

CALTECH NEWS

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A fast start gets Caltech's entry on its way to the first electric crossing of the continent.

The Great Electric Car Race; Caltech Wins, But There's An Awful Lot of Room for Improvement

For the last several years a persevering undergraduate has been Caltech's resident promoter of electric automobiles. Wally Rippel, '68, converted his 1958 Volkswagen bus to electric propulsion and drove it fumelessly around town in an attempt, he said again and again, to demonstrate an alternative to smog. His listeners smiled indulgently.

Now the smog remains and Rippel is gone, but the manner of his departure hinted that electric propulsion may not be such frivolous business after all.

At 9 a.m. PDT on August 26 the electrified VW, with Rippel and some classmates, took off for MIT in Cambridge, Mass. At the same moment a group of MIT students started off for Caltech in an electrified 1968 Corvair. The event was the result of a challenge to race electric cars across the country issued in January to MIT students by Rippel.

Both sides figured to take up to 5 days for the trip. Neither did. The MIT car made it to Pasadena 7½ days after the start, and Caltech hummed into Cambridge 37 hours and 20 minutes after that. But by the time the judges finished assessing penalties for such activities as towing, recharging with a portable generator between official charging stations, and replacing

parts, the tortoise had once more beaten the hare. Caltech's corrected time of 210 hours was 30 minutes less than MIT's.

Cost of the electricity used was about \$25 for each car, but before you head for Chicago in an electric runabout, consider a few of the logistics associated with the Great Electric Car Race:

► Charging stations set up in advance by Electric Fuel Propulsion Company of Ann Arbor, Michigan, in cooperation

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Caltech's First 130-Foot Antenna Gets Plugged In

The first unit in a proposed array of eight 130-foot-diameter parabolic dish antennae was dedicated on October 18 at Caltech's Owens Valley Radio Observatory. The new \$1.7 million radio telescope—mounted atop a four-story enclosed steel tower—takes its place near a pair of 90-foot-diameter dish antennae.

Construction of the new 130-foot dish was funded by the National Science Foundation. The two other dishes were built with support from the Office of Naval

Trustees OK Women Undergrads

A proposal to admit women as undergraduates at Caltech was approved in principle by the board of trustees at their Nov. 1-3 national meeting. The proposal is to enroll women both as freshmen and as upper class transfers, and on the basis of the same academic qualifications that apply to men.

Women will not be admitted as undergraduates, Caltech President Lee DuBridge explained, until approval by the trustees of a definitive plan for the administration and implementation of the proposal, including suitable housing.

First admission will not be earlier than September 1970.

"The unanimous action of the trustees follows the recommendations of both the faculty and student body for Caltech to break from its tradition of being a monastic type of institution and to become coeducational," Dr. DuBridge said. "A recent Princeton University study shows that more than 80 percent of the high school men who rank in the upper two-fifths scholastically feel that coeducation increases the attractiveness of a college."

"The action of our trustees will open up opportunities to women of exceptional ability who can profit by a Caltech educational experience, and will encourage

more women to seek careers in science and engineering.

"We feel that in this action Caltech is responding to a national trend toward coeducation at the college level," he continued. "Over the past year 18 American colleges that formerly were all male and 35 that formerly were all female have become coeducational."

This trend results from women's increasingly important role in business and industry, Dr. DuBridge pointed out, adding that broader educational opportunities should be made available to them so that they may better fit themselves for this role in what has become a coeducational society.

"The presence of women graduate students on campus since 1953," he noted, "has confirmed the expectation that women can add much to the intellectual life of Caltech. Forty-five of the 762 graduate students enrolled this year are women."

The new policy was proposed to the trustees by Dr. DuBridge on the recommendation of the faculty, which voted overwhelmingly for it after prolonged study and extended discussion.

Plans are now being prepared to build a new dormitory for women on the Caltech campus, with the hope that it will be ready by the fall of 1970. It is expected that such a dormitory will require funds approximately in the amount of \$650,000. □

Clauser Will Return To Head Engineering

Francis H. Clauser, vice chancellor of science and engineering at the University of California at Santa Cruz and a Caltech alumnus, has been named chairman of the Institute's division of engineering and applied science, effective in July 1969. Frederick Lindvall, who has headed the division since 1945, will retire from his chairmanship in June but will continue on the faculty as professor of electrical and mechanical engineering.

Dr. Clauser received three degrees from Caltech, his BS in 1934, MS in 1935, and his PhD in 1937. For the next nine years he was director of aerodynamic research and design research at the Douglas Aircraft Company in Santa Monica. In 1946 he went to Johns Hopkins University in Baltimore, where he founded the department of aeronautics and was its head for nine years. In 1965 he became academic vice chancellor of the University of California at Santa Cruz, and two years later was made vice chancellor of science and engineering.

At Caltech's 75th anniversary celebration in 1966 Dr. Clauser was one of 23 men who received the first alumni distinguished service awards ever to be given by the Institute. □

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Photo by Curtis Phillips

Caltech President DuBridge at the dedication of the 130-foot dish at Owens Valley.

ASCIT Research Project: Student Protest That Saw an Alternative and Experimented With It

The ASCIT (Associated Students of the California Institute of Technology) Research Project on Air Pollution did not originate because Caltech students felt a great desire to help alleviate the smog problem. Students chose the topic only after they kicked around the idea of a research project in the abstract. The project was envisioned as a unique expression of student activism consistent with Caltech.

Caltech students were concerned about the same issues that bothered students on other campuses. Many did not like the Vietnam war, and they did not want to be drafted because of it. Many worried about the terrible effects of racism and saw Pasadena's ghetto as a constant close reminder. Many experimented with drugs, and a small minority used them heavily. And finally, many expressed discontent with the Caltech educational experience.

Student anxiety, however, never came close to the point of forcing the type of open, disorderly confrontation that has plagued other universities.

The only organized presentation of student grievances at Caltech came at a meeting of the student body in the spring of 1967. At that meeting students passed a number of resolutions asking for liberalization of the curriculum, increased voice in Institute decision-making through membership on faculty committees, and establishment of study committees to explore various areas of the undergraduate program. The faculty greeted these requests favorably, and steps were taken to implement some of the student proposals. But student body president Joe Rhodes, '69, saw that a research project could penetrate far beyond small academic changes, and he convinced other students to take the initiative to set up an alternative educational structure alongside the conventional one.

Committees formed when school reconvened in the fall of 1967. They faced the task of picking a research topic, articulating the goals of the project, attracting other workers, and filling in the details. This is when the hard work began.

At an early meeting students chose air pollution as the research topic because it was a crucial, local problem with both social and technical aspects. The project members were unrealistic about the contribution they could make toward solving the pollution problem. They showed little appreciation or understanding of the great amount of work the Los Angeles County Air Pollution Control District and others had already done. But at the same time project members brought freshness and enthusiasm to the problem. Since they started out knowing nothing, they were not prejudiced by old concepts.

Beneath the first musings over air pollution, the social and educational project goals began to become clearer in the minds of the creators:

- ▶ Give undergraduates a chance to do research about real problems instead of just textbook problems.
- ▶ Rekindle the enthusiasm of Caltech

students by giving them the chance to become involved in something which they themselves formulate.

- ▶ Expose Caltech students to social science and to social science students from other schools.
- ▶ Expose social science students to the natural sciences and to Caltech students.
- ▶ Introduce women to the Caltech campus.
- ▶ Devise a social community oriented toward the completion of an intellectual task, but also a community where the emotional interactions between people are dealt with consciously and openly—this to be accomplished through the use of basic encounter group methods.
- ▶ Demonstrate that the behavior of American college students is motivated by a deep concern for this nation and the world.
- ▶ Challenge the image of Caltech as an ivory tower by actively demonstrating how the resources of an academic institution can be put to work on social and community problems.

In November 1967, with research topic and revolutionary goals clearly in mind, project members began to assemble proposals aimed at raising money to finance the project.

At about the same time the faculty decided to keep an eye on the project, both to advise the students and to make sure they did not commit Caltech officially to anything. The faculty board appointed an ad hoc committee to investigate the research project, and the board voted, on December 15, to approve the project and "encourage the student body to proceed with their proposals."

In attempting to obtain funds, the project developed into a bureaucracy which wasn't making headway toward doing research.

Bad news followed this good news only one week later. The first formal request for funds—\$33,000—was turned down by a California foundation.

Discouragement reduced project activity to its all-time low. Students who had worked from the beginning became disillusioned and quit. In attempting to obtain funds, the project had developed into a bureaucracy which did not appear to be making headway toward organizing around air pollution research. Many serious students who did not empathize with the educational goals refused to have anything to do with the project as long as research was secondary.

At the end of the tunnel, however, there was a dim light. In March, Joe Rhodes went to see S. Smith Griswold of the Department of Health, Education, and Welfare's Air Pollution Center in Washington. Griswold was impressed by the preliminary efforts and stopped at Caltech during a trip to the West Coast. He indicated that funds were available and that he thought the project could make a contribution to air pollution studies. He advised the students to rework their proposal and suggested areas of research to pursue.



Photo by Walter Girdner

The man behind it all, student body president and entrepreneur Joe Rhodes, '69.

Project members finally got down to the business of writing a serious research document. The final 88-page product asked for \$68,000 to fund about 60 student researchers. It included the following areas of proposed investigation:

- ▶ Assess the domestic pollution cost by sampling consumer household expenditures in a polluted and non-polluted community.
- ▶ Assess the public concern by sampling opinion in a polluted and non-polluted community.
- ▶ Study the role of government and pressure groups in pollution legislation.
- ▶ Study the feasibility of implementing wide-scale, computer-arranged car pools.
- ▶ Attempt to improve the photochemical model of atmospheric smog.
- ▶ Study the effects of atmospheric lead on living things.
- ▶ Study the costs and effects of various control measures.

In May the proposal was mailed to Washington. Everyone waited impatiently. Students from other universities, some in the East, were set to come to Pasadena if the project received funding. Many could not hold up their summer plans beyond the first of June. On June 6 the project learned it had gotten the money.

The planners had until June 24, the official starting date, to devise a structure

for the summer. Little attention had been paid to summer organization because project members had channeled all their efforts into obtaining funds. On June 24 about 45 new participants would arrive. Many of them only knew that the project would study air pollution.

Fortunately the project got help from TRW Systems in Redondo Beach. TRW had trained some of its professional systems staff in basic encounter techniques as a means of helping project teams within the company to run smoothly. Discussions with members of the TRW staff produced a number of goals and concrete proposals for organization of the Caltech research project:

- ▶ The project decision-making structure should be completely democratic. Every project member should clearly understand the organization and how he could affect it.
- ▶ The participants should not consider project work a nine-to-five summer job, but instead something that could produce great personal commitment, dedication, and involvement.
- ▶ Project members should be completely free to choose the type of work they would do.
- ▶ A clear framework should exist to allow project members to air any form of dissatisfaction, including problems of personal relationships. These problems should be dealt with immediately, before they could interfere with the work that had to be done.
- ▶ The project's organization should not be rigid; there should be constant re-evaluation and, if necessary, modification of the organizational structure.

Following an intensive orientation week the project began operation within a structure that placed just about all activity within two types of groups—a task group and a family group. The task groups were the work groups, and there was one for each area of research. The family groups met as basic encounter groups, providing a place where problems could be discussed. Membership in family groups cut across task-group lines in an attempt to provide maximum mixing and communication.

The value of the project in teaching participants how to do research became apparent as the task groups grappled with the problem of defining and then attacking their work. Task groups at first had great trouble getting beyond a vague statement

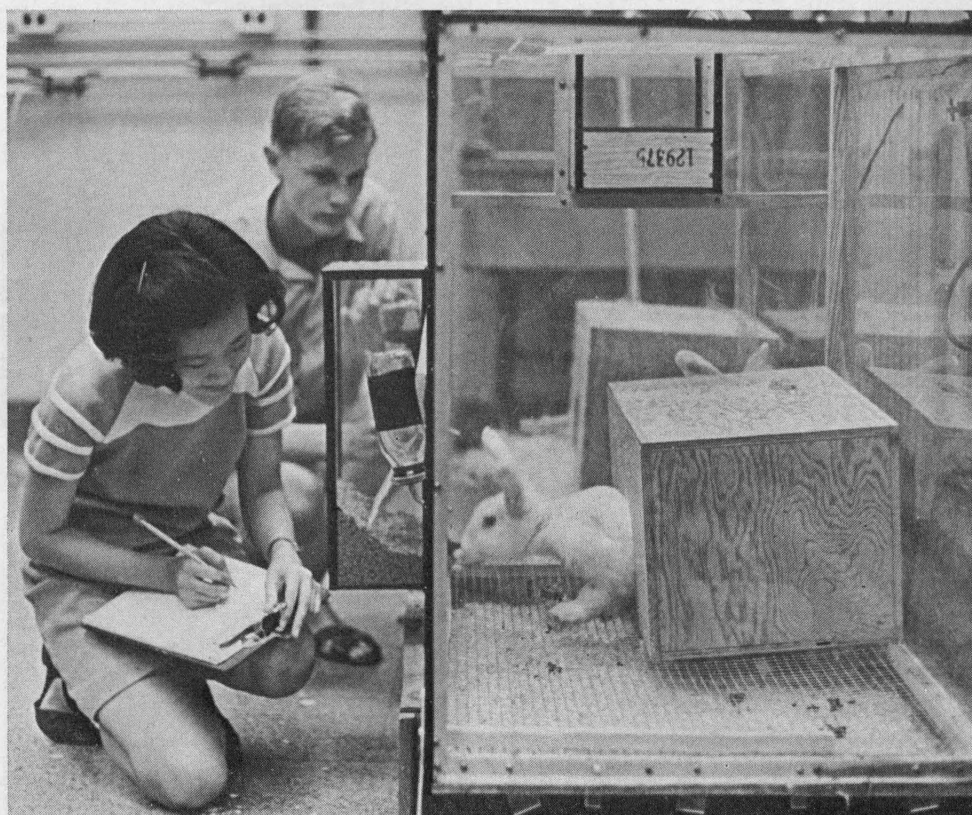


Photo by Walter Girdner

Students studying biological effects of smog claim that rabbits breathing smog-free air have 25 percent less lead in their blood than rabbits living in a smoggy environment.

One goal was to demonstrate that the behavior of college students is motivated by deep concern for this nation and the world.



Photo by Walter Girdner

Women workers make themselves at home in their summer residence in Blacker House.

of their work (i.e., "We are going to study the working of the government as related to pollution legislation" or "We are going to survey the public's attitudes toward air pollution"). From these abstract statements, groups had to formulate day-to-day tasks and plan the work for a 12-week time limit. Planning like this, however, was almost impossible without some intuitive understanding of the research problems. Such intuition comes from an exhaustive prerequisite understanding of the subject, plus experience. Project members lacked both, and thus faced the additional problem of becoming experts in a few short weeks. This prevented some groups from establishing a definite plan of attack until late into the summer. The groups that faced this problem remained on the verge of panic, worrying about whether their efforts would ever produce any results.

The task group-family group arrangement turned out to be only a partial success. Instead of working out personal antagonisms within the family groups or with the person involved, many project members confided in intermediaries and personal friends.

The project's group approach to research also had some shortcomings. Some people worked better independently and a few project members showed little initiative and needed even *more* direction than the group could provide. Even so, the open-ended, flexible atmosphere of the research project was far more successful in inspiring creativity and productivity than the rigid atmosphere of the classroom.

The one unqualified project success was its role in bringing 25 undergraduate women to campus. The scarcity of girls before the project, other than secretarial staff, made it easy for such a small number to have a great impact.

The research project did not produce any earth-shaking results, but no one really expected it to. It did, however, do some honest research, and a report of that research will be published by the end of

the year. More important, the project attempted to practice the goals that it preached. That made it not only a means to an end, but an end in itself.

The project has a number of immediate implications for Caltech:

The faculty and students should continue to explore ways of reforming the academic program. New liberalizations, especially student-initiated projects, should be encouraged.

Caltech should seriously pursue development in areas other than the natural sciences. The project was consistent and anticipated all the directions in which Caltech has said it hopes to head.

The admission of women should be pursued with all due haste.

The project had shortcomings and limitations. It was student protest that saw an alternative and attempted to experiment with it. It is therefore essential that the experiment be analyzed in terms of what it proved and what it failed to prove. Only then can the results be applied and have lasting value.

—Barry Lieberman, '68 □

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E&S--One of the Ten Best

Engineering and Science magazine has been judged by the American Alumni Council to be one of the top ten alumni magazines in the council's 1968 competition.

The top magazine this year is from Yale University. Others in the unranked top ten with *E&S* are published by the University of California at Berkeley, UCLA, University of Chicago, Hofstra University, University of Oregon, Rhode Island School of Design, MIT, and Washington University.

Caltech News was also honored by the AAC with a general award for distinguished achievement in Institutional Content. □

DuBridge on the Modern Engineering Educator

"The task of the engineering school is not to 'train engineers'; it is to *educate* human beings to prepare them to become engineers after they graduate," said Caltech's President Lee A. DuBridge at the American Society for Engineering Education meeting at UCLA on June 19, 1968.

Engineering education is different from what it was 50 or even 20 years ago, he added, because engineering itself has changed so much in that time. Today's engineers, for example, work on lasers and solid-state circuits, requiring knowledge of quantum mechanics and atomic theory, or on microwave radar, requiring advanced electrodynamics or even molecular spectroscopy.

"Through it all," said Dr. DuBridge, "today's engineer must be an expert with the modern electronic computer, knowing its capacities, its intricacies, its limitations, and being aware of how to program his elaborate equations into computer form.

"At the same time engineers are still building bridges and dams and highways—and turbines and generators and agricultural machinery. Ever and always the engineer must have an eye to economy, efficiency, effective design, salability, and all the other things which convert a laboratory curiosity into a useful product."

Dr. DuBridge pointed out four basic concerns for the modern engineering educator.

►To provide a broad mathematical and scientific knowledge for 17-year-old students, who cannot possibly know where their areas of talents and interests lie.

►To provide adequate preparation for the growing number of engineering students who will go on to graduate school.

►To avoid the pitfalls of teaching technologies that will be obsolete in a few years.

►To recognize that no one engineering school can be all things to all people, and to choose areas of interest, educational policies, and students to fit the institution's particular program.

"The last goal," he noted, "is not often realized by students or parents, or even by engineers. Some schools will emphasize the theoretical and the advanced modern types of engineering or applied science and give emphasis to preparation for graduate work. Others will give the more practical kinds of classical engineering; and still others will be in between. The student who knows his goals and talents can pick from among a rich and wide variety of engineering colleges, and employers can recruit in those colleges that produce the kinds of engineers they need.

"College or graduate school training is only the beginning of an engineer's education. He will have to learn later the special field of the particular company into which he goes. He will have to have learned how to keep up with this field so he must continue his learning process throughout life . . . School only gives a man a start. What his career is like after that is up to him—and up to the company or institution with which he works."

Later, Dr. DuBridge homed in on engineering education at Caltech, saying that "our policy has always been to offer to the exceptionally able students that we attract a challenging variety of choices in both science and engineering. Although our undergraduates are more likely today to choose mathematics, physics, or chemistry than engineering, we have sharply increased our engineering enrollment at the graduate level.

"We conferred 102 MS degrees in engi-

neering in 1968, compared to 21 in 1930, and 34 PhD's in engineering in 1968, compared to none in 1930. Also, a very large fraction of Caltech's BS recipients now go on to graduate work.

"Very broadly, the engineering subjects offered are the same now as in 1930—civil, mechanical, electrical, chemical, and aeronautical. But within each of these areas the modern aspects are emphasized—otherwise we would have lost *more* of our undergraduates to the science options.

"That we are producing the types of engineering graduates now in great demand is attested to by the growing competition among companies for our BS, MS, and PhD recipients, and by the higher salaries offered them.

"There is more science in engineering today than 30 years ago—and more scientists *become* engineers now too. The student, graduate and undergraduate, who is looking for the best in modern engineering curricula has learned to choose Caltech—and he knows that the Caltech grad also gets the best job." □

Some Applicants Now Face

A New Admissions Test--

Evaluation by Undergraduates

Caltech is one of the few universities whose faculty still interviews most of the qualified applicants for undergraduate admission. Each spring 15 men talk to about 500 high school students across the country—the survivors of the 1,100 who went through the initial round of evaluation in the quest to enter Caltech.

This year, for the first time, 200 of the applicants were interviewed by a combined faculty-student team. Largely as an outgrowth of student requests in 1967 for more participation in Institute affairs, three seniors and one sophomore took part in the undergraduate admissions program.

Each team (one faculty member and one student) interviewed about 50 applicants in the southern California area, then met to make a first cut of those who should obviously be admitted or turned down. The student interviewers were included in deliberations up to the final in-fighting about the not-so-obvious cases and the scholarship discussions. As it turned out, students interviewed about 25 percent of the class of 1972.

Undergraduates are now apparently a permanent part of the admissions program. Student interviewers will hit the road once more next spring, although they'll be working only in nearby areas again because of the time and expense of travel to other regions.

The four faculty interviewers agreed that their student partners made the interview process more productive for everyone. Applicants got better answers to questions about student and academic life and, in turn, were subjected to the additional scrutiny of a contemporary.

The effects of any changes in procedure can't be discerned until a freshman class has been around Caltech for a while. But director of admissions Peter Miller can already point to at least one tangible result of this year's innovations: a freshman who wouldn't have been admitted at all if the faculty half of the interview team had seen him alone. □

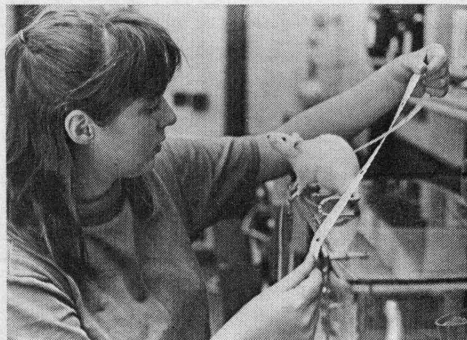


Photo by Walter Girdner

Students also claim that rats, dosed with ozone, learn slower and remember less.

Race: More a Test of Endurance Than Performance

Continued from page 1

tion with local utility companies along the route (US 66, the Indiana-Ohio-New York-Massachusetts Turnpikes). Charge times ranged from 45 to 60 minutes.

► One or more "chase" cars supplied by each entry, carrying additional crew members (6 total for Caltech; 13 for MIT) and, in Caltech's case, towing a portable 220-volt generator.

► Ice for cooling batteries (50 pounds for Caltech, 350 for MIT) at most stops.

In addition, for purposes of timing the entries (and also to carry additional spare parts and personal gear), each team had a judge and a station wagon supplied by *Machine Design* magazine.

MIT's entry, developed more or less by their electrical engineering department, had a car supplied by General Motors and \$20,000 worth of batteries supplied by Gulton Industries. It was considerably more sophisticated than Caltech's car, which really belonged to Rippel. The car and the batteries—\$600 worth—are his, although he had received several donations of equipment and help from Caltech and outside enterprises as the race neared.

But MIT's sophisticated car was a laboratory model and had never been driven until shortly before the race. Reports from Cambridge were that the car would go faster than Caltech's and recharge in less time. Rippel, admitting that MIT had an edge in equipment, figured he would have a reliability edge because of simpler design and proven components.

Ultimately, that turned out to be the case, although once the race started the gremlins in both vehicles emerged.

Members of the MIT crew—who had a notion of what they might face after a last-minute trial run that almost burned up their set of nickel-cadmium batteries—had to tow their car about 250 of the first 500 miles. They had a constant heat problem, but they partially solved it by cramming the battery areas full of ice at each charging station.

Caltech's problems were less spectacular, but nonetheless vexing. The main problem, too, was heat, especially while recharging the lead-cobalt batteries. It forced the Caltech crew to slow down the recharging rate at first, wasting driving time.

To Caltech crew member Dick Rubinstein, '69, riding in the chase car, the trip went like this:

"I was a little uneasy when we started out, not knowing how things would go or what was going to happen. In the first stretch we found newsmen following us, even photographing us from bridges. There were so many things happening at

every turn we really couldn't pay attention to everything.

"Our first charge stop—in San Bernardino—was a little awkward. The Edison Co. crew didn't know what to expect of us, and we didn't know what to expect from them, but that smoothed out after a few charge points.

"Our next charging point, the Green Tree Inn at Victorville, went smoothly. We were able to eat and relax a little, while the batteries charged. We were having trouble with the batteries overheating, and we had this trouble through most of the first half of the race.

"The people we met at these charge points were wonderful. We usually attracted small crowds, and everybody had questions. We had fun talking to the people, but we also had to chase around to eat and call ahead to other charge points.

"I might add that through the desert we had more trouble with Andy Joseph's '70 car overheating than we did with the electric car. But, it's a 1958 Chevy, and after all, it was towing that heavy portable generator.

"After stops at Newberry and Amboy we did all right. I remember the service station attendant at Amboy. He thought it was all a joke and asked: 'What do you need an electric car for, anyway? What air pollution?'

"I remember waking up about six miles from Needles. Andy was on the two-way radio with Wally, and Wally said he only had about 90 seconds worth of power left, so get ready to use the generator. We didn't know how much farther the car would go, and it was slowing down. But after a minute—or maybe a little more—we rode over the crest of a hill, and it was downhill all the way to Needles. Wally used the downgrade to recharge the batteries with the motor, but we got into Needles with almost no power to spare."

Meanwhile the MIT car was reported to have been towed to its first few charge points. The batteries didn't seem to hold enough power. Towing was allowed, but with a penalty of five minutes per mile according to the race rules.

"We had to run around a little in Needles to find the charge point, but when we arrived, people there gave us soft drinks and made us welcome. I had to stop awhile and be interviewed on the phone by a wire-service reporter.

"I caught some more sleep between Needles and Kingman. On the way we had to use the portable generator for the first time—a half-hour penalty. In Kingman we pulled up behind a school to the recharging point. It was after midnight, and while two of us were walking to a gas station, we were stopped by the police. They wanted to know what we were doing walking around town at that hour. We explained.

"Everybody was tired already, but from Kingman we moved on to Seligman. We had to stop twice to use the generator, but that was our fault. We thought we had enough power in the batteries to make it after the partial recharging, but we didn't.

"Before we reached Seligman, Pat Silverthorne '71 mentioned he wasn't feeling well. He said he had a swelling in his neck and cheeks but that the doctor had assured him it wasn't mumps. It was mumps. Sam Barnes, the fellow from *Machine Design* magazine who came along to judge our performance, drove Pat to the town of Williams to see a doctor, then on to Flagstaff. That's the last we saw of Sam Barnes for more than a day.



Wally Rippel: Caltech's own Tom Swift.

"Well, anyway, just east of Seligman, about mid-morning, disaster struck. Wally was driving down a hill with the car in second gear, trying to put a little more charge into the batteries. From my point of view—I was half asleep at that point—we were coming down the hill and there was a very loud thud. The electric car slowed down abruptly, stopped, and somebody got out and ran around back. Wally said, 'I think we blew the motor.'

"So we sat there, thinking. Then Wally and Andy got in the chase car and drove back to Seligman—about 10 miles—and got on the phone to Robert Aronson of the Electric Fuel Propulsion Co. in Michigan. Andy came back alone. Wally was still in Seligman calling everybody he could, and Andy went ahead to drop the portable generator at Ashfork. We took the motor out of the electric car when he came back.

"It was a little hard trying to figure out how to get that 200-pound motor out gently, but when we did, it only took about ten minutes. George Swartz [a former classmate of Rippel's at Caltech] sort of caught it with his knees as we supported it by ropes.

"Lots of people came by, too. Some stopped, wanting to see how we were doing. Of course we had plenty of time to talk now.

"Andy, George, and I went back to Seligman where Wally was. Ron Gremban '69 stayed with the car. Wally had finished phoning and found out we would get another motor, that it was being flown to Phoenix, and we could pick it up there."

Things weren't going much better for the MIT crew, either. They reported in just a few miles east of Buffalo, N.Y., where they were stalled after burning up a transformer. They were delayed seven hours, but after making repairs they began making good time across Ohio.

Repairs took a little longer for the Caltech machine, since the new motor was being flown all the way from New York.

"We all sat down in Seligman and had a beer or two, and at one point Wally stepped outside to watch a train go by—he has a fascination with trains. Then we decided to go on to Flagstaff, leaving Ron with the electric car.

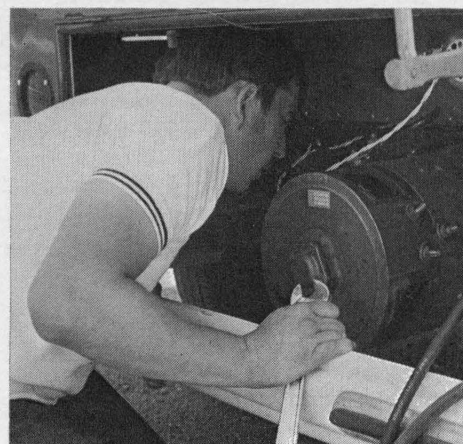


Photo by Dick Rubinstein, '69

George Swartz removes the burned-out motor from Caltech's crippled Volkswagen.

"We were looking for Sam Barnes, too, since all our clothes and other stuff were in his car. We all looked grubby, but went in a restaurant anyway and had a good steak dinner. Then we found a place to stay—and we washed some clothes in the motel.

"We all got a little sleep, but about 11 p.m. Andy and I took off for Phoenix to meet the plane. I slept most of the way, but when we got there we found it was a case of hurry-up-and-wait because the plane didn't arrive until 3:30 a.m., and it was another hour and a half before we got the motor. We carted it to Flagstaff, then slept while the others put the adaptor plate on it and took it to Seligman.

"They must have found Sam somewhere, because he woke me up at the motel and we took off for Ashfork to meet the electric car. It sure was nice to see that thing pulling into town under its own power.

"Apparently they had no trouble getting the motor in the car, especially since they were able to borrow a transmission jack to help.

"From there on the going got smoother. We were still pretty disorganized, with everybody's stuff in the wrong places, but we soon worked all that out. We met Pat Silverthorne [the one with the mumps] in Flagstaff, where he was recuperating with an aunt who lives there.

"Everything went all right through Winslow, Ariz., and Sanders, Ariz., but we had a minor problem in Gallup, N.M. Everything was fine with the electric car, but we had an eye problem in ours. Andy, who wears contact lenses, was getting ready to drive and was putting his eyes in when one lens disappeared. We spent about 40 minutes searching for it with no luck. After we gave up, he looked in his lens case, and there it was, where it had fallen.

"Our next recharging station was in Grants, N.M., where the power company people had coffee and donuts waiting for us. They were talkative and friendly.

"Getting into Albuquerque was an easy trip. It was sort of downhill going in, and our reception in Albuquerque was something else. They had the recharging station roped off on the sidewalk, a big sign was up, and they had a girl dressed up as Reddy Kilowatt. They provided us with showers, bought us breakfast, and gave us a red carpet welcome. In all we probably stayed in Albuquerque about half an hour longer than we should have."

For MIT, the problems were compounding. The car caught fire when it was being recharged at Elkhart, Indiana. It was put out quickly, but damage was worse than first estimated, and the delay was more than ten hours.

The MIT car was next reported in the area of Springfield, Ill., where they were having problems with the motor overheating. The method they chose for cooling it was to pour water on it.

"We soon ran into a great glob of traffic on the way out of Albuquerque. It turned out they were blasting on the road ahead, and we had to sit there at least 45 minutes. We spent the time discussing some method for cooling down the batteries during the charging process.

"Our next recharging point was Clines Corners, N.M., but before we got there, Wally pulled over, complaining that a brake or something seemed to be dragging. We jacked the car up and checked, but nothing was wrong. We were afraid we didn't have enough battery power left to make Clines Corners, so Wally lightened the load by having Ron and George walk. It was only about two miles, but the car



Photo by Dick Rubinstein, '69

Not an elegant charge station, but amps are amps no matter how they're delivered.



Photo by Dick Rubinstein, '69

Motor catastrophe behind them, the crew enjoys the attention of Albuquerque pedestrians.

made it and it was a nice walk for them.

"Along about the time we reached Santa Rosa, N.M., the weather started looking nasty. It became very, very windy in Santa Rosa, so windy we could hardly walk.

"We had to use our portable generator before we got to Tucumcari, N.M. Also, we ran into a heavy rainstorm going into Tucumcari, and where we were charging, we found the streets were somewhat flooded. After Tucumcari, it got so that if you weren't driving you were sleeping.

"Amarillo became another trouble spot for us. Somehow, when we were hooking up the lines, we got out of phase and blew out three diodes. That presented no problem except that Sam Barnes—who was driving without a relief driver since Pat Silverthorne got the mumps—couldn't be found. He was making a practice of driving ahead a stop or two to catch some sleep as we drove. We called everywhere but couldn't find him, and we even had the Texas Highway Patrol out looking. We found we could get the new diodes in Dallas, but boy, that was a long way off. Finally Sam got our message and came back. We charged up, ate breakfast, and took off again—after a delay of three or four hours. The weather was still kind of damp, too.

"We finally solved our battery overheating problem in McLean, Tex. While the car was charging, I went into town to buy some rubber tubing and a rubber syringe bulb. We got some small ice cubes and put them on the batteries, then used the tubing to siphon the water out of the battery enclosure. We used the syringe bulb to start the siphon. That was our handy-dandy cooling system, for which I blushinglly accept credit.

"It was also in McLean that a Texan came to our rescue. One of the bystanders walked off, then returned bearing a nice, ice-cold 50-pound watermelon. It was home-grown, and the best I've ever tasted.

"At Erick, Okla., we sent a telegram ahead to the MIT crew asking if they'd agree to stop awhile in Oklahoma City for a chat and rest, maybe something like 12 hours. But we actually met at Weatherford, Okla., the charge point west of Oklahoma City.

"We'd finished charging at Weatherford when they were towed in. We waited there a couple of hours, and we saw their recharging procedure. It was enough to scare someone out of driving an electric car. It was amazing; there were probably 12 people involved, girls rushing around, dropping big bags of ice on the ground, everything helter-skelter, confused. And they refused to stop to talk. They took off

right after recharging.

"After Oklahoma City we got the batteries straightened out very well. We charged them slowly for four hours and got everything back in phase. This made it much smoother than it had been.

"The charge point at Tulsa was near a big motel called the Camelot Inn. They really fussed over us there and gave us a room in the motel to take showers. We probably lost more time on this kind of thing than for any other reason, but it was great.

"Going into East St. Louis, Ill., we got lost. We ended up waiting nearly an hour for somebody from the power company to find us and lead us to the charge point. They had 350 pounds of ice ready when we got there, but we only needed 50.

"Monday morning—a week after we left Caltech—we were in Elkhart, Ind., and we learned that Pat Silverthorne was feeling better and would meet us in Cleveland. Of course in Cleveland [headquarters of *Machine Design* magazine] there were all kinds of people out to greet us. We met the race judges and the members of Sam Barnes' family. We also learned the MIT car was in California."

The MIT car was indeed in California. But here the problems multiplied. Crew members didn't like the charging setup at Newberry, so they elected to tow part of the way to the next point, Victorville. The driver, however, neglected to take the car out of low gear while being towed at 65 mph. The electric motor, turning over too fast, disintegrated.

The MIT crew notified the judges and others that they intended to tow the car directly to Caltech, bypassing the last two charge points. They arrived at 3:26 p.m. and crossed the finish line.



MIT photo

The winners get the checkered flag in Cambridge nearly nine days after they left Pasadena.

"After Cleveland the stops were pretty smooth, and many looked just alike. The only place we encountered any problem was at the last stop before Cambridge. I called ahead to the power dispatcher at Charlton, Mass., but he almost refused to accept my call. He finally took the call but said it wouldn't do any good because he didn't want to call anybody out to work on overtime just to charge our batteries. I called Bob Byers, the public relations man at MIT, who called the power company, and they assured us we'd get recharged.

"But it didn't work out that way. When we arrived, we found the point was six miles off the highway instead of the short distance we were told, and then we found he couldn't supply three-phase power. We ended up charging the batteries with the portable generator anyway.

"Before we reached this last charge point, we had been met by an escort committee from MIT, and they led us right in to the campus. That was the end of our long, weary journey."

The boys were greeted on arrival—7:56 a.m. Wednesday—by MIT President Howard Johnson, then attended a news conference that afternoon and a banquet that night sponsored by Caltech alumni. By the time of the banquet they knew they'd won the race by half an hour.

The following night—at the Tavern-on-the-Green restaurant in New York's Central Park—crew members of both teams were honored at a victory dinner. The celebration was arranged by Caltech alumnus Victor Wouk, PhD '42, of Gulton Industries, which had provided equipment (notably MIT's nickel-cadmium batteries) and advice to both teams. Wally Rippel was presented with a trophy for the "1968 National Electric Car Competition" given by the Edison Electric Institute and Reddy Kilowatt, Inc.; he insisted it belonged not to him, but to Caltech, and had it forwarded to Pasadena.

By Saturday both cars (Caltech's having been trucked from Cambridge, MIT's flown from San Bernardino) were on display at the Smithsonian Institution in Washington, D.C., highlighting a "Cars of the Future" exhibit sponsored by the U.S. Department of Transportation.

Wally Rippel has gone on to Cornell for graduate work, but Ron Gremban, one of the co-drivers, is already making plans for another race next summer. Electric Fuel Propulsion Co. has offered improved lead-cobalt batteries that will recharge faster and run as many as 250 miles between charges, and a new motor capable of speeds up to 90 mph. What Gremban still lacks is a car—preferably at VW square-back sedan—in which to install them.

This year's race seemed, in some ways, to be more a test of endurance than performance. A second race might reverse that emphasis and make for an even more exciting contest. □

Trustee News

Caltech's board of trustees elected two new members this fall. Both attended the annual national trustees' meeting on November 1-3.

Henry E. Singleton, 51, founder and chairman of Teledyne, Inc., is a native of Texas. He took his BS, MS, and ScD degrees at the Massachusetts Institute of Technology. He was elected a member of the MIT Corporation, the governing board of MIT, last June.

Singleton engaged in research in electronics at MIT before joining the Hughes Aircraft Company in 1951. Prior to forming Teledyne, he was vice president of Litton Industries and general manager of its electronic equipments division.

Teledyne manufactures aviation electronics and controls, special metals for aviation and nuclear energy applications, and equipment for seismic and oceanographic research. Founded by Singleton in 1960, Teledyne's sales in 1961 were less than \$5 million. Since then the company, through internal growth and acquisition of other firms, has become an industrial giant doing business at a rate of more than \$700 million annually.

Deane F. Johnson, 50, a senior member of the prominent Los Angeles law firm of O'Melveny & Myers, is a lifetime Californian. He attended public schools in Ione, Calif., and took his bachelor's degree in economics at Stanford University, from which he graduated with distinction in 1939. He took his law degree at Stanford and upon graduating was made a member of the Order of the Coif. During the past two years he has served as chairman of the board of visitors of the Stanford Law School.

Johnson joined O'Melveny & Myers in 1942 and became a partner in 1950. His contacts with Caltech began years ago, and he has represented the Institute in numerous legal matters.

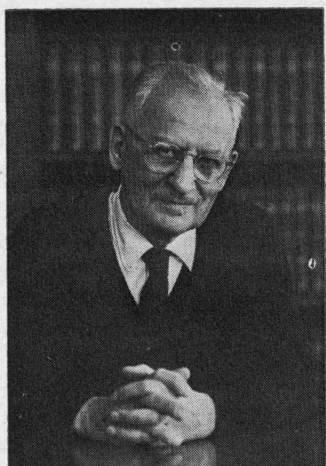
Death took three members of the board of trustees in recent months. Chester F. Carlson, '30, one of four alumni members, died in New York on September 19 at the age of 62. He had been on the board since 1966. Carlson invented xerography in the late 1930's and saw it finally marketed, as the "Xerox machine," 20 years later.

P. G. Winnett, 87, died in July. Winnett, who donated the student center at Caltech bearing his name, was a co-founder of Bullock's stores. He was a Caltech trustee from 1939 to 1961, and an honorary trustee since then.

Edward R. Valentine, 60, president of the Robinson Building Company and a director of the J. W. Robinson stores, died in July. He was a Caltech trustee from 1948 to 1965, and an honorary trustee since 1965. □

The *Time/Life* publication of the proceedings of a presentation made by Caltech faculty to business leaders in New York and Chicago last spring is available without charge to alumni. Several hundred copies of the book, which contains essentially the same material as was in the May 1968 *Engineering and Science* magazine, have been reserved by the Alumni Relations Office, Building T-6, Caltech, 1201 E. California Blvd., Pasadena, California 91109.

Faculty Retirements--June 1968



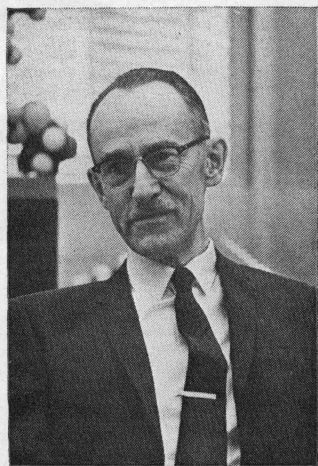
Henry Borsook

Henry Borsook, noted for his work in protein synthesis and for his contributions to the field of nutrition, became professor of biochemistry, emeritus, this year after nearly 40 years on the Caltech faculty.

Borsook received his undergraduate and graduate degrees from the University of Toronto and came to Caltech in 1929 as assistant professor of biochemistry. His interest in proteins led him in the early 1930s to a new theory about their metabolism. Evidence at that time indicated that proteins were probably very stable, but Borsook believed that there was a continual interchange of proteins, that they were in a state of constant flux. He conducted tests (this was before the discovery of isotopes) that proved the accuracy of his theory, but it met with considerably resistance from other biochemists. The instability of molecules is now unquestioned.

His 1940 book, *Vitamins: What They Are and What They Will Do for You*, was one of the first to present contemporary nutritional ideas to the layman. During World War II he was engaged in research on the importance of nutrition both at home and at the front. As an extension of his research, he developed the multipurpose food (MPF) that is distributed widely to underdeveloped areas of the world by the Meals for Millions Foundation.

Dr. Borsook is now doing research at the University of California at Berkeley on the function and production of red blood cells.



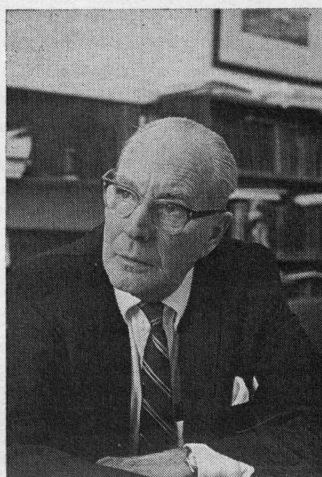
Robert Corey

Robert Corey, after more than 30 years at Caltech, has become professor of structural chemistry, emeritus. After receiving his bachelor's degree from the University of Pittsburgh and his PhD from Cornell University (where he also taught for five years), Dr. Corey began working at the Rockefeller Institute for Medical Research in 1929. It was there that he became interested in the structure of molecules, work that has occupied much of his time for the past 30 years. In 1937 Dr. Corey came to Caltech for a brief stay, because the Institute had the equipment necessary for his studies in x-ray crystal-

lography. He was encouraged to remain, however, by the stimulating atmosphere he found here and by the people interested in his field of research. Linus Pauling, then chairman of the chemistry division, had been working on the structure of proteins, but needed more information about the dimensions of the bonds and bond angles and the radius of the atom in the peptide chains—a project Corey undertook.

Except for his research on rocket fuels during World War II, he worked steadily on the development and improvement of reliable models for use in the study of protein structure. The current "CPK models" are named for Corey, Pauling, and Koltun (who developed the plastic form of the models).

In recent years, Corey has been involved in the determination of the structure of protein molecules by the investigation of the structure of protein crystals.



L. Winchester Jones

Louis Winchester Jones retired this year and became dean of admissions, emeritus. For nearly 40 years he has had a hand in the selection of Caltech's freshman class—and thus, a hand in shaping the kind of school Caltech has become.

Winch Jones became a member of the admissions committee in the late twenties, when its chairman was James Bell, professor of chemistry. Caltech had only about 300 applicants then, nearly all from local high schools, and the Institute gave its own entrance exams. Professor Bell personally perused all the applications and selected most of the winners. Then he assembled the half-dozen members of the committee, and they settled the fate of the few borderline cases remaining. It all took the better part of one day.

The admissions program has changed considerably since Winch Jones became dean in 1937. An admissions committee of 15 members now works for nearly two months studying the records of applicants, another week or two interviewing all over the country, and another week selecting those who will make up the freshman class—about 200 from a field of nearly 1,200—and assigning scholarships.

Dean Jones has worn an assortment of hats at Caltech. From 1925 to 1960 he taught English, becoming an associate professor in 1943. Since 1960, however, he has had to devote full time to admissions and financial aid. He has been assistant dean of upperclassmen, registrar, director of admissions, and finally, dean of admissions and director of undergraduate scholarships. And he has been a trustee of the national College Entrance Examination Board, membership chairman of that board, and president of its West Coast section.

Retirement plans? Dean Jones says, "I'll figure that out after I'm retired."



Robert King

Robert B. King, professor of physics, retired this year after 20 years on the Caltech faculty. A native of Pasadena, he attended Pasadena schools and was graduated from Pomona in 1930. In 1933 he received his PhD in astronomy from Princeton.

In 1933-34, Dr. King was a National Research Fellow at Mount Wilson Observatory. He became instructor of physics at MIT in 1935, returning to Mount Wilson Observatory in 1938. He was appointed associate professor of physics at Caltech in 1948 and professor in 1952.

Dr. King, who has more than 25 publications on astrophysics, is a member of the American Physical Society, American Astronomical Society, Astronomical Society of the Pacific, International Astronomical Union, and Optical Society of America. He received the Naval Ordnance Development Award in 1945 and the President's Certificate of Merit in 1948 for his work with rocket fuzes during World War II.

Dr. King, 60, retired early to move to his oceanfront home near Mendocino.



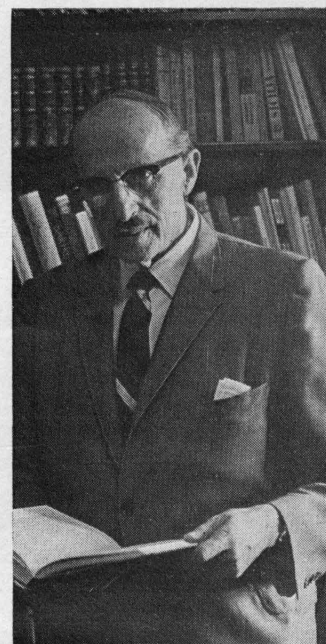
Arthur Klein

In 1927, when Arthur Klein was a research fellow in physics, a mathematician named Clark Millikan occupied the office across the hall. When Millikan and Theodore von Kármán began formulating plans for the construction of Caltech's Guggenheim Laboratory of Aeronautics and for a wind tunnel, Klein began to see more and more of his two associates. He had studied engineering as an undergraduate and graduate student at Caltech, and there were questions about engineering problems, about the practical application of their ideas in terms of equipment. Within a year Dr. Klein was doing all the designing and engineering for aeronautics, from the building of Guggenheim to the construction of the wind tunnel and the design of experimental equipment connected with it. Dr. Klein became a member of the aeronautics faculty in 1929. Only now, after 40 years, is the equipment in Guggenheim Laboratory being renovated and replaced.

And once again Dr. Klein is supervising the design and installation.

In 1937, Dr. Klein began spending half of his time with Douglas Aircraft, where he had been an intermittent consultant since 1932, and he has been instrumental in the design of many of their aircraft over the last 20 years.

Since his retirement to become professor of aeronautics, emeritus, he has been completing his work on the new apparatus in Guggenheim. He is retaining his position as consultant to Douglas Aircraft.



Alfred Stern

After 21 years at Caltech, Alfred Stern retired this year to become professor of philosophy, emeritus. A native of Vienna, Austria, he received his PhD from the University of Vienna and later taught philosophy at the University of Paris and the Institute of High Studies of Belgium. During World War II Dr. Stern served as a volunteer in the French Army. After his demobilization in 1942, he went to Mexico, where he taught at the National University and the French Lyceum. In 1947 he came to Caltech and taught French and German language and literature, and later, philosophy. His courses in "Philosophy and Literature" and "Contemporary European Philosophy" became very popular.

Dr. Stern is the author of several books and a contributor to philosophical journals of many countries. His book, *Sartre—His Philosophy and Existential Psychoanalysis*, appeared in English, Spanish, and Japanese editions; his *Philosophy of History and the Problem of Values* was published in five languages. Dr. Stern is fluent in English, French, German, and Spanish and did most of the translations himself. He also published: *Philosophy of Laughter and Tears* and *The Philosophy of Values* in French and Spanish, *The Philosophical Foundations of Truth, Reality and Value* in German, *The Philosophy of Politics* in Spanish, and *The Concept of Will in Schopenhauer* in German. His latest book, *Philosophical Vistas—A Search for Meaning*, will be published in English.

In 1964 Dr. Stern was elected president of the Pacific division of the American Philosophical Association. He is a Knight of the Legion of Honor of France, vice president of the Alliance Francaise of Los Angeles, and editorial consultant of *Folia Humanistica* in Barcelona, Spain.

After his retirement Dr. Stern and his wife, the Puerto Rican writer, Marigloria Palma, will move to their 200-year-old Spanish house in San Juan. Dr. Stern will teach philosophy—in Spanish—at the University of Puerto Rico in Mayagüez.



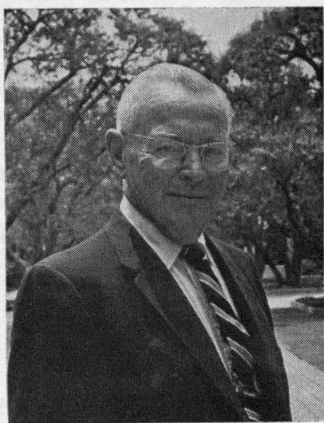
Henrietta Swope

Henrietta Swope, research fellow in astronomy at the Mount Wilson and Palomar Observatories, retired this year after 16 years on the staff. Her retirement, however, will not mark the end of her research on variable stars.

Although Miss Swope traces her interest in stars back to her childhood, she became professionally interested in astronomy while getting her AB degree in math at Barnard. In 1926 she began doing graduate work in astronomy at Radcliffe, spending most of her time at the Harvard College Observatory in Cambridge. She became a research assistant there that same year and held this post until World War II, when she was asked to go to MIT's Radiation Laboratory to help develop a secret form of navigation called Loran.

After the war Miss Swope taught astronomy to undergraduates at Barnard and at Connecticut College for Women, but her real enthusiasm was for research, and in 1952 she welcomed an opportunity to come to Pasadena as research assistant at the Mount Wilson and Palomar Observatories, assisting Walter Baade with his research on variable stars.

One of her most significant contributions to the field is her calibration—the most accurate to date—of the distance from the earth to Andromeda, by means of determining the brightness of the cepheid beacons in the spiral arms of that galaxy. This measurement has become the "cepheid yardstick" by which other relative distances in the universe are calculated.



Ray Untereiner

After 43 years at Caltech, Ray E. Untereiner retired this year to become professor of economics, emeritus. Born in Redlands in 1898, he was graduated from the university there in 1920, received his MA in economics from Harvard in 1921, his law degree from Mayo College in Chicago in 1925, and his PhD from Northwestern in 1932.

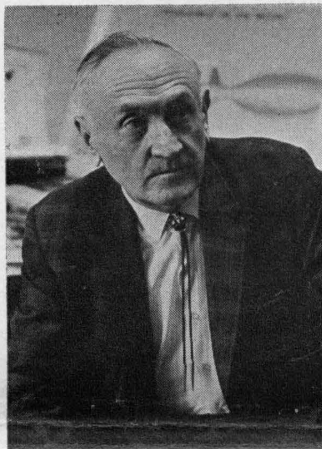
Dr. Untereiner first taught history and economics at Caltech in 1925, and in addition maintained a law practice in Los Angeles until 1931. From 1939 to 1943 he also served as dean of freshmen.

During the late twenties and early thirties Dr. Untereiner's history classes included as many as 160 students and were conducted in Dabney Lounge—the only room large enough to accommodate the group. William Pickering, now director of JPL,

used to grade examinations for him for 75 cents an hour. Social activities then centered around the Robert Millikan home. Every year Dr. Millikan invited freshmen to Sunday dinner, in groups of about 30. The Untereiners were always in attendance, their duty being to make sure that the boys asked to see Dr. Millikan's medals—and left the house promptly at 10 p.m.

The Untereiner family lived on San Pasqual across the street from the campus for 34 years. Once, to their surprise, they discovered that the "old gentleman down the block" who had been voluntarily tutoring their son in grammar school "numbers" was Albert Einstein.

Dr. Untereiner has been active in local and state government affairs. He has served as chairman of the Los Angeles County Citizen's Committee on Local Taxation, president of the Pasadena Board of Education, and chairman of the City Recreation Commission and as a member of the California State Public Utilities Commission. Following a summer Caribbean cruise, Dr. Untereiner plans to continue his legal consultation practice.

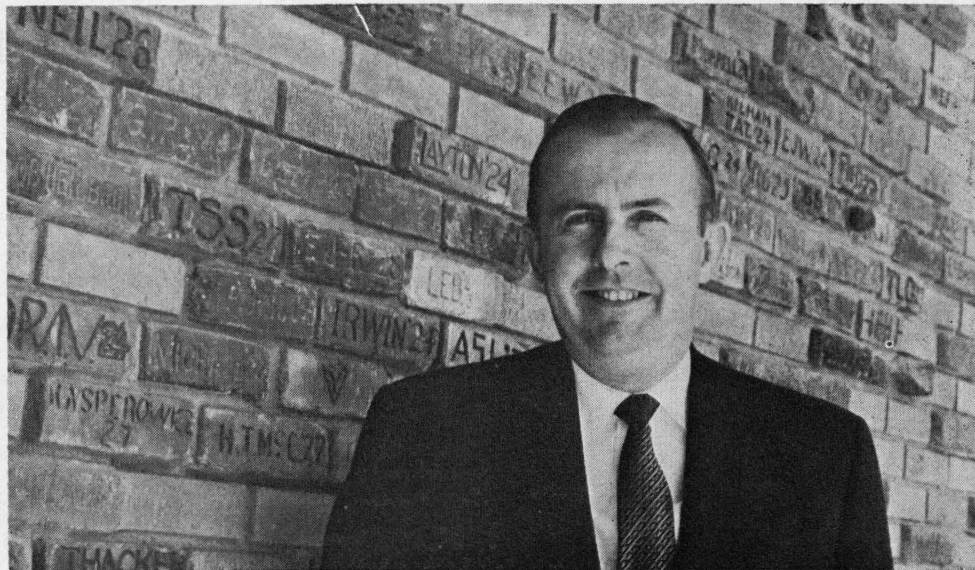


Fritz Zwicky

Fritz Zwicky retired this year to become professor of astrophysics, emeritus. A pioneering astronomer, Zwicky was born in 1898 in Varna, Bulgaria, and received his BS and PhD degrees from the Federal Institute of Technology in Zurich. A Swiss citizen, Zwicky came to Caltech in 1925 as an International Research Fellow in physics for the Rockefeller Foundation, after five years as a research assistant at Zurich. He still speaks of his early years here as some of the happiest of his life.

The faculty in the late 1920s was a close-knit group which shared social activities as well as working relationships in classrooms and laboratories. Physics department dinners were almost weekly events, and on weekends the physicists were often mountain climbing or skiing together.

Dr. Zwicky has gained worldwide recognition for his discovery of 45 supernovae. He has published more than 300 articles on physics, jet propulsion, astronomy, and the philosophy of science, and he has written seven books. After 30 years of work, he and four collaborators have completed a six-volume catalog of galaxies and clusters of galaxies. He has been a professor of astrophysics since 1942 and a staff member of the Mount Wilson and Palomar Observatories since 1948. He was awarded the U. S. Medal of Freedom by President Truman in 1949, the U.S. Army Air Forces Commendation for Meritorious Civilian Service for his work with rocket propulsion during World War II, and the Gold Medal awarded by the Pestalozzi Foundation, which supports about 60 villages for war orphans and destitute children on all continents. He is the founder of the International Society for Morphological Research and vice president of the International Academy of Astronautics. □



James Black

Alumni Association Has a Full-Time Director

The Caltech Alumni Association now has a full-time executive director. James Black, formerly city administrator for the City of Maywood, California, was chosen from nearly 90 applicants by a committee of Institute personnel and alumni. Black's job will include management of all alumni events, direction of the campus alumni office, and liaison between the Association and Caltech.

Black has assumed many of the duties that Association secretary Donald S. Clark, Caltech professor of physical metallurgy and director of placements, has been overseeing for many years. Clark will now be able to devote more time to his other Caltech jobs.

Taking advantage of the executive di-

rector's presence, the Association has already scheduled an increased level of alumni activity for this year. Two dinner meetings with Caltech faculty speakers are set (New York, November 14; Detroit, November 25), and more are being planned (Washington, D.C., Houston, and three or four in the southern California area this spring). The regional meetings are intended to bring firsthand news to Caltech alumni and to promote more regional chapter activity.

Black, who has a BS in public administration from USC, had also been chief financial officer and assistant city administrator of the City of Commerce, California. He and his wife and three daughters live in Brea. □

Fall Sports: Water Polo Having a Fine Season

Water Polo

The Beaver water polo team is having a fine season, and coach Lawlor Reck's swimmers are looking toward a possible league championship. Led by co-captains Larry Hunt, '69, and Gregg Wright, '69, the team started off by defeating Riverside City College (12-4), then lost close matches to Santa Ana JC (4-3), LA State (4-3), and Mt. SAC (6-4). In the SCIAC Tournament Caltech lost to UC Riverside (5-4) in the last ten seconds, but the following week defeated a strong San Francisco State team (6-5).

After three league matches, Caltech had a record of 2-1, with a loss to Claremont-Mudd (14-8) and victories over Pomona (10-5) and Redlands (9-8).

Football

One week into November, with five games behind them, Caltech football play-

ers were still looking for a win. The team lost decisively to Loyola University of Los Angeles in its first game (48-14) and to Nevada Southern University at Las Vegas in its fourth (69-0). The intervening games against Azusa Pacific College (27-0) and Pomona College (20-7) were close most of the way, with the last two minutes of both deciding the outcome. The fifth game was lost to LaVerne (59-17).

The team and coach Tom Gutman are optimistic about the rest of the season and hopeful of breaking a 34-game losing streak. The major problem is, as usual, too few football players. The return of the one-platoon system—a prospect viewed with dismay by the large schools—would be a blessing for Caltech football teams.

Cross Country

Coach Bert LaBrucherie's harriers finished their dual meet schedule with a record of 3-4. Caltech lost the first meet to Whittier College (22-35), then won three in a row. Pasadena College fell (16-43), then Claremont-Mudd (19-38), and finally UC San Diego (18-39). The win streak was broken with a loss to Occidental (18-45). Caltech then lost to Pomona (21-38) and Redlands (21-38).

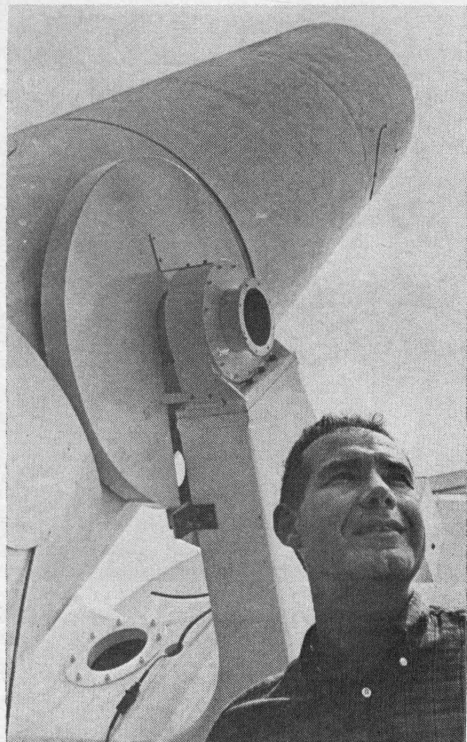
Standout on the team has been Lane Mason, '70, with first places in four of the meets.

Soccer

Just into the second half of the season, coach Ron Kehoe's soccer team had compiled a 1-5 record. The lone victory came in the first game at the expense of Rio Hondo Academy (2-1). Defeats have been handed out by Pomona (4-1), Claremont-Mudd (5-2), Redlands (5-2), Cal Poly (3-2), and Occidental (2-0). Team leaders have been Richard Burton, '70, Gerald Eisman, '71, and Andrew Chow, '72. □



AND ANOTHER EMERITUS. A. G. ("Fig") Newton, campus cop for 20 years, bids Caltech a sad farewell at a goodbye picnic in June in Tournament Park. □



Harold Zirin

Harold Zirin--One of the Daytime Astronomers

Solar astronomer Harold Zirin is known as "unchained energy" to the three post-doctoral fellows who work with him. This limitless energy, they say, makes for a man easily impatient with those around him who can't or don't work as prodigiously as he does. It also spreads a certain amount of dismay among the people in charge of astronomical equipment. (They say some of it buckles under Zirin's energetic approach.) And his co-workers admit that Zirin's perpetual zest results in occasional mistakes as he hacks his way through scientific underbrush to blaze a path to the sun.

In the same breath all these critics reveal, with considerable admiration, that Zirin will always cheerfully and candidly admit a *gaffe*—a quality, along with his generosity to colleagues, that is not invariably found among scientists. And a close co-worker, astronomer Robert How-

ard, adds that Zirin has not only brought solar observation to the campus, but is a never-ending source of provocative and stimulating ideas in the realm of solar physics.

Zirin came to Caltech in 1965 from the High Altitude Observatory at the National Center for Atmospheric Research in Boulder, Colorado, largely because of Howard and Caltech physicist Robert Leighton. He had worked with them as a visiting professor at Caltech in 1963 and found it exciting. When he was invited to join the Caltech faculty in 1965, the timing was right. He was dissatisfied with the atmospheric conditions in Colorado, and Pasadena offered ideal ones (very stable air). In addition, he knew there was solid interest at Caltech in building a solar telescope somewhere in southern California. After three years, he is convinced that Caltech has the most stimulating environment that an astronomer can find anywhere.

The trio has been very productive at Caltech. They each have a particular interest in the structure of the sun's chromosphere: Zirin in cinematography and the morphology of the sun; Leighton in the theory of sunspot cycles; Howard in solar magnetism. Howard and Zirin have conceived and designed the large reflecting telescope system that JPL is contributing to the Apollo Applications Program. And all three were involved in the selection of the site for Caltech's new solar observatory now under construction at Big Bear Lake, with Zirin responsible for its funding and design.

Solar astronomy is a relatively small field; there are only about five active solar observatories in this country. Zirin estimates that the number of people really active in the field is no more than 50, so they work with each other as "cooperative competitors."

"I don't know why solar astronomy isn't as popular in the United States as it is in Europe," he ponders. "Every college has its little 16-inch telescope for stellar work, but they seldom have a solar telescope. They're relatively cheap—we get beautiful results with a five-inch photoheliograph that cost about \$30,000—and we have all the benefits of daytime observing."

Solar astronomy has become more important recently because of space exploration; intermittent solar phenomena can interrupt long-distance communications or injure astronauts. Then too, scientists who have been observing x-rays and cosmic rays are becoming more interested in the solar flares that produce them.

Zirin got his Harvard PhD in 1953 as a theoretician, but has long since become what he calls a "working astronomer." In fact, he refers to those who wear heavy trappings of theory as the *betes noirs* of solar astronomy—the phrase being loosely translated from the French as pains-in-the-neck.

"There are still too many people who are so wound up in mathematical analyses that they forget to think of the sun or stars as real. Until about 1910 astronomy was very classical, with no physics in it at all. Then, largely through the influence of Hale and others, the new physics came in and theory became important. In time a lot of the emphasis shifted from observation and interpretation to theory."

"Theory is great as long as it's physical theory. It's when it becomes giant mathematical exercises that there is danger. Now, if you look at an astronomical journal, you sometimes find about half the papers are just big calculations somebody did in order to get a degree or to publish."

They're more academic exercises than steps forward."

Zirin thinks the biggest job in his field today is to *see* what is actually happening on the sun. He is convinced that most of its mysteries will be solved by physical thinking rather than by extensive mathematical analysis.

"One example," he says, "is solar flares. For years theoreticians tried to explain them when most had never seen one. They were like the blind men trying to describe the elephant."

He believes that the primary reasons for studying the sun are because it has such a great influence on the earth and because it is the one star we can really see well.

"When you study a distant star," Zirin says, "its spectrum is just a little track—a fingerprint. With the sun it's like seeing the whole man."

One of the most absorbing features of his work is that the sun is always different, changing from day to day. Eventually he wants to see a chain of three coordinated solar telescopes in good locations to film the sun every minute of the 24-hour day. So far he has the funds for just one of them. The project ("one of a number that are dragging me down in the mire") has taken him all over the world in search of ideal sites. He considered Iran but ran into problems. He tried northern Sweden, but atmospheric conditions stymied him. He finally decided on Israel, where support facilities and trained people were available, but even there he hasn't found the going easy.

He took a telescope there in May 1967—a twin of his pet five-inch photoheliograph on the roof of the Robinson Laboratory of Astrophysics on the Caltech campus. It was all set up and ready to be used when the war broke out. (He considers it lucky that the instrument wasn't fired on by the Arabs; perched up on the roof of a building, it looks just like a cannon.) When the telescope was finally put into use this year, it didn't work properly, so he had to return to Israel this summer to straighten things out. He subsequently sent David Bohlin of his staff to do further work on it.

Meanwhile at Caltech he anxiously awaits completion of the new solar observatory at Big Bear Lake.

"We think it's going to be a terrific spot. This is the first time in history that a solar observatory was really chosen as the result of a detailed study, so we're expecting optimum conditions—air that is clear and stable."

"I'm still interested in spectroscopy and its interpretation. At Big Bear we hope, for the first time, to make rapid spectrograms so we can see immediately what we're getting."

He and his group are already using the new telescope, which will be moved to Big Bear but which is temporarily installed on the roof of the Robinson Laboratory. By the time it is finally on the site, the project will be four years old—and that's a long time in Zirin's frenetic life. He won't be surprised if the new installation will then have to be updated.

"But," he says, "you have to be flexible—continually. Every *day* we change what we're doing with the telescope. Maybe I don't stick to one thing long enough. Maybe I change too often."

Grad Students Want to Foster a Closer Community

The graduate students have finally organized. Twenty-three of them, from 16 fields of study, comprise a council that represents graduate student interests to the faculty and administration.

The idea was launched last May by James Knowles, professor of applied mechanics and then-chairman of the faculty graduate student relations committee. He had found it next to impossible to get students together when necessary, as had Deans Frederic Bohnenblust and Harold Lurie of the graduate office. Moreover, the wishes, opinions, and complaints of the nearly 900 graduate students were difficult to know to any accurate degree.

The three faculty members asked division chairmen to suggest students to discuss how to ease the situation. Bohnenblust and Knowles met with those students and outlined suggestions for some informal organization that could serve as a representative body for the students.

According to Bill Everett, an applied math student who has been one of the prime movers since the May meeting, the graduate student group welcomed the idea. It was decided that each division would have voting members, with representation in proportion to the number of students in a division. They also planned elections and started organizing activities to start off the fall term.

The group's first action was to expand the orientation of new grad students. Ac-

cording to Everett and Don Strange, a student in physics, the old orientation practices ranged from too little in the physics division to almost ideal conditions in biology. As a result of stepped-up orientation in all divisions, before the summer was over old students had met new ones in small groups to let them know what to expect in their own research areas, divisions, and on the campus as a whole.

At first-term registration the interim council distributed questionnaires to the graduate students asking their opinion of a permanent council. Responses were overwhelmingly in favor of the idea, and the new council was elected at the end of October.

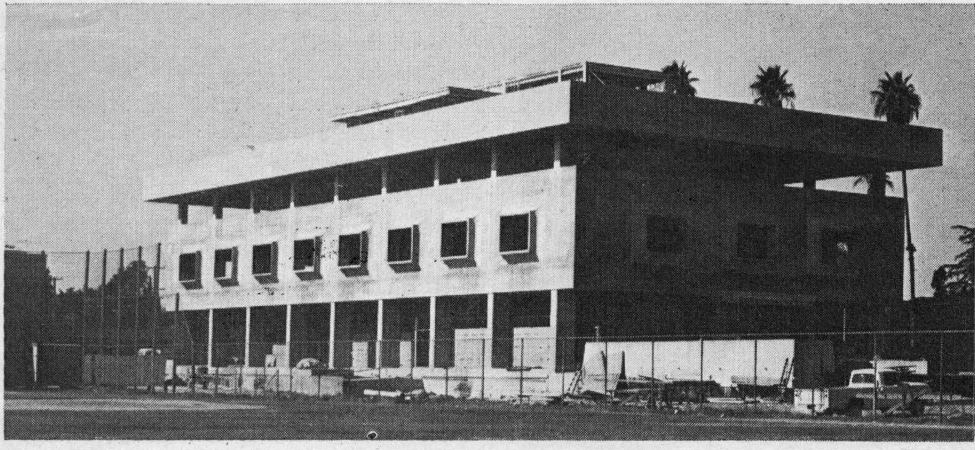
The questionnaires also showed that graduate students were eager for social activities and for closer faculty-student relations. One of the first activities was a well-attended volleyball tournament. Other new events this fall included two highly successful social events underwritten by the administration. One, which replaced the traditional evening reception at the Athenaeum, was a buffet dinner given by the graduate office in Winnett courtyard for all new graduate students and their wives. The second was an October party in Dabney lounge and garden marked by record attendance. Future social and business expenses may be met by a small yearly assessment of each graduate student. □



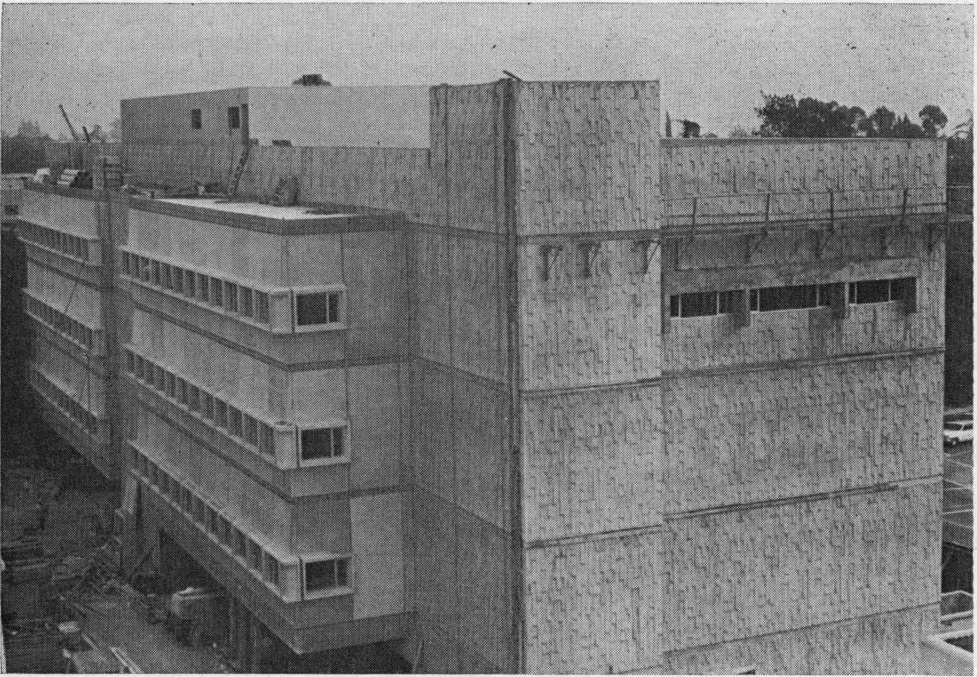
200 graduate students and their wives came to the Oct. 4 dinner in Winnett courtyard.

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Write: Business Manager
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THREE NEW BUILDINGS are well along the way to completion. The Business Services Building (left), adjacent to Tournament Park, will house personnel and accounting offices, as well as graphic arts, safety, and mail operations. The 61,000-square-foot structure will be finished in April. The George W. Downs Laboratory of Physics and the Particle Physics Laboratory (below), adjacent to the Synchrotron along California Blvd., are set for occupancy in February. They will provide 85,000 square feet for physicists. □



Alumni Cough Up \$1.7 Million Toward \$2 Million Goal, But Only 27 Percent Have Given To Date

Excellent dollar results toward our \$2 million Alumni Campaign goal are outlined below. A conspicuous margin for improvement in participation remains. The minimum participation target is 50 percent—and it *should* be 100 percent.

Thanks go to the area chairmen listed,

their more than 700 workers, and 2,578 alumni donors for the progress to date. Every Caltech alumnus must count himself personally responsible for the ultimate success of this campaign.

Ruben F. Mettler, '44
Chairman, Alumni Committee

Area	Chairman	Goal	Subscribed To Oct. 31	Percent of Participation
(Areas in boldface type have met their dollar goals)				
San Diego	Frank E. McCreery, '39	\$ 23,575	\$ 11,814	24.2
San Diego County	David B. Wilford, '48	93,835	40,542	16.5
South Coast	Loys Griswold, '24	33,540	10,359	20.1
Santa Ana	J. R. Lester Boyle, '30	26,425	17,630	38.8
Fullerton	Dwight C. Schroeder, '50	28,425	5,295	5.5
	Lawrence J. Grunder, '29			
	Don H. Pickrell, Jr., '49			
Long Beach	Paul L. Smith, '39	28,660	5,405	13.5
Palos Verdes	Donald H. Loughridge, '23	60,884	42,694	47.1
South Bay	Hector A. Schetne, '48	20,015	12,181	22.4
LA-Eastside	Will Richeson, Jr., '47	45,325	73,146	7.4
LA-Hollywood	David J. Klein, '43	11,945	13,405	16.4
LA-Central	Richard Schamberg, '43	33,902	37,832	37.2
LA-West Central	Milton Kamins, '57	16,475	41,710	33.6
LA-Southwest	George F. Smith, '44	19,620	13,257	25.6
LA-Beverly Hills	Artur Mager, '53	21,020	30,160	29.0
LA-Northwest	Albert P. Albrecht, '42	34,275	52,498	30.2
Santa Monica	George J. Todd, '40	21,250	22,480	40.9
Malibu	Ernest C. Hillman, Jr., '30	19,750	19,991	20.5
Inland Empire	Frederick C. Essig, '46	20,730	34,067	14.5
Pomona Valley	William C. House, '40	15,800	13,495	36.3
E. San Gabriel V.	Willard E. Baier, '23	21,215	7,913	2.0
Whittier	David H. Steinmetz III, '40	25,800	13,655	24.4
San Gabriel	Clifford C. Burton, '40	26,905	17,221	32.3
Arcadia	Joseph B. Earl, '44	51,685	21,540	24.3
San Marino	James T. Luscombe, '51	126,500	81,056	16.6
Pasadena-Eastern	Stuart M. Butler, '48	30,800	14,463	12.7
Pasadena-Northern	John V. Hallstrom, '51	24,700	8,097	10.9
Pasadena-Central	David Sheffet, '30	18,125	16,896	34.9
Pasadena-Caltech	William H. Corcoran, '41	40,900	43,507	28.8
Pasadena-Western	Fred C. Gunther, '48	29,450	18,789	35.5
Altadena	Wm. Fred Arndt, '31	117,450	106,079	22.1
	Reuben B. Moulton, Jr., '57			
La Canada	Howard B. Lewis, Jr., '48	13,085	10,355	21.2
Glendale	Edward J. Kasnicka, '36	28,109	20,149	13.5
E. San Fernando V.	Donald C. Tillman, '45	24,500	20,348	14.5
C. San Fernando V.	Robert W. Haussler, '39	16,118	9,906	27.7
W. San Fernando V.	Arthur N. Prater, '33	40,215	23,427	23.3
Ventura	Robert K. Campbell, '54	8,475	0	0
Santa Barbara	John W. McKee, '55	55,600	35,607	26.2
Central California	G. Donald Meixner, '46	28,925	7,445	2.6
Santa Clara County	W. Lawrence Noon, '49	26,460	81,947	23.1
Los Altos	William L. Wise, '52	28,600	12,375	42.2
Palo Alto	Carl H. Heilbron, Jr., '25	34,560	12,425	34.2
Stanford	David M. Mason, '43	9,950	9,422	47.0
Peninsula	Richard H. Jahns, '35	19,570	34,892	18.1
	Walton A. Wickett, '37			
SF-Marín County	Theodore G. Lawrence, '43	36,120	9,140	16.2
Berkeley	William H. Claussen, '32	19,375	6,476	18.2

Area	Chairman	Goal	Subscribed To Oct. 31	Percent of Participation
East Bay	G. Neal Huntley, '54	12,900	18,986	17.7
Orinda	Harrison J. Sigworth, '44	24,950	24,950	50.0
Sacramento	Frederick J. Groat, '24	16,000	24,337	58.0
W. Ore.-S.W. Wash.	Wayne MacRostie, '42	21,325	33,319	33.3
	Langdon C. Hedrick, '47			
W. Washington	Martin J. Poggi, '37	22,595	25,386	41.4
N.W. Rockies	Walter Z. Davis, '41	17,725	499	0.7
Colorado	Paul W. Fullerton, Jr., '48	17,550	10,184	22.8
Arizona	Dean Nichols, '37	25,205	39,907	37.1
New Mexico	Edward A. Hayes, '33	11,580	12,213	56.8
	Adam F. Schuch, '50			
West Texas	Robert D. Forester, '49	6,305	8,559	40.5
Houston	Sidney Schafer, '36	26,775	17,887	47.7
Northern Texas	Frank W. Davis, '36	16,125	16,466	25.8
Central States	Thomas W. Norsworthy, '44	15,850	16,763	28.8
	Oran A. Graybeal, '38			
W. Great Lakes	David L. Douglas, '47	6,560	12,333	36.5
Michigan	Cyrus G. Minkler, '28	32,655	14,854	29.3
Chicago	Laurence H. Nobles, '49	24,180	16,183	10.5
S. Ill.-St. Louis	William A. Kelley, Jr., '51	11,035	2,317	7.2
Ohio Valley	George S. Holditch, '48	23,860	32,983	26.7
Ohio	Stanley C. Pace, '49	13,640	11,245	33.7
South Central		11,350	1,380	3.3
Florida	Ernest B. Wright, '45	10,000	5,625	12.5
South Atlantic	Louis T. Rader, '35	9,750	9,885	10.8
D. C.-Virginia	Bruce A. Kaiser, '54	16,270	7,110	8.8
	Josiah E. Smith, '39			
Washington, D.C.	Clifford I. Cummings, '44	7,905	8,176	25.6
D.C.-Maryland	Walter S. Baer, '59	17,060	13,665	5.0
Maryland-Delaware	Victor F. Hanson, '26	7,215	8,553	28.0
W. Pennsylvania	Charles L. Malone, '57	11,455	9,261	36.1
E. Pennsylvania	Merwyn E. Hodges, '47	18,255	9,980	19.8
C. & S. New Jersey	Martin Summerfield, '37	27,500	6,591	5.1
Bell Labs	William D. Warters, '50	14,000	10,465	66.7
N. New Jersey	Hallam E. Mendenhall, '27	15,500	12,590	59.2
New York City	Rodman Jenkins, '50	41,300	34,907	15.6
New York-Hudson	Harry J. Moore, Jr., '48	20,680	46,011	58.6
NY-Long Island	Herbert S. Ingham, '31	23,460	11,015	44.6
Upstate New York	Robert H. Dalton, '25	22,630	18,536	37.7
Connecticut	William E. Lockwood, Jr., '44	20,800	12,528	5.5
Harvard-MIT	Arthur E. Bryson, Jr., '49	8,125	4,686	26.1
S. New England	J. Davis Shuster, '27	18,110	8,344	17.6
New England	Charles F. Thomas, '35	10,700	16,640	17.0
Foreign			2,869	4.4

Alumni campaign goal	\$2,000,000
Total subscribed to Oct. 31	\$1,737,162
Percentage of goal to date	86.9
Percent participation	26.9



Why Would Caltech Alumni Join the Peace Corps? Reasons and Reactions of Three Who Did It

Jim Eder, BS65Bi

My first reaction upon being invited to train for the Philippines Education Project was tinged with a little disappointment. Teaching pidgin-English-speaking children wearing Woolworth's T-shirts didn't sound like my idea of a rich cultural experience.

But the Peace Corps psychologist said that when the time came for the long lonely hours, it would be what we were doing, and not where we were, that would be important. This proved to be true—just as it is true that the less that one culture knows about another, the greater its reliance on simple stereotypes to portray it.

And, anyway, Peace Corps picks the assignment to fit the individual, and this was to be a job-oriented effort placing relatively high emphasis on technical skills. When I was then able to add the environmental essentials—personal bamboo hut, coconut palm, and outrigger canoe—in a culture with some really fine people, it proved quite a satisfactory arrangement.

Why did I join? Dissatisfaction with the status quo is a reason too well worked to bear repeating here. I would say that the reasons, or goals, that seemed pretty thoughtful two years ago—enrichment of self—seem superficial now, and it was somewhat naive to expect that the way I would relate to, say, career goals, would not change.

What did I learn? Well, for one thing, the Philippines is not India, and anyone who puts all Asian countries under one category (be it "underdeveloped" or anything else) commits a grievous wrong. I worked variously in adult literacy (in a country with a 72-percent literacy rate), public health (with people schooled in the germ theory of disease who can explain how they got their worms even as they go barefoot), and agriculture (in a country lacking not knowledge about increasing production, but interested manpower).

I used to think that the ultimate, though nebulous, achievement known as "cross-cultural understanding" was a mechanical

thing, an automatic byproduct of a sufficiently lengthy stay in a foreign culture. I now know this is not true. One doesn't gain cultural understanding simply by living in a foreign culture, any more than one learns to speak a foreign language simply by being around people speaking it. To learn to speak a language, you must speak it.

I won't attempt to make such a generalization about culture, but learning most certainly has something to do with people. I once met a Filipina nurse recently returned from five years in the United States. I asked the obvious—"What did you think of the States?" I will never forget her reply: "You know," she said, "I met a few people I really liked."

During my Peace Corps experience I made people my goal, and while I don't claim total cultural understanding—or even being near to it—I think knowing a few people closely goes a good part of the way.

Michael Field, MS63Ge

Ah, Ghana—an eight-room house (plus servant's quarters) situated on one of the hills at the edge of town so that we could catch the afternoon breeze as we sat on the porch; brilliant, sunny days—a little hot, but otherwise as close to perfect as you could imagine; roads winding through clefts in the lush green forest; villages filled with noise and bustle, bright clothes, and friendly smiles; the gentle sound of faraway drums at dusk.

These are the images that first come to mind when I recall my two years in the Peace Corps. With time the memory of interminable waits, of near-collisions on the highways, of always being a foreigner and a curiosity disappear. The memory is conveniently selective.

It is hard enough to remember what changes took place within me during those two years in Ghana. It has been another two years since, and for one of those years I have been working with VITA, an international information service, which has kept me in constant contact with Peace Corps Volunteers and other overseas work-



Ghana: Geologist Mike Field sips a calabash of palm wine after a hard day's work.

ers. My overseas experience has made me empathetic enough to the situation of others that now it's difficult to remember what I have experienced in actuality and what vicariously.

To evaluate any intellectual changes during my Peace Corps tour would be largely a fabrication. To describe my experiences would be misleading, since working for the Ghana Geological Survey and being in control of work groups of African laborers does not fit well into the traditional Peace Corps image. I would really like to describe the Peace Corps as I see it from my present viewpoint—as someone outside of the group yet in daily contact with it.

The broader perspective with which I can now view the Peace Corps, in addition to the thoughts associated with my own change of career direction, have led to a lot of thinking on the role of the engineer in the developing nations. An interesting fact is that only about 15 percent of the Peace Corps Volunteers have any sort of technical background. This low figure, which includes people with agricultural and medical training, is less than half the percentage of college graduates in these fields.

One is immediately tempted to draw sweeping conclusions—either that the liberal arts majors can't get any other jobs than with the Peace Corps or that engineers couldn't care less about what happens to people. There is probably a little truth in both these statements, but neither is an explanation. I won't be able to come up with an explanation, either, for there is too much information I do not have; but I would like to raise some questions on the role of engineers and scientists in the Peace Corps and other development work—to talk about that 15 percent.

It is difficult to combine a professional engineering career with one in development; development work is too watered down. One is not using his abilities fully or pushing his knowledge further, but is working with technical skills acquired perhaps early in his undergraduate career. In my Peace Corps work as a geologist much time was spent in non-professional work. Besides being a geologist, I was in charge of

a work crew of about a dozen laborers, with all the detail that involves. Field work is delayed when you find the assistant told the crew to clear a trail along *that* river rather than along *this* river. Microscope work is interrupted to hear a long emotional plea for a pay advance because of a family crisis. A couple of days a month are spent in bookkeeping, and so on.

Likewise, the secondary school teachers (the other Peace Corps group in Ghana) were using little more than their high school education—if that—and the curriculum was too rigid to permit much use of their ingenuity. In positions higher than those the Peace Corps occupies, the work might be more challenging, but there would still be a lack of equipment, a slow bureaucracy, and other restrictions. An agriculturalist I know says that after eight years at a farm school in Afghanistan he is too far behind current U.S. practice to get a good job in this country.

A decision to go into international development work at the village level is thus, in most cases, a shift *away* from a professional engineering career. But does this explain the reluctance of engineers to join the Peace Corps, an obligation of only two years? There is certainly a tendency among scientists and engineers to go straight through from kindergarten to MS or PhD and thence to a job without a break. Perhaps they feel that taking two years off in Thailand would put them behind in their specialty and create suspicion in the mind of their employer. More likely it is just part of the modern educational pattern to get it all at once, though I suspect the tendency for such a thorough course is less strong among liberal arts students. When one is majoring in Greek history preparatory to selling life insurance, a break of a few years won't make any difference, and it may even be helpful.

A certain percentage of "scientists" going into the Peace Corps aren't really scientists at all. We all knew people in school who took an excess of literature courses, participated in extracurricular activities to the detriment of their technical studies, and ended up going to business or theological school. Likewise, some people go into the Peace Corps as physicists and come out to go to graduate school in economics; in as biologists and out as sociologists; in as chemists and out as public health workers. But the Peace Corps did not really change their direction; it only changed their career and confirmed the direction in which they had always wanted to go.

This is only one element; it would be unfair and untrue to say that the only engineers in the Peace Corps are those on their way *out* of the profession. Despite some common traits, there are many different personalities within the group we call engineers. Some are satisfied with the challenge of research, and ask only that their work be enough to use the best of their ability. Others want to be aware of their overall goal and position in society. The emphasis of the first is on the quality of his work, and that of the second is more on his worth as a man. For this latter person, a setback in work is upsetting, but not defeating. He would not be satisfied with a good piece of work if he thought the goal of the whole project was unimportant.

An important asset of the second type of person is his freedom. He is not obligated to get his education in one continuous sweep, or to work always in one specialty to keep up with the other people who spend all of their time in the same specialty. He cannot forego good judgment in planning his career, of course, but his mind is free of "professional paranoia." He is in control of his work, not vice versa.

It seems to me that those interested in



Philippines: Jim Eder helps a local resident install a drainage system for his kitchen.

It is difficult to combine a professional engineering career with one in development; the work is too watered down.

If you expect any professional gain from those two years, you will be disappointed.

the Peace Corps are this sort of person. They are interested in the world around them, and want to see it and contribute to it. But more important, perhaps, they feel free to take that two years off if they feel like it. I have long felt that altruism is less strong a motive for people joining the Peace Corps than a desire for adventure and fun, and such an attitude is important to a successful Peace Corps tour.

Joining the Peace Corps is, of course, a matter of individual choice. It is a little difficult for me to resist encouraging others to join, because I enjoyed the tour so much myself; but at the same time I can look at many of the people around me and know they wouldn't enjoy it. The Peace Corps certainly needs engineers and scientists, partly because one keeps running into situations where some technical background would be useful. In my present work I see many examples of Volunteers planning projects which a little thought could have shown were not tenable. Seeing this, it is painful to think of the large percentage of scientists who will never be in the Peace Corps.

To an engineer considering the Peace Corps, I would say: If you expect any professional gain from those two years, you will be disappointed. But you are a person as well as an engineer, so make sure that your whole self is involved in the decision. If you decide not to join, be honest with yourself about the reasons. If you believe in taking a chance once in a while, this is one I recommend.

Richard Karp, BS64Ma

Baguio City is a mountain tourist resort in the Philippines. The climate is temperate; the local scenery is dominated by pine trees. Baguio's restaurants serve pizza, chateaubriand, cheeseburgers, and Swiss fondue, in addition to Filipino dishes. For recreation there are three English-language movie theaters, bowling alleys, two golf courses, periodic duplicate bridge tournaments, and genuine U.S.-made slot machines. Baguio City is where I am "roughing it" for my two years as a Peace Corps Volunteer (PCV).

I teach mathematics at the University of the Philippines (U.P.) in Baguio. U.P. in Baguio is a recently constructed campus, with an enrollment of about 300 students. The physical plant is good, the classes are small, and the faculty is excellent.

Admittedly, not everything is perfect in this apparent paradise. The city utilities (particularly the water system) are unpredictable in their operation. There are people who seem to feel that an American likes as a greeting nothing better than "Hi, Joe! Give me money." And the U.P. in Baguio library has fewer volumes than the average high school library in the U.S. Yet despite these problems, my assignment is sorely lacking in most of the so-called hardships that accompany the Peace Corps image.

In fact, the entire Peace Corps program in the Philippines seems not to follow the "thatched hut and no electricity" mythology that the Peace Corps itself sometimes seems to be slyly encouraging. The largest number of all PCVs in the Philippines are in education projects, although the Philippines has more teachers than there are jobs available in teaching. In many barrios



"Roughing it in the Philippines": Mathematician Richard Karp with two of his students.

(farming communities), the school is the best-kept, nicest building.

These considerations have almost forced Peace Corps/Philippines, if it intends to fill a useful role, into a different type of program than found in other Peace Corps projects: a program oriented toward improving the quality of instruction available, rather than the quantity.

This quality emphasis means that Volun-

teers work primarily with teachers, rather than students, in the fields of math, science, and English. For it has been found to accomplish far more in the long run to convince a few teachers to adopt modern methods, than to merely teach in such a manner to a few classes.

Even within this unusual context, my assignment is unusual—in that it is usual. At U.P. in Baguio I teach regular classes and do not work with my fellow instructors, except for the few who have enrolled in my classes for credit. Actually, my fellow faculty members are already quite competent, and there is little—if anything—that I can teach them.

This makes it quite difficult for me when I try to imagine why the school—and in a larger sense, the Philippines—needed me to come all the way from the U.S. Possibly the only visible result of any significance will be that my presence has enabled the college to give another instructor full-time study leave with pay during my tenure. This means that, because of my presence, there will be at least one better-trained professor when I leave—even though I did not actually train this instructor myself. This is not a very great accomplishment for me, and I doubt that I will be singled out in Jack Vaughn's message to the Congress. It seems, however, that as far as Peace Corps is concerned, this is accomplishment enough. If the organization is satisfied with my work, then I am content too.

For me the Peace Corps has been of great personal benefit. During my stay in the Philippines, I seem to have discovered that I like math. This is rather un-

expected, and I am more surprised than anyone at this turn of events. It is something I never found out during my two years of graduate school—nor, I regret to report, during four years at Caltech. This emphasizes the extremely personal nature of the ways in which PCVs benefit from the Peace Corps experience. It has only one serious flaw—the experience agrees only too well with Peace Corps statements on the subject and, as such, it becomes immediately suspicious.

From the time that Peace Corps training begins, the potential Volunteer is bombarded with reminders that successful Volunteers "really get more than they give." But when Peace Corps reports to Congress, it does not state that "last year 10,978 Volunteers got more than they gave." Instead the message lists the number of students, farmers, teachers, and other individuals helped that year. (How this is computed might be interesting to discover; certainly no one else in the Peace Corps knows how many people I helped last year—if any—and if it could be called help.)

The statement to Congress may be justified by political reasons, but it still seems to me that the rationale for my presence may be just a well-worked-out cliché—a cliché, in fact, that isn't even good enough to report to Congress. Considering this possibility, then, it is probably best to avoid any final judgment on the benefits of the Peace Corps, and rely instead on more pragmatic criteria. Knowing what I do now, would I do it again? Perhaps predictably (but no less valid because of it), the answer would be an emphatic yes. And maybe that's all I really need to know. □

CLARENCE KIECH, '26

Clarence F. Kiech, '26, passed away suddenly in Los Angeles of a heart attack on November 4. Kiech, at the time of his death, was a partner in Harris, Kiech, Russell & Kern, patent attorneys, located in Los Angeles. After receiving his degree from Caltech, Kiech graduated from the USC Law School in 1933. For over 20 years he was active in Institute alumni activities, including service as president of the Association in 1939-40. More recently Kiech was a member of the alumni study group, on which he served as chairman of the subcommittee on alumni affairs. He was a member of the board of directors of the Association and was active in the alumni seminar programs. He was also past president of the Oneonta Club.

Kiech was instrumental in attempting to foster improved alumni-Institute relations, and during the early days of the Association he spent a great deal of his energy in this area.

He is survived by his wife Myrtle and three daughters, Mrs. Lorna Wallen, Mrs. Helen Cloud, and Mrs. Marilyn Kirk.

Contributions may be made to create a Clarence F. Kiech Memorial Scholarship at Caltech.

—James Black
Alumni Association
Executive Director □

Membership in the Caltech Alumni Association (\$10 a year) brings:

► *Engineering and Science* magazine nine times a year

► Alumni Directory, to be issued in 1969.

► Athenaeum membership privilege

JOE BEEK, EX '11

Joe Beek, who died October 20, was one of the great guys of Caltech (Throop) history. He didn't graduate (had to go to work) but saw that two sons (Barton, '44, and Allen, '50) did, and another (Seymour) from Pomona.

Upon leaving Throop he took over the rehabilitation of Balboa Island in southern California, playing a leading role in developing Balboa and Harbor Islands and Beacon Bay. He was the first harbor master of Newport—from 1919 to 1927—and founded the Balboa Island ferry in 1919.

Joe was also a state official for 55 years, having been secretary to the California State Senate since 1919, and assistant for six years before that. He was the chief parliamentarian of the upper house, dubbed "Mr. California" by both Republicans and

Democrats.

Joe was a noted yachtsman, and had been chairman of the California Small Craft Harbors Commission. He was also commodore of the Southern California Yachting Association in 1929 and senior staff commodore of the Newport Harbor Yacht Club at the time of his death. During World War II he was a convoy transport commander.

He had been editor of *Poly*, the yearbook at Throop, for the two years he was there; in 1965 he edited a nostalgic *Poly*, reprinting pictures of his fondly remembered student days and providing up-to-date biographical sketches of as many of his former classmates as he was able to find.

—Ted Combs, '27 □

KENNETH F. RUSSELL, '29

Kenneth F. Russell, '29, past president of the Alumni Association, died on September 14, following an illness of a week. Ken was born in Los Angeles on August 30, 1906. On graduating from Caltech, he was employed as a draftsman with the Vortex Co. in Claremont, California. He became an expert in the field of air filtration, rising to the position of chief engineer, and then chief engineer and manager of Vortex, a position he held when he left the company in 1957 to become chief engineer of the Brodrex Co. in Pomona. He was active in the development of fruit-handling equipment, and at Brodrex he developed a unique process for automatic sizing and packaging.

At about the same time he left Vortex, Ken formed his own company, the Kenneth F. Russell Co., producing different types of fine wire, and more recently, flattened wire used in rotating brooms of street sweepers. He developed entirely

new equipment for the drawing of very fine wire and for the production of flattened wire.

Ken was a highly creative engineer who refused to become obsolete. He was interested in new things and insisted on understanding new materials and processes. He was a member of ASME and a licensed mechanical engineer in California.

He served as a member of the board of directors of the Alumni Association during the period 1952-55, as vice-president for the year 1953-54, and as president for the year 1954-55. He was a life member of the Association.

Ken had two sons: Doug, a teacher, and Tom, who is a Caltech graduate, '52, PhD '58, employed with Standard Oil Co. of California in San Francisco. He is also survived by his widow, Marie, a sister, Mrs. Eleanor Rector, and five grandchildren.

—Donald S. Clark, '29 □

PERSONALS

1923

HAROLD S. ENDICOTT, retired consulting engineer for General Electric Company's Missile and Space Division in Philadelphia, has received the Award of Merit from the American Society for Testing and Materials. Endicott was cited for "his effective administrative and technical service to the Society's technical activities, particularly for outstanding leadership in electrical measurement procedures and test methods." Endicott retired from GE in 1966 and is now a consultant in Claremont, Calif.

1924

WILLIAM HOLLADAY has been named national president of the American Society of Heating, Refrigerating and Air-Conditioning Engineers. Holladay is chairman of the board of Holladay, Eggett and Helin, a Los Angeles engineering and consulting firm.

1925

WESLEY HERTENSTEIN, an engineer who helped direct the growth of the Caltech campus for 37 years, retired in June. Hertenstein joined Caltech in 1930 as a resident engineer, became director of physical plant in 1954, and was recently appointed special assistant to the vice president for business affairs.

1928

W. MORTON JACOBS, president and chief executive officer of the Southern California Gas Company, has been elected president of the American Gas Association, a national trade organization for the natural gas industry.

1931

JOHN R. McMILLAN, president and director of Reserve Oil and Gas Company and Fargo Oils, Ltd., is the new president of the American Institute of Mining, Metallurgical, and Petroleum Engineers, a professional and technical organization for engineers and scientists working in the minerals industry. McMillan started in the oil business in 1929 and is now considered one of the outstanding independent oilmen in the world, making his mark in the development of small, independent oil companies.

1932

MILLARD V. BARTON, manager of the Engineering Mechanics Laboratory at Systems Group, TRW Inc. in Redondo Beach, Calif., has been appointed senior technical advisor for engineering operations. He will continue in his present position but will add duties involving formation of consulting teams to provide assistance to Systems Laboratories, a division of TRW Systems. Before joining TRW in 1954, Barton was chairman of the Engineering Mechanics Department at the University of Texas, where he was a faculty member for 12 years.

New Alumni Books

The Structural Basis of Antibody Specificity, David Pressman, '37, PhD '40, and Allan L. Grossberg, '42, MS '44. Benjamin, N.Y., 1968. \$16.75.

Current Algebras and Applications to Particle Physics, Stephen L. Adler and Roger F. Dashen, PhD '64. Benjamin, N.Y., 1968. \$12.50; paper \$5.95.

The Primary Structure of Proteins. Principles and practices for the determination of amino acid sequence, Walter A. Schroeder, PhD '43. Harper & Row, N.Y., 1968. Paper \$5.95. Modern Perspectives in Biology.

The Story of Science in America, L. Sprague de Camp, '30 and Catherine de Camp. Scribner's, N.Y., 1967. \$4.95 □

1934

NEPHI A. CHRISTENSEN, MS, PhD '39, professor of water resources engineering in the school of civil engineering at Cornell University, has retired as professor emeritus after 20 years on the faculty. Christensen has also been a consultant to the Atomic Energy Commission and to the Brookhaven National Laboratory. More recently he has been coordinator of four engineering consulting firms engaged in a major pollution abatement study.

1935

KENNETH S. PITZER, newly chosen president of Stanford University, is the recipient of the American Chemical Society's 1969 Priestley Medal, the highest honor in American chemistry. Pitzer, president of Rice University since 1961, has served as director of research of the U.S. Atomic Energy Commission and as chairman of its general advisory committee. He has been a member of the President's Science Advisory Committee since 1965. He is noted for his work in the use of infrared analytical techniques and in the applications of mathematics to thermodynamic problems in physical chemistry.

1938

WILLIAM S. ALTHOUSE, JR., vice president-finance for Baker Oil Tools, Inc., has been elected vice president-planning and public relations for the Los Angeles firm. Althouse joined the company in 1938 and has been a director since 1958.

HARRY D. EVANS, MS, is the new head of the process design-chemical department of the Shell Development Company in Emeryville, Calif. He has been with Shell for 30 years.

1940

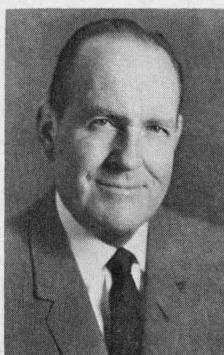
ROBERT W. WAYMAN has been named vice president-advance transmission engineering for the newly created transmission products group of Borg-Warner Corporation. Wayman joins the group, which is headquartered in Muncie, Ind., after 18 years as chief development engineer at Warner Gear.

1941

JOHN K. ARNOLD, MS, assistant dean of students at Florida State University, Tallahassee, has been appointed acting vice president for student affairs. Arnold joined the faculty of Florida State in 1958 as professor of air science and was named assistant dean of student affairs in 1963.



Endicott, '23



McMillan, '31



Campbell, '41



Hoagland, '42

NORMAN CALDWELL, MS, director of public works for Santa Barbara County since 1949, was honored with an Alumni Achievement Award by Santa Ana College, Santa Ana, Calif., at the June 1968 commencement.

DONALD C. CAMPBELL, a captain in the U.S. Navy, recently retired from the Navy after 27 years of service. Upon leaving his position as commander of the Naval Radiological Defense Laboratory in San Francisco, Campbell was presented with the Legion of Merit medal. He is now a staff engineer at Lockheed Missile and Space Co. in Sunnyvale, Calif.

DONALD S. NICHOLSON was recently appointed associate head of the Electrical and Optical Department in the Electronics Division of the Aerospace Corporation in El Segundo, Calif. Formerly manager of the optical systems section in the Electronics Division, Nicholson joined the Aerospace Corporation in 1965.

1942

JACK C. HOAGLAND, an engineer with the McDonnell Douglas Astronautics Company's Western Division in Huntington Beach, Calif., is a recipient of the M. Barry Carlton Memorial Award, presented by the Institute of Electrical and Electronic Engineers. Hoagland and a fellow engineer at McDonnell Douglas were cited for excellence in their paper on the difficulties of transmitting messages and data from Mars to Earth.

BENJAMIN F. HOWELL, JR., MS, PhD '49, professor of geophysics at The Pennsylvania State University, University Park, has been named assistant dean of the graduate school. Howell has been a member of the University faculty since 1949 and served as head of the department of geophysics and geochemistry from 1949 to 1963.

1943

LLOYD C. PRAY, MS, PhD '52, has left his position as a research associate at the Denver Research Center of Marathon Oil Company, where he has been since 1956, to accept a position as professor of geology at the University of Wisconsin, Madison. Pray was a staff member in the geology division at Caltech from 1949 to 1956.

1944

NEVILLE S. LONG, MS '48, has assumed the newly created position of executive representative in the United Kingdom and Western Europe for the International Power Industrial and Metals Division of Bechtel Corporation, headquartered at Bechtel House in London. Long will deal primarily with the division's business development and operating relationships with clients in Great Britain and Western Europe. Prior to assuming the new position, he was an executive engineer in the firm's San Francisco office.

WARREN G. SCHLINGER, PhD '49, is the new director of Texaco Inc.'s Montebello, Calif., Research Laboratory. Schlinger was on the Caltech faculty from 1949 to 1953, when he joined Texaco at the Montebello Laboratory as a chemical engineer.

ROBERT S. WILLIAMS, MS, is a project manager with the Martin Marietta Corporation in Denver. He is living in Littleton.

1945

DONALD B. DUNCAN, PhD '51, has been appointed vice president and chief technical officer of The Singer Company, New York. He will have responsibility for the company's research and development, manufacturing services, and patent and technology utilization activities. Duncan joins Singer from Litton Industries, where he had been a corporate vice president and president of the guidance and control systems division for the past two years.

EDWARD R. ELKO has been appointed vice president-operations for the newly formed McDonnell Douglas Astronautics Company's Western Division, Huntington Beach, Calif.

HARRISON W. FOX is currently senior vice president in charge of mortgage lending with First Federal Savings and Loan Association in St. Petersburg, Fla.

HUGH S. WEST, director of training for Connecticut General Life Insurance Company, Hartford, has been named director of agency development. West joined the company in 1953.

1946

ALI B. CAMBEL, MS, is the new dean of the College of Engineering at Wayne State University, Detroit. Cambel was Walter P. Murphy Distinguished Professor in the mechanical engineering and astronautical sciences department at Northwestern, a position he had held since 1956. He had been on leave from Northwestern since 1966 and was vice president for research for the Institute for Defense Analyses.

SAMUEL T. MARTNER, MS, PhD '49, assistant chief geophysicist with the Pan American Petroleum Corp., has been promoted to geophysical research director at the company's headquarters in Tulsa, Okla.

1947

WILL RICHESON, JR. is now first vice president of Dean Witter & Co. in Los Angeles. He joined the company as sales coordinator in 1951, became an analyst in the research department in 1957, and was named a partner with the underwriting and syndicate departments in 1960.

ARTHUR TRABANT, PhD, has been elected president of the University of Delaware in Newark. Formerly vice president for academic affairs at Georgia Institute of Technology, Atlanta, Trabant assumed his new position in September. Prior to his position at Georgia Tech, which he accepted in 1966, he was at Purdue University for 13 years and at the State University of New York at Buffalo for 6 years.

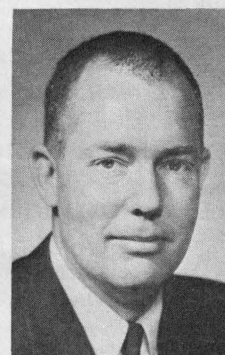
1948

KEITH W. HENDERSON, a staff engineer of the Stanford Linear Accelerator, is a new national director for the National Society of Professional Engineers, representing the California Society of Professional Engineers.

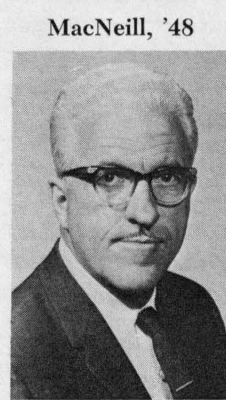
ROBERT J. MacNEILL, vice president of Kaiser Aluminum Technical Services, Inc., and senior technical advisor to Placer Exploration Ltd. of Australia, has been named a director of Placer Exploration, a company jointly owned by Placer Development Ltd. of Canada and Kaiser Aluminum & Chemical Corporation. MacNeill will be located at the headquarters of Placer Exploration Ltd. in Sydney, Australia.



West, '45



Richeson, '47



MacNeill, '48



Cestari, '55

THOMAS VREBALOVICH, PhD '54, engineer-scientist at Caltech's Jet Propulsion Laboratory, has accepted a two-year teaching assignment in Kanpur, India. He has been granted a leave of absence to accept this position with a project that is sponsored by Caltech under the auspices of the U.S. State Department.

1949

DAVENPORT BROWNE, JR. has joined the office of the campus architect at Caltech as construction manager. He has been a member of Stanford University's staff for the construction and activation of its linear accelerator for the past seven years.

ARTHUR E. BRYSON, JR., MS, PhD '51, became professor of applied mechanics, aeronautics, and astronautics at Stanford University in July. He had been on the faculty of Harvard University since 1953 and professor of mechanical engineering there since 1961.

ROBERT P. CRAGO, MS, is the new vice president of IBM's federal systems division and general manager of the division's communications and engineering sciences center in Gaithersburg, Md. He was formerly director of civil programs for the division.

SAMUEL N. DOMENICO, MS, geophysical research director at the Pan American Petroleum Corp.'s research center in Tulsa, Okla., has been named chief geophysicist there.

HEINZ G. PFEIFFER, PhD, has been appointed manager of the educational technology program at the General Electric Research and Development Center in Schenectady, N.Y. He will direct GE's efforts to achieve broader understanding of educational needs and coordinate the company's work in educational technology. Pfeiffer joined the research laboratory in 1948.

1950

R. REHA MESARA is the Turkish civil engineer on a joint Turkish-American project for water supply and disposal for the city of Ankara.

Coming Caltech Events

- Dec. 1, 3:30 p.m.,** Beckman Auditorium. Coleman Concert. Duetri Ensemble.
- Dec. 3, 8 p.m.,** Beckman Auditorium. Tuesday Nights at the Silent Movies. "The Big Parade."
- Dec. 3, 8 p.m.,** Dabney Lounge. Talk by canon lawyer Stephan Kuttner. "So What's New in the Vinland Map?" Free.
- Dec. 7, 8:30 p.m.,** Beckman Auditorium. Leonard Pennario, pianist.
- Dec. 8, 8:15 p.m.,** Dabney Lounge. Chamber Music Concert. Les Harpes Harmoniques. Free.
- Dec. 10, 8 p.m.,** Beckman Auditorium. Tuesday Nights at the Silent Movies. "An Evening of Comedies."
- Jan. 19, 8:15 p.m.,** Dabney Lounge. Chamber Music Concert. International Piano Quartet. Free.
- Jan. 25, 8:30 p.m.,** Beckman Auditorium. Roger Wagner Chorale.
- Jan. 26, 3:30 p.m.,** Beckman Auditorium. Coleman Concert. Juilliard Quartet.
- Feb. 2, 8:15 p.m.,** Dabney Lounge. Chamber Music Concert. Di Tullio Trio. Free.
- Feb. 7, 8, 8:30 p.m.,** Beckman Auditorium. University of Utah Repertory Dance Theater.
- Feb. 9, 3:30 p.m.,** Beckman Auditorium. Coleman Concert. Pro Musica, New York. Medieval and Renaissance Music.
- Feb. 14, 8:30 p.m.,** Beckman Auditorium. Kipnis Mime Company of Israel.
- Feb. 23, 8:15 p.m.,** Dabney Lounge. Chamber Music Concert. Valley String Quartet. Free.
- Feb. 28, 8:30 p.m.,** Beckman Auditorium. Isaac Stern, violinist. ☐

1953

WILMER A. JENKINS II, PhD, assistant manager of the Newport, Del., plant of E. I. du Pont de Nemours & Company, has been promoted to manager of the technical section of the company's Pigments Department. Jenkins began working for Du Pont in 1952 as research chemist in the Experimental Station.

MAURICE A. ROBKIN is a professor in the department of nuclear engineering at the University of Washington, Seattle.

1954

JAMES L. HIEATT, MS, has been promoted to manager of the electro-optics department of the sensor systems laboratory of the Systems Group of TRW Inc., Redondo Beach, Calif. Formerly assistant department manager, he joined TRW nearly ten years ago as a member of the technical staff in the controls analysis section.

KENNETH D. JOHNSON, PhD, a staff member of the Manufacturing Chemists Association in Washington, D.C., was recently named chairman of the Washington chapter of the American Institute of Chemists.

1955

VINCENT M. CESTARI, MS, has become a research associate at Eaton & Howard, Inc. Cestari was formerly manager of the Economic Analysis Department of Honeywell, Inc. He has wide educational and training background in research, particularly in the computer-electronics area.

ALBERT J. LIEBER is now in the test division of the Los Alamos Scientific Laboratory in New Mexico. He was previously employed by Varian Associates in Palo Alto, Calif.

1956

HUBERT E. DUBB is moving to Chicago where he will be a patent solicitor for Corn Products Company. He got a PhD from Yale in 1959 and an LLB from San Fernando in 1967.

CHARLES A. NORMAN, a division geologist for the Continental Oil Company in Corpus Christi, Tex., has received a 1968-69 Sloan Fellowship to study at MIT's Alfred P. Sloan School of Management in Cambridge. The fellowship program trains promising business and government executives in management, preparing them for future leadership positions. Norman joined Conoco in 1956.

JAMES F. POAGE, MS, has been promoted to head of the computer department at Bell Telephone Laboratories in Murray Hill, N.J. His new responsibilities include long-range planning and system programming. Poage joined Bell Laboratories in 1955 and has been supervisor of the information systems research group since 1963.

ROBERT L. SHACKLETT, PhD, professor of physics at Fresno State College and a faculty member there for the past 13 years, is the new assistant academic vice president at the college.

1957

PAUL H. KING, MS, '61, has been promoted to the rank of associate professor at Virginia Tech College of Engineering in Blacksburg. Formerly at the University of Kentucky, King joined the civil engineering faculty at Virginia Tech in 1966.

PHILIP M. PLATZMAN, MS, PhD '60, a member of the solid state and plasma physics research department at Bell Telephone Laboratories in Murray Hill, N.J., was recently promoted to head of the department.

RICHARD E. SKINNER, MS, has been elected vice president of Parzen Research, Inc., a subsidiary of Ovitron Corporation, in Westbury, L.I., N.Y. Skinner was previously with North American-Rockwell, RCA, and several smaller firms in the Washington, D.C., area.

1958

WARREN V. BUSH, PhD, an engineer at the Shell Development Company research center in Emeryville, Calif., has been named supervisor in petroleum processing. He joined the research center staff in 1957.

RICHARD T. COWLEY, MS '59, is living in Huntsville, Ala., doing S-IC propulsion system work for the Boeing Company, where his wife is also an engineer. He is devoting more and more time to his pet project—flying and working on the airplane he purchased shortly after transferring to Huntsville from Seattle, Wash., several years ago.

ROBERT E. HUFFMAN, PhD, spent the 1967-68 academic year in the spectroscopy group in the Department of Physics at Imperial College, London. He has now returned to his position as a research chemist with the spectroscopic studies branch of the aeronomy laboratory of the U.S. Air Force Cambridge Research Laboratories in Bedford, Mass.

EDWIN M. PERRIN, MS, is a new research evaluation group leader in the Dow Chemical Company's Midland division production economics department in Michigan. Perrin joined Dow in 1962 in chemical sales and has served in industrial chemical sales and in economic evaluation.

1959

WILLIAM L. KO, MS, PhD '63, a senior research engineer at the Southwest Research Institute in San Antonio, Tex., has achieved special recognition for his work as a water-colorist. His recent painting of the LBJ Ranch is now in the collection of President Johnson.

KAYE D. LATHROP, MS, PhD '62, has joined the staff of the theoretical division of the Los Alamos Scientific Laboratory in New Mexico. He was formerly with Gulf General Atomic in San Diego.

WILLIAM O. McCLURE is now in the biochemistry division of the department of chemistry and chemical engineering at the University of Illinois at Urbana. He moves there from Rockefeller University in New York.

NORMAN J. ZABUSKY, PhD, supervisor of the plasma physics research group at Bell Telephone Laboratories since 1963, has been promoted to head of the plasma and computational physics research department in Murray Hill, N.J.

1960

MARSHALL LAPP, PhD, a physicist in the optical physics branch of the General Electric Research and Development Center, has been awarded a British Science Research Council fellowship to do post doctoral work in physics at the University of Newcastle upon Tyne, England. Lapp began a year's sabbatical from GE in October to assume the post of Science Research Council Senior Visiting Fellow in the University's school of physics, department of atomic physics.

1961

ROBERT L. HEATH is currently working in the department of biology at the Brookhaven National Laboratory in Upton, L.I., N.Y. He received his PhD in biophysics from the University of California at Berkeley in September 1967.

DOUGLAS S. JOHNSON, MS, AE '62, a major in the U.S. Air Force, was recently awarded the Bronze Star Medal with "V" device at Bien Hoa, Vietnam. He was decorated for "valorous actions following an intense and accurate rocket and mortar attack on the flight line at Bien Hoa." Johnson is serving as a fighter pilot and advisor in the 23rd Vietnamese Tactical Wing at Bien Hoa.

CLEVE B. MOLER is an assistant professor of math at the University of Michigan in Ann Arbor.

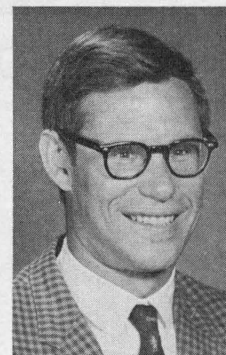
KENNETH W. WOOD, MS, has been appointed project evaluation manager in the new projects department of Shell Chemical Company's industrial chemicals division in New York. Wood has been with Shell at the research center in Emeryville, Calif., for seven years.

1962

JOHN R. GOLDEN has joined ITT Data Services as an applications specialist in the market development department in Paramus, N.J. He will have primary responsibility for defining and specifying scientific applications for the company's time-shared computer service.



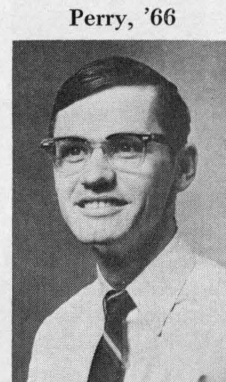
Poage, '56



Platzman, '57



Lapp, '60



Perry, '66

LAWRENCE W. HALLINGER, MS, PhD '67, senior project engineer for the U.S. Navy's Civil Engineering Laboratory, is in charge of one of five teams taking part in a probe of the continental shelf on the Navy's third undersea mission—Sealab III—which goes down to a depth of 620 feet near San Clemente Island off the California coast later this year.

GARLAND R. MARSHALL JR. is now assistant professor in the Department of Physiology and Biophysics and the Department of Biological Chemistry at the Washington University School of Medicine in St. Louis, Mo.

1963

BRIAN C. BELANGER has joined the General Electric Research and Development Center as an electrical engineer in the Metallurgy and Ceramics Laboratory in Schenectady, N. Y. Belanger received his PhD earlier this year from the University of Southern California in Los Angeles.

ARTHUR R. ROBINSON received his PhD in chemistry from the University of California at San Diego, La Jolla. He is now assistant professor of biology and a faculty member in the school of medicine there.

Continued on page 14

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 91109

Please send me: (Check one)

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

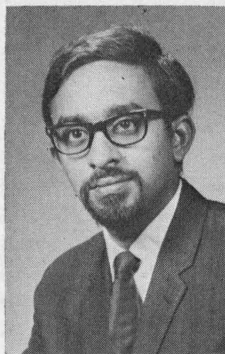
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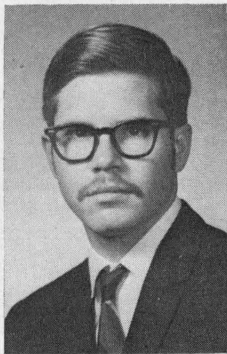
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PERSONALS

Continued from page 13



Shankar, '67



Rumbaugh, '68

1966

FRANCIS LATAPIE, MS, has accepted a two-year appointment as assistant to the scientific counselor in the office of the French Scientific Mission in Washington, D.C. He is living in Bethesda, Md.

WALLACE L. OLIVER JR., a graduate student in chemistry at Northwestern University in Evanston, Ill., has received a National Institutes of Health Predoctoral Fellowship.

EDWARD H. PERRY, MS '67, is the recipient of a Daniel and Florence Guggenheim Fellowship for study at the Guggenheim Jet Propulsion Center at Caltech for 1968-69. He is one of 10 leading young engineers to receive similar awards for the 1968 academic year.

1967

PATTAMADI N. SHANKAR, MS, PhD '68, has joined the General Electric Research and Development Center in Schenectady, N.Y., as a fluid mechanics engineer in the mechanical engineering laboratory.

GREGORY R. SHUPTRINE, who spent the summer in Europe after completing work for his masters degree at the University of Michigan, is working in New York for the Caltex Petroleum Corporation as a process engineer. After a training period, he will probably be given a two-year assignment in Australia.

1968

JAMES J. DUDERSTADT, PhD, has been awarded the Mark Mills Graduate Student Award of the American Nuclear Society for 1968. Duderstadt, a research fellow at Caltech, will move to the University of Michigan in January to become assistant professor of nuclear engineering.

WILLIAM G. FOWLER has been named project administrator, field programs, in IBM's field engineering division, which installs and services IBM data processing equipment. Fowler will be working at the division headquarters in White Plains, N.Y.

JAMES E. RUMBAUGH, MS, is a programmer at the General Electric Research and Development Center in Schenectady N.Y. He had been a summer employee at the center for the past two years.

FRANK J. WEIGERT, PhD, has joined the research staff of the Du Pont Company's central research department at the experimental station in Wilmington, Del. □

OBITUARIES

1925

PAUL C. RIVINIUS died suddenly on March 31, 1968, in Pasadena. He was the office manager for Guill, Blankenbaker and Co. of Pasadena.

1928

ROBERT D. BUCHANAN died in February at the age of 63. He had been active in the honey industry most of his life, having taken over the business from his family. He had extensive honey producing facilities in California and Minnesota.

1929

MAURICE F. HASLER, PhD '33, chairman of the board of Applied Research Laboratories in Sunland, Calif., was killed in a car-train collision in July. He was 61. Hasler was co-founder of Applied Research in 1934 and became chairman of the board in 1958 when it merged with Bausch & Lomb. The 1958 winner of the Beckman Award in chemical instrumentation, he was also the recipient of the Spectroscopy Society Award in 1967. He is survived by his wife, a son, and a daughter.

1938

A. HALL HUGHEY, MS, died September 3. Hughey was a dynamicist with the Lockheed Aircraft Company before his retirement, and had also worked for the Vultee Aircraft Co. and Douglas Aircraft Co. A memorial scholarship fund has been established in his name at Caltech.

1939

DAVID E. HOYT, executive vice president and manager of operations for The O.K. Earl Corp, died in June in Pasadena at the age of 51. Hoyt, a registered mechanical engineer, joined the Pasadena firm in 1962 and was named executive vice president in 1963. He is survived by his wife, a son, and a daughter.

1941

CHARLES B. ROEN, vice president, project development, for Holmes & Narver in Los Angeles died in July. He is survived by his wife, a daughter, and three grandchildren.

1947

HAROLD S. ANTHON, MS, general superintendent of engineering for the Chicago Transit Authority, died December 6, 1967, in Elgin, Ill. He was 49. Anthon, who joined CTA in 1948, was an administrator and coordinator for many important rapid transit extension and improvement projects financed by the City of Chicago and the federal government. Anthon was chairman of the plant and engineering division of the American Transit Association. He is survived by his wife.

1953

TAKEO ASAKAWA died in Claremont, Calif., October 26 after a long illness. He had been a senior engineer for Aerojet-General Corp., but retired a year ago for health reasons. He is survived by his wife, two sons, and his mother.

1954

STUART A. CAMERON, a senior design engineer for Infra Red Industries of Carpinteria, Calif., died on August 21 when he was struck by an automobile.

1968

GREGORY S. HARKNESS died in July. He is survived by his parents and two sisters. A memorial fund has been established in his name at Caltech. □

Address Unknown

The Institute has no record of the present addresses of these alumni. If you know the current addresses of any of these men, please contact the Alumni Office, Caltech.

1906

Norton, Frank E.

1907

Miller, James C.

1911

Lewis, Stanley M.

1921

Arnold, Jesse

1922

Cox, Edwin P.

1923

Neil, W. Harvey

1924

Carr, John

Gridley, Horace V.

Tracy, Willard H.

Waldo, Cornelius T.

1925

Waller, Conrad J.

1926

Chang, Hung-Yuan

Huang, Y. H.

Yang, Kai J.

1927

Peterson, Frank F.

1928

Chou, P'ei-Yuan

Martin, Francis C.

1929

Briggs, Thomas H., Jr.

Espinosa, Julius Nelson

(now Nelson, Julius)

Kibort, Leon

Lau, Kam H.

Robinson, True W.

Uyterhoeven, Wm.

1930

Chao, Chung-Yao

Moyers, Frank N.

Reynard, Willard G.

White, Dudley

1931

Ho, Tseng-Loh

Oaks, Robert M.

West, William T.

Woo, Shu-Chow

Yoshioka, Carl K.

1933

Downie, Arthur J.

Koch, A. Arthur

Larsen, William A.

Michal, Edwin B.

Muller, Jerome J.

Murdoch, Keith A.

Plank, Dick A.

Rice, Winston R.

Shappell, Maple D.

Smith, Warren H.

1934

Harshberger, John D.

Liu, Yun P.

1935

Antz, Hans M.

Beman, Ward W.

Bertram, Edward A.

Evans, M. Harrison

Huang, Fun-Chang

McNeal, Don

1936

Chu, Dien-Yuen

Meng, Chao-Ying

Tan, Chia-chen

Van Riper, Dale H.

Young, Larry L.

1937

Burnight, Thomas R.

Cheng, Ju-Yung

Easton, Anthony

Fan, Hsu T.

Jones, Paul F.

Lotzkar, Harry

Maginnis, Jack

Servet, Abdurrahim

Shaw, Thomas N.

Yin, Hung C.

1938

Goodman, Hyman D.

Gross, Arthur G.

Gutierrez, Arnulfo G.

Li, Yuan-Chuen

Lowe, Frank C.

Rhett, William

Tsao, Chi-Cheng

Wang, Tsun-Kuei

Watson, James W.

Woodbury, William W.

1939

Burns, Martin C.

Jones, Winthrop G.

Liang, Carr C-C

Oakley, Spencer W.

Wilson, Harry D.

1940

Akman, M. Seyfi

Compton, Arthur M.

Gibson, Arville C.

Green, William J.

Hsu, Chang-Pen

Karubian, Ruhollah Y.

King, James L.

Lovoff, Adolph

Menis, Luigi

Tao, Shih C.

Torrey, Preston C.

Wang, Tsung-Su

1941

Clark, Morris R.

Easley, Samuel J.

Geitz, Robert C.

Gould, Martin J.

Harvey, Donald L.

Kuo, I. Cheng

Robinson, Frederick G.

Standridge, Clyde T.

Vaughn, Richard

Yui, En-Ying

1942

Devault, Robert T.

Emre, Orhan M.

Go, Chong-Hu

Ip, Ching-U

Levin, Daniel

Martinez, Victor H.

Widenmann, John A.

1943

Angel, Edgar P.

Brown, James M.

Bryant, Eschol A.

Burlington, William J.

Eaton, Warren V., Jr.

Hamilton, William M.

Hillyard, Roy L.

Johnsen, Edwin G.

Kane, Richard F.

King, Edward G.

Koch, Robert H.

LaForge, Gene R.

Leeds, William L.

Leonard, James H.

Ling, Shih-Sang

Lundquist, Roland E.

Mampell, Klaus

McNeil, Raymond F.

Mowery, Irl H., Jr.

Nesley, William L.

Neuschwander, Leo Z.

O'Brien, Robert E.

Patterson, Charles M.

Pearson, John E.

Rivers, Naim E.

Roberts, Fred B.

Rupert, James W., Jr.

Scholz, Dan R.

Shannon, Leslie A.

Smithe, Thomas B.

Sweeney, William E.

Tindle, Albert W., Jr.

Vicente, Ernesto

Walsh, Joseph R.

Washburn, Courtland L.

Weis, Wm. T.

1944

Alpan, Rasit H.

Barriga, Francisco D.

Bell, William E.

Benjamin, Donald G.

Birlik, Ertugrul

Burch, Joseph E.

Burke, William G.

Cebeci, Ahmed

Cooke, Charles M.

De Medeiros, Carlos A.

Fu, Ch'eng Y.

Harrison, Charles P.

Hu, Ning

Johnson, William M.

Labanauskas, Paul J.

Leenerts, Lester O.

McBreen, Kenneth L.

Onstad, Merrill E.

Pi, Te-Hsien

Ridlehuber, Jim M.

Shults, Mayo G.

Stanford, Harry W.

Stein, Roberto L.

Sullivan, Richard B.

Sunalp, Halit

Tanvildiz, R. S.

Trimble, William M.

Unayral, Mustafa A.

Wadsworth, Joseph F., Jr.

Wight, D. Roger

Wolf, Paul L.

Wright, John J.

Yik, George

1945

Ari, Victor A.

Gibson, Charles E.

Ho, Chung P.

Jenkins, Robert P.

Loo, Shih-Wei

Rice, Jonathan F.

Tseu, Payson S.

Turkbas, Necat

1946

Allison, Charles W., Jr.

Austin, Benjamin

Behroon, Khosrow

Bowen, Mark E.

Brinkhaus, Harvey H.

Burger, Glenn W.

Chen, Ke-Yuan

Dyson, Jerome P.

Esner, David R.

Fateh, Hassan F.

Freire, Luis E.

Halvorson, George G.

Hoffman, Charles C.

Ingram, Wilbur A.

Lewis, Frederick J.

Maxwell, Frederick W.

McConaughay, James W.

Prasad, K. V. Krishna

Salbach, Carl K.

Shepard, Elmer R.

Sledge, Edward C.

Smith, Harvey F.

Srinivasan, Nateson

Tung, Yu-Sin

Webb, Milton G.

1947

Asher, Roland S.

Atencio, Adolfo J.

Chung, Ta-San

Clarke, Fredric B.

Clements, Robert E.

Collins, Hugh H.

Dagnall, Brian D.

Hsu, Chi N.

Huang, Ea-Qua

Lall, William G.

Leo, Fiorello R.

Linton, William M.

Manoukian, John

Molloy, Michael K.

Moorehead, Basil E. A.

Olson, Raymond L.

Page, Myron E.

Ray, Kamalesh

Rust, Clayton A.

Sappington, Merrill H.

Torgerson, Warren S.

Vanden Heuvel, George R.

Wan, Pao K.

Wellman, Alonzo H., Jr.

Wimberly, Clifford M.

Winters, Edward B., Jr.

Ying, Lai-Chao

1948

Agnew, Haddon W.

Au, Yin-C

Bunce, James A.

Chu, Tao-Hung

Chuang, Feng