTHUR PICKETT, Ex, on September 5 of a heart attack. He was retired and living in San Marino, California.

ROLLAND S. THOMAS on August 22. He was retired from two careers—one as a public school teacher and later as president and general manager of Dalewood Mutual Water Association in Garden Grove, California. His wife survives him.

1927

KENNETH A. BELKNAP on November 29. He had retired from his Los Angeles insurance firm of Belknap and Smith in 1969 and moved to Laguna Hills. As secretary of Pi Alpha Tau at Caltech, Belknap organized the group's reunion every year. He treasured a silver tray he received from the members in expression of their gratitude. He is survived by his wife, Florence, sons Bruce and Raymond, and two grandchildren.

1939

ANGUS C. TREGIDGA, PhD, on November 25 of a heart attack. He had been an instructor at Kansas State College and chief engineer and general manager of the first Motorola plant in Phoenix, Arizona. Tregidga then spent 25 years at the applied physics laboratory of the Johns Hopkins University, where he was assistant to the director from 1959 to 1975. At the time of his death, Tregidga had retired to Whidbey Island, Washington. Surviving him are his wife, Ruth, two children, and two grandchildren.

1945

RAYMOND O. FREDETTE, MS, on October 13, 1979. He had been with Hayes International Corporation in Birmingham, Alabama.

1947

RICHARD S. BARNA on August 8, of a heart attack at his home in South Pasadena, California. He had been business manager of York Square in Los Angeles, a shopping center that included a family-run liquor store and bookstore. Barna is survived by his wife, Bonnie.

1948

WALTER C. SWAN, Eng., on November 5 at his home in Bellevue, Washington. At the time of his death he was director of technology with the Boeing Military Airplane Development Company. Swan joined the Boeing Commercial Airplane Company in 1959, where he became chief engineer with the supersonic transport and then director of engineering technology with that firm. Selected as an AIAA fellow in 1977, Swan was a member of the aeronautics committee of the National Aeronautics and Space Administration advisory council and was a member of the Air Force scientific advisory board. Survivors include his wife, Mary, two sons, Walter, Jr., and David, and three daughters, Terri, Laura, and Rebecca. Contributions should be sent to the Walter C.

Swan, Sr., Memorial Fund, Brain Tumor Institute, Swedish Hospital, Seattle, Washington 98104.

1969

WILLIAM M. ROBINSON, JR., PhD, on December 2, in an accident while flying his private plane. He was president of Mansfield Aircraft Products Company in Mansfield, Ohio.

Personals

1932

PATRICK B. LYONS writes from Vero Beach, Florida, "Still healthy and active—thank goodness! Starting third year as an elected county commissioner (comparable to the board of supervisors in California). Was elected chairman this year. Also served as chairman of a four-county regional planning council last year."

1936

ROBERT L. JAMES, MS '44, has retired as professor of civil engineering at Oklahoma State University at Stillwater. He had been on the OSU faculty for the past 15 years, after a number of years in private industry and in other college appointments. He and his wife, Dorothy, are retiring to what was their vacation home near Brainerd, Minnesota.

1937

ROBERT BRYSON, MS, resident of Leisure World in Laguna Hills, California, was named Leisure World of the Month for November. Bryson was recognized for work as program scientist for supporting lunar research and technology for NASA. He was also recognized by Leisure World for his 25 years with the U.S. Geological Survey, and for his current participation in the Saddleback College Emeritus Institute program. "Energy resources" is the subject of one of the courses he is teaching.

ROLAND BUDENHOLZER, MS, PhD '39, has been recognized by The Society of Mechanical Engineers for his lifetime of service to engineering and has been accorded honorary membership in that society. Budenholzer, John T. Retaliata Professor Emeritus at the Illinois Institute of Technology, was cited for "his many important contributions to thermodynamics and power engineering as educator, researcher, director and chairman of the American Power Conference, and through his service to the Power Division of ASME."

1939

PHILIP S. DEVIRIAN, MS '40, has retired as vice-president and general manager of the ordnance division of FMC Corporation, in San Jose, California. He will remain as adviser to the group's management.

TYLER MATTHEW writes, "While reading the Personals in the December issue of *Caltech News*, I was again reminded that it has been many years since I can recall reading any news of the class of 1939. Here, then, is an item; not very newsworthy, it's true, but perhaps it will serve to fill the void: 1939. Tyler Matthew retired as a logistics engineer at the Naval Surface Weapons Center, Dahlgren, Virginia. He and Mrs. Matthew have resumed residence in Seattle, Washington."

Ed. note: seemed newsworthy to us.

1942

PICHEL W. PICHEL reports from Rancho Santa Fe, California, that he retired in July from Solar Turbines International after 25 years in the development of industrial gas turbine engines.

GEORGE P. SUTTON, MS, has been at the Lawrence Livermore Laboratory for the past three years and has just completed an international survey of the state of the art of machine tool technology. Under Sutton's guidance this multidiscipline project, known as the Machine Tool Task Force, had the participation of more than 120 experts in the field. Results can be obtained from Sutton.

1944

ALFRED G. KNUDSON, JR., PhD '56, has been named president and chief executive officer of the Fox Chase Cancer Center, in Philadelphia, and will direct the Center's two component institutions, the American Oncologic Hospital and the Institute for Cancer Research. He will continue as director of the Institute, a post he has held since 1977.

1945

DUDLEY SMITH and his wife, Esther, who live in Larchmont, New York, report that the highlight of 1980 for them was the LES (Licensing Executives Society)/Patent Office delegation trip to China. "Two weeks in Canton, Peking, and Shanghai with our Chinese friends. The book we are writing for LES on technology deals with the People's Republic of China and will be published in April. Climbing part of the Great Wall, exploring the Ming Tombs and the Forbidden City, watching the boats in Shanghai Harbor are experiences we'll long remember, as well as Esther's visits to a farm commune and a kindergarten." The Smiths plan to move to Brookings, Oregon, in July.

DONALD TILLMAN, MS '47, city engineer for Los Angeles, has been named City Employee of the Year by his co-workers in the City Employee Service Benefits Association. He is recognized for his contributions as engineer and as a retirement commissioner.

1947

DAVID S. HATCHER writes from Boulder City, Nevada, that he and his wife, May, have been enjoying a busy life since his retirement from the Naval Facilities Engineering Command in 1978.

1949

ARTHUR E. BRYSON, JR., MS, PhD '51, the Paul Pigott Professor of Engineering at Stanford University, has received the Rufus Oldenburger Medal of the American Society of Mechanical Engineers. The award, which recognizes significant contributions and outstanding achievements in the field of automatic control, was presented to Bryson for his "creative contributions to the art, science and pedagogy of optimal control and for fostering its practical application to flight control and navigation systems."

1953

EARL D. JACOBS, MS '54, PhD '61, of Santa Ana, California, has been named vice president of GenRad, Inc., of Concord, Massachusetts. In April 1980 Jacobs was appointed general manager of GenRad/Futuredata, now known as the Development Systems Division, in Culver City.

1954

MELVIN L. GOLDBERG announces that he has moved to Florida as director of clinical chemistry at a large hospital after thirteen years on the faculty of the department of pathology at UC San Francisco. He lives in Altamonte Springs.

1955

TOYOO TOMITA, MS, who is on the faculty of the National Institute of Agricultural Science in Ibaraki, Japan, reports that during 1980 he made his third visit to Hungary, where he helped the country to increase its rice production in spite of abnormally bad weather.

1957

KENNETH STEFFAN, MS, has been appointed general manager of the Information Processing Division at The Aerospace Corporation in Los Angeles. Steffan, who joined Aerospace in 1960, was formerly the principal director of the software and system analysis subdivision.

1961

ROBERT J. QUIGLEY, MS '62, sends us this update: "I'm an associate professor of physics and astronomy at Western Washington University in Bellingham. I've been there since 1970. About six years ago, I decided to switch from solid state physics to observational astronomy. I spent a sabbatical year ('76-'77) in the astronomy department of the University of Texas at Austin and devoted a quarter of my time observing flare stars, cataclysmic variable stars, and lunar occultations at UT's McDonald Observatory in West Texas. This academic year ('80-'81) I'm on leave from Western Washington and am working as a visiting scientist at Sacramento Peak Observatory (Sunspot, New Mexico)."

1966

DONALD S. REMER, MS, PhD '70, writes, "Louise and I had our third child, Miles, in 1979. His two sisters are enjoying having a little boy around the house. In June I was promoted to the position of Oliver C. Field Professor of Engineering at Harvey Mudd College. And just recently I was selected to be the first director of the newly formed Energy Institute at Harvey Mudd. I will hold both positions. Louise is quite busy raising three children and teaching statistics and computer science part time at California Polytechnic State University in Pomona."

1968

MARSHALL I. SCHOR has been promoted to senior engineer at IBM's General Products Division and has accepted a two-year assignment in New York in the corporate headquarter's engineering, programming, and technology staff, where he is the consultant in storage products. Schor, his wife, Susan, and their 1½-year-old son, Aaron, will be living in Pleasantville, New York, in 1981-82.

1974

JAMES LEGER received his PhD in applied physics from UC San Diego and is now an assistant professor at the university. He is planning to be married to Penny Ludwig in June.

"This one would have been really good if it had worked," said Lt. Robert Montoya of the Pasadena Police Department in commenting on the 1981 Rose Bowl prank attempted by Lloyd House students.

But unfortunately for aficionados of Caltech pranksterism, security guards apprehended four undergraduates early Wednesday morning, December 31, as they were on their way to bury a box on the sidelines along the 50-yard line in the Rose Bowl. Those arrested were Charles O'Neil, Stephen Martin, Joel Brian Ennis, and Juanito Villanueva.

Inside the box they carried was a four-foot balloon with "Caltech" imprinted on one side and "DEI" on the other (a reference to Dabney House, according to the instigators) and a 25-foot streamer bearing the word, "Beavers." Also inside were two electronically controlled gas canisters, one containing helium and another with compressed air.

A buried connecting wire, 75 yards in length, was to have run from the box to a spot on an aisle where one of the students would have activated it after half-time ceremonies. At this point, a hydraulic lifting device would have pushed the box to the surface and its contents would have been released, providing a grand finale to the show put on by support groups of the Huskies and Wolverines.

But unknown to the plotters, an extra security guard was on duty inside the Rose Bowl, in addition to the ones patrolling outside, and the students were apprehended as

they scaled the fence at 4:30 a.m. with the balloon, hydraulics, and a post-hole digger.

The Lloyd House contingent started working on the project three or four months before New Year's, and intended to bury the box well before January 1, but were delayed by a succession of technical difficulties. The final mishap occurred several nights before the game as the students tested the device in the Lloyd House courtyard. The balloon inflated properly, but when it ascended it kept on going, heading in the general direction of the San Gabriel Mountains. This made it necessary to find a new balloon in a hurry, as well as an artist to embellish it with the necessary graphics. And in the interim, the security force at the Rose Bowl was stiffened as the day of the game approached.

O'Neil, Martin, Ennis, and Villanueva were arrested on suspicion of trespassing and released after three hours in jail—an experience that they described as "very interesting."

In a court appearance, they entered a plea of "guilty with an explanation." The judge ordered them to summary probation for the rest of the day, then entered a "not guilty" plea for them, and after due deliberation, found them not guilty. Noting that such acts "lend color to the Rose Bowl," he said he wished they would do a better job next year. Defendant Martin said he would consider this part of his sentence.

CALTECH NEWS



The owl monkey plays a special role in unraveling mysteries of the brain and vision.
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