

CALTECH NEWS

VOLUME 7, NUMBER 6, JULY 1973

PUBLISHED FOR ALUMNI AND FRIENDS OF THE CALIFORNIA INSTITUTE OF TECHNOLOGY

First women receive Caltech BS degrees

Change was the keynote of the 79th annual commencement of the California Institute of Technology held June 8 on Beckman Mall.

To the left of the graduates, with their parents and friends, rose the nearly completed behavioral biology building, sym-

bolizing a new frontier in Caltech research.

Marching in the gowned procession of seniors were the first four women in history to receive BS degrees from the Institute.

Doctoral candidates were especially honored for the first time in many years by having the titles of their dissertations read (but not explained) as they were awarded their PhD's.

This year there was no commencement speaker.

Arnold O. Beckman, PhD '28, making his ninth and final appearance at commencement exercises as chairman of the board of trustees, cited the changes that have taken place during his 50-year association with Caltech.

And President Harold Brown described some of the changes in undergraduate and graduate education that are being suggested for the future at the Institute.

Brown conferred 387 degrees, including 164 BS, 104 MS, 8 Engineer, and 111 PhD degrees. Six seniors received both BS and MS degrees. Among the bachelor degrees awarded were 43 in engineering, 108 in various sciences, and 13 in the social sciences.

A total of 88, or 54 percent of the seniors receiving BS degrees, maintained a B-plus or better average for four years and were graduated with honor. While this ties the record percentage of last year's graduating class, there were 11 more seniors graduated with honor this year.

Caltech's first four women graduates were among the honor students. They included Stephanie Charles of Alexandria, Virginia; Deborah Chung of Hong Kong; Sharon Long of Denver; and Flora Wu of Hong Kong. All plan to go on to graduate school.

In his concluding remarks, Brown said

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Davidson reports Alumni Fund is above \$340,000

The 1972-73 Alumni Fund had exceeded its goal of \$300,000 by more than \$40,000 as the year closed on June 30, according to Donald D. Davidson, BS '38, chairman. Davidson said the fund had received more than \$340,000 in alumni gifts and pledges and corporate matching grants.

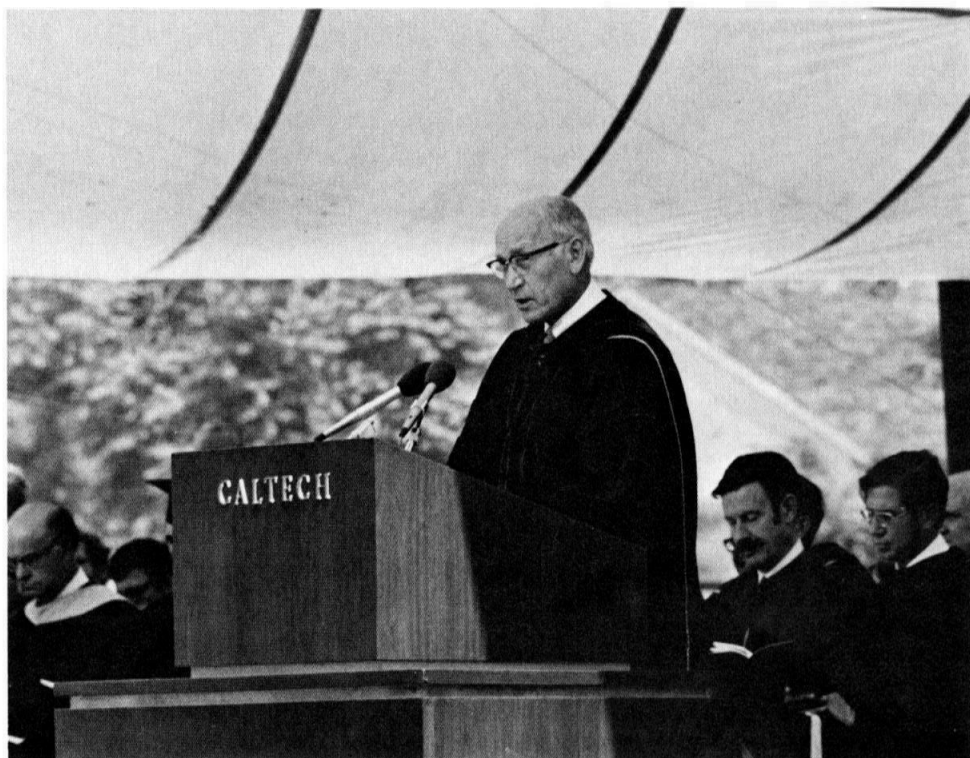
He explained that the \$340,000 figure includes the pledges that were to be paid by June 30 as well as cash on hand, so that the actual total will vary from the \$340,000 figure. He said a final accounting will be completed during the summer and a report mailed to all alumni in the fall.

Davidson expressed his appreciation to the Fund Council, the area chairmen, and the other Fund workers, to whom he gave credit for the Fund's success in surpassing its goal.

"Eighty percent of the dollars received came from alumni who were contacted personally," Davidson said. "It was the efforts of these workers—talking with alumni throughout the country—who made it possible for us to achieve this success."

Davidson said the Council is pleased that the average gift was more than \$180.

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Arnold O. Beckman, PhD '28, chairman of the board, presides over commencement for last time.

Butler succeeds Spaulding as president of association

Stuart M. Butler Jr., BS '48, accepted the gavel as new president of the Caltech Alumni Association from the outgoing president, Arthur O. Spaulding, BS '49, MS '58, during the annual Alumni Din-

ner at the Athenaeum, June 1.

A resident of Pasadena, Butler is the executive vice president for administration of the William Simpson Construction Company, Division of the Dillingham Corporation. He has been active in alumni affairs and was vice president of the Association last year.

Other new Alumni Association officers announced at the dinner include: vice president Raymond L. Heacock, BS '52, MS '53, Altadena, spacecraft systems manager, Mariner Jupiter-Saturn 1977 Project, the Jet Propulsion Laboratory; secretary Stanley T. Wolfberg, BS '38, Pasadena, administrative officer, division of engineering and applied science, Caltech; and treasurer Fred A. Wheeler, BS '29, Los Angeles, retired.

New directors of the Association are G. Louis Fletcher, BS '56, MS '57, Red-

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Stuart M. Butler Jr., BS '48 (left), takes over presidency from Arthur O. Spaulding, BS '49.

STUDENT AWARDS

Clark Award

Gregory Griffin, a sophomore from Novato, Calif., and Richard Baker, a junior from Encino, were chosen to receive the Donald S. Clark Alumni Awards of \$500 for their potential leadership qualities and academic performance. Both are engineering undergraduates.

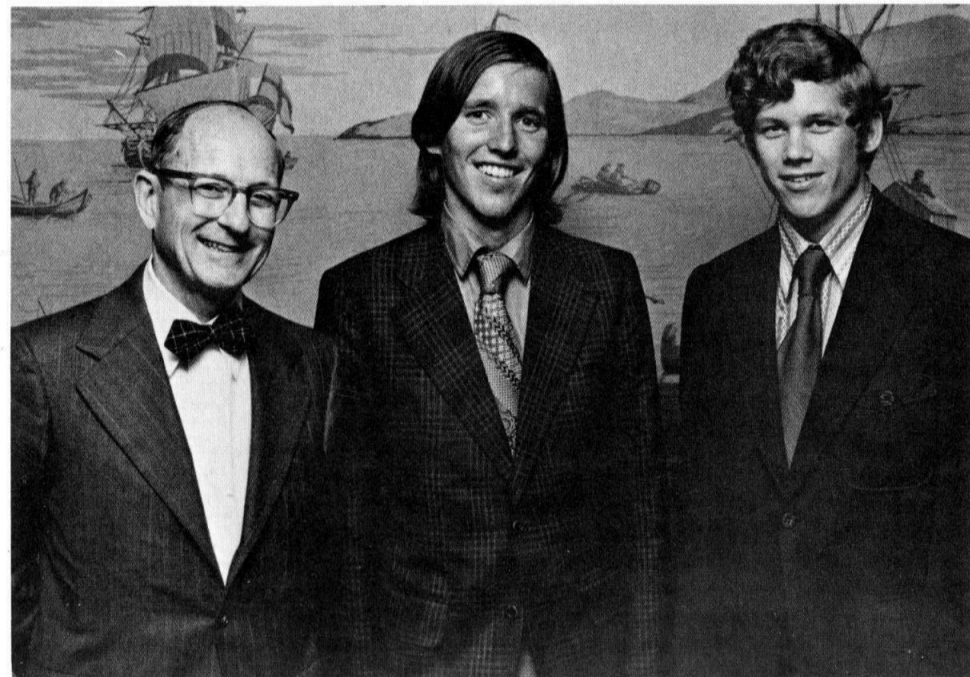
Clark Awards of \$500 each are made annually from funds contributed by the Caltech Alumni Association to honor

Donald S. Clark, professor of physical metallurgy, who was secretary of the Alumni Association for more than 26 years.

Fisher Award

Edmund G. Sutton of Baltimore was elected by a physics faculty committee as the junior demonstrating the most promise for future contributions to the field of physics. He was cited as a student with

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Donald S. Clark, professor of physical metallurgy, meets with students Gregory Griffin (center) and Richard Baker after they were chosen to receive the Donald S. Clark Alumni Award.

Top aeronautics graduates receive Douglas Fellowships

Two college seniors with outstanding records in aeronautics have been chosen to receive the first Donald Wills Douglas Graduate Fellowships at Caltech's Graduate Aeronautical Laboratories.

The fellowships are supported by a fund initiated last year by Jackson R. McGowan, president of Douglas Aircraft Company, to honor the famed aviation pioneer on his 80th birthday. More than 100 corporations in the United States and foreign countries, as well as personal friends of Donald Douglas, contributed.

The fellowships include a stipend of \$6,000 per year, plus tuition and an allowance for dependents. They are awarded for one year and can be renewed for an additional two years.

The first recipients are Keith Koenig, Xenia, Ohio, a senior at Mississippi State University, and Robert E. Breidenthal, Jr. of Wichita, Kansas, a senior at Wichita State University.

In announcing the Douglas Fellows, Hans Liepmann, professor of aeronautics and director of GALT, said, "We're convinced that the future demands better technology, not less technology; and not simply more specialists, but engineers with wide interests and a thorough grounding in science as well as engineering. Douglas fellows are selected to fill

this bill because they've demonstrated outstanding scholastic ability as well as creative imagination."

Koenig has earned the highest grade point average of any student in aerospace engineering at Mississippi State University in the past 25 years. He was named as one of the top 20 military engineers in the nation by the Society of American Military Engineers. Koenig also received an Outstanding Engineer Award from Phi Kappa Phi, honorary scholastic fraternity.

He has been conducting research on the design of a hydrofoil boat and on air turbulence of rotating wings for the U. S. Army.

Breidenthal was employed last summer as a student engineer at the Boeing Company. He has been doing research for NASA on modifying a Piper Seneca aircraft for improved climbing performance and has been studying ways to weaken the tornado-like vortices that form inside the air inlets of turbine aircraft. These vortices cause engine damage by sucking up debris.

Breidenthal received one of eight national awards for excellence from Sigma Gamma Tau, honorary aerospace fraternity.



At the June 1 Alumni Dinner, Robert L. Daugherty, professor emeritus of mechanical and hydraulic engineering, was named an Honorary Alumnus.



Among the classes holding reunions this year were (from top) 1973, 1933, and (below) the class of 1923 which was inducted into the Half-Century Club at the Huntington-Sheraton Hotel.



Classes hold reunions

Continued from page 1

lands, chief engineer, San Bernardino Valley Municipal Water District; John D. Gee, BS '53, Pasadena, assistant sales manager, Bethlehem Steel Corporation; Robert B. Grossman, BS '33, La Canada, vice president, ASD Properties; and Leon T. Silver, PhD '55, Pasadena, professor of geology, Caltech. Serving a one-year term will be Rea A. Axline, BS '31, president, Metco Inc., New York.

In a ceremony during the evening, Robert L. Daugherty, professor emeritus, mechanical and hydraulic engineering, and Bert LaBrucherie, recently retired coach at Caltech, were named Honorary Alumni in recognition of their contributions to the Caltech community.

Anthony Day, editor of the editorial pages of the *Los Angeles Times*, was the featured speaker. He discussed the way the *Times* determines its editorial policy.

Classes that had held reunions earlier in the day—and that were introduced at the dinner—included 1968, 1963, 1958, 1953, 1943, 1938, 1933, and 1928. A special welcome was given to members of the class of 1973.

Introduced to alumni were recipients

Alumni Fund exceeds goal

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"If many of those who didn't give will be as generous as those who did contribute this year, the 1973-74 Fund will be an even greater success," he said.

Davidson said that as the year closed contributions had been received from about 1,800 alumni—short of the goal of 3,500 donors. But he is confident that alumni participation will increase every year as the area chairmen continue to contact alumni on an individual basis.

Commenting on the value of the Fund to Caltech, he said the general operating fund enables the Institute to carry on a lot of important projects that otherwise wouldn't be done.

"Although the Alumni Fund represents a small part of Caltech's total operating budget, it is a highly important portion," he said. "The Fund provides the Institute with its most valuable kind of income—general operating money."

"Operating funds of this type are the most important money any business—or any university—can obtain. A lot of the money the Institute receives is earmarked for a specific purpose—or is unpredictable in its regularity. Providing Caltech with a consistent source of income that has no strings attached is one of the most important contributions the alumni can make."

President Harold Brown expressed appreciation to the alumni donors by saying, "No university can survive without operating funds. They provide the foundation that enables all of Caltech's other programs to continue. The Alumni Fund will make a tremendous contribution in enabling the Institute to maintain its role as one of the world's leading institutions in science and technology."

of the Donald S. Clark awards—Richard Baker, a junior, and Gregory Griffin, a sophomore.

Members of the class of 1923 had been inducted into the Half-Century Club earlier in the day at a special luncheon at the Huntington-Sheraton Hotel. They were joined at the luncheon by alumni of all classes graduating before 1923, for a total attendance of 85.

Reuben B. Moulton, past president of the Alumni Association, welcomed the new members and presented each one with a membership card and a certificate. Then each alumnus described what he'd been doing in the 50 years since his graduation.

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Meetings: University Club, 917 "H" St. Luncheon second Friday of each month at noon. Visiting alumni cordially invited—no reservations.

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Alumni profile

Guy Stever earned his PhD cold

by William K. Cassell

If anyone ever earned his doctorate the hard way at Caltech, it was H. Guyford Stever, PhD '41, who measured the lifetime of a mesotron (now called a meson) on the highest mountain lake in North America.

Stever, director of the National Science Foundation, vividly remembers the research expedition he went on to Lake Tularinyo, near Mt. Whitney, with fellow graduate students Robert Hoy, MS '39, and Hugh Bradner, PhD '41.

"Our first problem came when Bradner and I tipped over our boat," Stever recalls. "The water was 38 degrees Fahrenheit and the air was well below freezing. Our clothes were freezing on us, so we had to take them off and run down the mountain to our camp about two miles away. We met Hoy coming up the mountain with a mule to pick up the equipment. He was so surprised to see us running down the mountain naked he almost fell off the cliff behind him."

"Then we were hit with an early snow storm," Stever continued. "It was toward the end of September and we were caught by surprise. We were slowed down and had to wait for it to clear up. Our food ran out and we were about ready to give up, but we finally made it back with the data."

Stever says he chose to do his graduate work at Caltech because of the Institute's personal approach, and it is the personal influence of his professors that he still remembers most about his years in Pasadena.

When he earned his BS degree from Colgate in 1938, Stever received letters of acceptance from five graduate schools—UC Berkeley, Harvard, Illinois, Rochester, and Caltech.

"Only two of those letters had a personal touch," he recalls, "Robert Millikan's from Caltech and Lee DuBridge's from Rochester." And Stever adds, "I later worked for DuBridge at the MIT radiation lab."

Stever did his research in cosmic rays under Victor Neher, whom he remembers as a "superb experimentalist." He also received help on his thesis from several faculty members including Robert Oppenheimer, who was dividing his time between Pasadena and UC Berkeley.

"When I got back from the trip and developed the data, I still had to work out the complex theory behind the experiment," Stever says. "I remember walking back from lunch at the Athenaeum with Oppenheimer and going into my research room in Bridge. I was sitting at my desk when Oppenheimer came in and lectured to me all afternoon. I took notes at a high pace, and it took me a semester to understand what he had explained to me."

Stever not only worked with Millikan and Neher in his cosmic ray research, he also worked for Millikan as a tour guide.

"Millikan asked if I would help him show the campus to important visitors," Stever recalls, "I always wondered how he decided which important visitors he would take and which I would take. I concluded that the important visitors who were not going to give money went with me on the tour."

"I remember taking visitors into the lab of Thomas Hunt Morgan. I showed them the Erlenmeyer flasks filled with drosophila. I also took them to the high voltage lab in Kellogg and to the optical shop where grinding and polishing of the 200-inch mirror was under way."

Stever says he felt close attachment to the mirror because he worked summers for the Corning Glass Company in Corning, New York, where the mirror was made.

"I left Corning for my freshman year at Colgate just at the time Corning poured the first mirror blank," he recalls. "The first one was imperfect so they poured another. I was back working in packing and shipping in the summer of 1935 when they had the great flood in Corning. We worked overtime to protect the mirror from the water."

Stever remembers the late Ira Bowen, PhD '26, a professor of physics who became director of Palomar and Mt. Wilson Observatories, as a man from whom he learned a lot about the practicalities of testing scientific theories.

And Stever also remembers another of his physics professors, Nobel Laureate Carl Anderson, as "someone you could talk to over a milkshake in the Greasy."

William Fowler, Institute Professor of Physics, is one of the faculty members that Stever got to know the best. "Willie Fowler was an absolutely superb teacher," he says, "and he was personally a lot of fun."

Stever believes that the fact that graduate students can be so close to the great men of science is the secret of a Caltech education. "I went back and visited my old office in West Bridge," he recalls, "and there was that same feeling of faculty and graduate students working together."

"I hope Caltech doesn't break this tradition of the direct, close contact between professor and student," Stever says. "I think the Institute has reached sufficient size." He also feels that Caltech can prepare students for challenging careers in science without growing in size.

"Caltech has chosen its fields well—it is not stagnant," Stever says. "Its fields today are new versions of those existing in 1941. You can find excellence in every field."

For the incoming graduate student who is worried about getting a job when he finishes his PhD, Stever says, "If you really want to do physics research, do it. When I went through, jobs in physics were pretty scarce. I remember Bell Labs took one graduate a year—Charlie Townes (PhD '39) one year and Barney Oliver (MS '36, PhD '40) the next. It wasn't until 1941, when I graduated, that the gates began to open in industry, government, and universities."



H. Guyford Stever, PhD '41

Stever says he had to choose between offers to teach physics at Stanford or do war research at MIT. "It almost broke my heart to turn down the Stanford job," he recalls, "but there was a war going on and I felt I could contribute more by working at MIT on military research in radar."

After a year of doing research in the MIT radiation laboratory and instructing in the Officers Radar School, Stever served in London from 1942 to 1945 as science liaison officer for the Office of Scientific Research and Development.

For 24 years, Stever combined a career of teaching on the faculty at MIT and serving the U.S. government. He was Chief Scientist of the U.S. Air Force from 1955 to 1956 and has served as a member of the Advisory Panel on Science and Astronautics to the House of Representatives since 1959.

In recognition of his research and professional work in aeronautical engineering and space technology, Stever was elected to both the National Academy of Engineering and the National Academy of Sciences.

Stever was head of the departments of mechanical engineering, naval architecture, and marine engineering at MIT in 1965 when he was named president of the Carnegie Institute of Technology. He presided over the merger of Carnegie Tech and the Mellon Institute in 1967 and became president of the new Carnegie-Mellon University.

During Stever's tenure, CMU created a new School of Urban and Public Affairs and a College of Humanities and Social Sciences. It also launched a \$55 million fund-raising campaign in 1968.

At the end of 1971, Stever was nominated by President Nixon to a six-year term as director of the National Science Foundation. Since that time he has also become the chief spokesman for science in the U.S. government.

"I thought I was through asking for money when I left the university," Stever says, "but I am still battling to get money for science."

"Support of basic research is the fundamental mission of the NSF and at this time in history, basic research is not losing ground—but budgets are tight and likely to remain so. Our main job is to emphasize quality. Over the long term, I am confident that the people of the United States and the world will continue—and must continue—to support basic research."

"We are in tight fiscal times now," he says, "All universities will have hard times, but the ones with the highest-quality programs will do well in competition for grants from government and private foundations."

"Society will continue to support high-quality research. It will be up to the universities to be very careful in their choice

of priorities. They will have to get closer to the market place and consider the needs of society."

"I know that we need more expensive equipment to do research today. I lived through part of the transition from sealing wax to modern equipment in the laboratory. But the quality of the research must still be good and that takes excellent people, not just larger facilities."

"An unfortunate part of the fiscal squeeze is that possibly its greatest impact falls on young researchers."

One of the sharpest cuts in government support of education has been the reduction of graduate fellowships. Stever would like to see an increase in the number of fellowships again, but he believes the day is over when every graduate student can expect to be supported.

"If one carries the business of support to the point where it becomes automatic, people can get the attitude that the world owes them a living. I personally feel any human endeavor is better if it's a competition."

Although there seems to be a slight surplus of graduates in science, Stever believes the best young scientists will always be in demand. He also feels the need for scientists and engineers will increase again in the next ten years.

"The problem," he says, "is that it takes ten years to get someone into a field from the freshman year in college, and changes in fields have a shorter time constant."

Despite the complexity of the manpower problem, Stever does not believe that controls are the answer.

"If a person is talented and interested in a field, whether it is astrophysics or biology, he should go into it. I believe the manpower situation will adjust to the individual who is motivated enough to be a scientist."

Although science and technology has come under criticism in recent years, Stever believes scientists should not feel defensive.

"If scientists are responsible and can communicate on a broad scale with other segments of society, they will have no problem competing for support," he says. "I believe America has an important impetus to maintain its position of leadership in science and technology."

"First, there is the economic competition. Without strong programs in basic science and technology, we will not remain a front-runner. Second, people of the world are just realizing the impact of man on the environment. They are going to demand new ways of doing things to protect the environment that will require new scientific solutions."

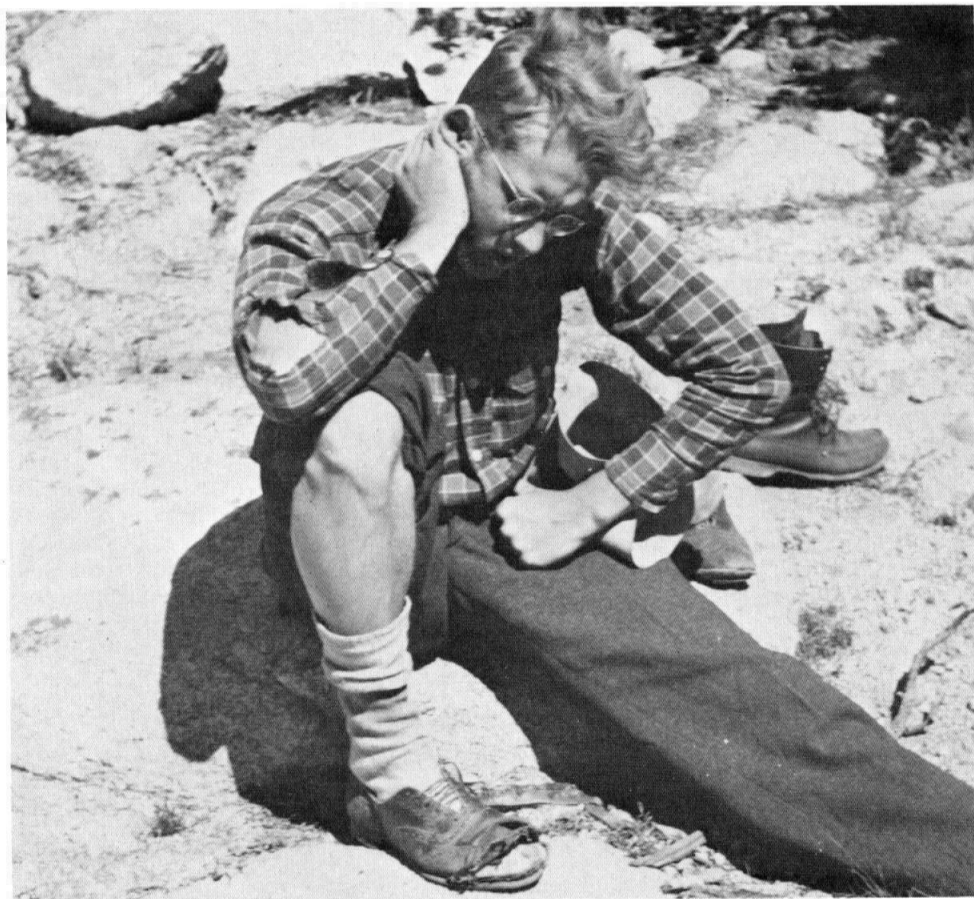
"There will also be all sorts of other services that an affluent society will demand, such as a larger supply of clean energy, effective mass transportation, and better health services that will need both basic and applied science."

"We can either do both basic and applied science in reasonable proportions or oscillate between them. I believe we ought to do both, but we will have to establish some priorities."

"It is easy to decide what to support when you have a war or a space race, but choices become more difficult, with many differing value judgments being expressed, when you are trying to improve the quality of life. But maybe we are becoming more mature. There are more educated people today, and I think there is more understanding of human values in life, also more well-expressed disagreement."

"Science will win or lose influence, not because of the power of a single spokesman, but rather by the willingness of all scientists to work and help us to establish priorities that reflect the human needs of society and then to communicate an understanding of the role of science in reaching these priorities."

Battling in Washington for funds to support scientific research is not the easiest task, but after you have fallen in a lake at 38 degrees Fahrenheit on a sub-freezing day to measure the lifetime of a meson, you don't give up easily. Science could not ask for a better spokesman than H. Guyford Stever, PhD '41.



The future director of the National Science Foundation examines a research problem in 1939.

Changes mark 79th commencement

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that an ad hoc committee on the undergraduate program, whose chairman is James K. Knowles, professor of applied mechanics, has been looking into facets of undergraduate education at Caltech during the past year.

"Since the committee has not yet issued its report," Brown said, "I feel freer than I otherwise would to make a few comments of my own on undergraduate education at Caltech and some ways in which it might beneficially change in the future. In doing so, I am secure in the knowledge that what I say will not unduly—nor perhaps at all—influence the committee's report or subsequent events."

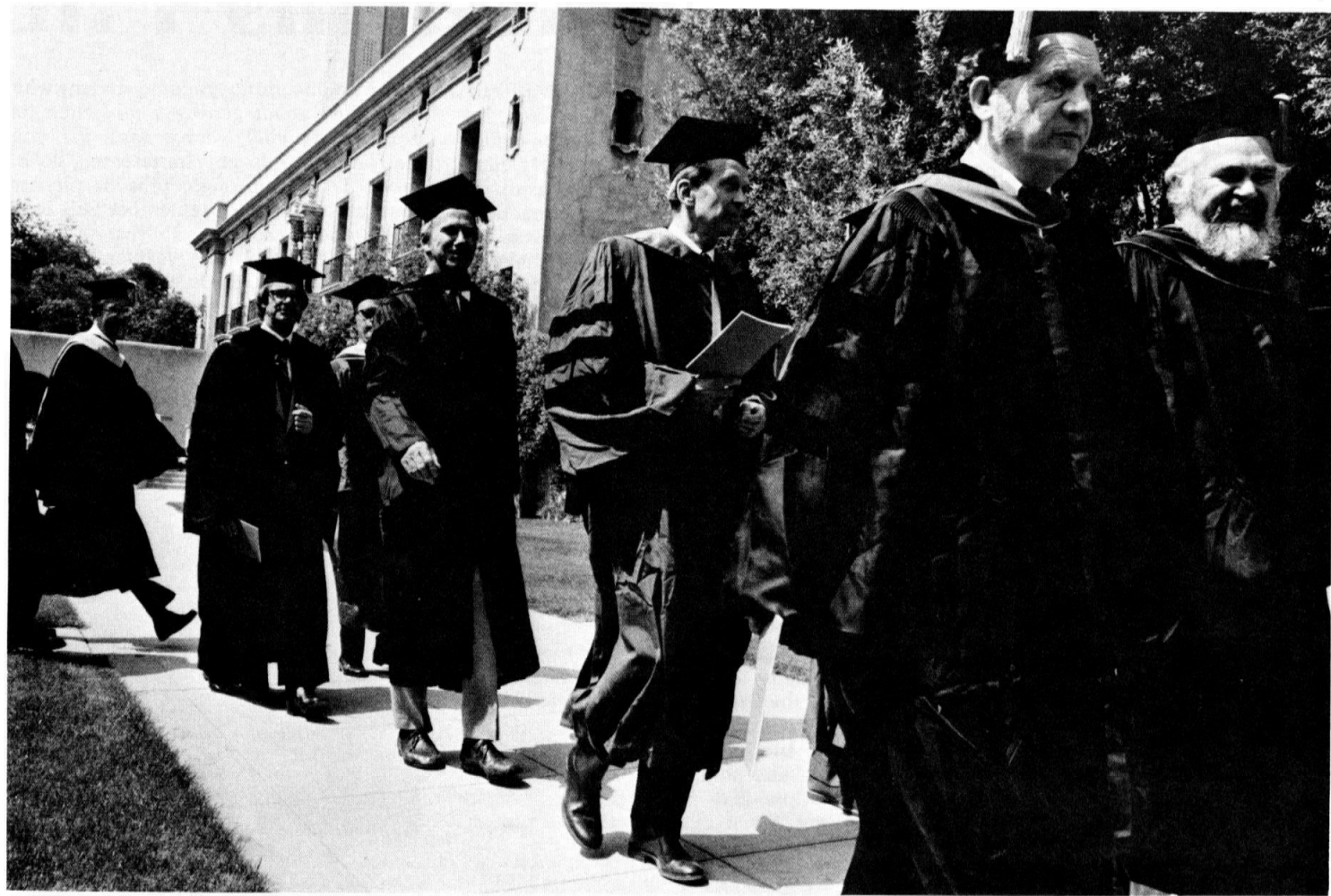
Noting that undergraduate life at Caltech is certainly influenced by the size of the undergraduate student body, Brown rejected the extreme alternatives of eliminating undergraduates or expanding the size of the student body to the 6,000 in universities like Harvard. Instead he made the assumption that during the next five years or so the undergraduate student body will be "within about 20 percent either way of what it is now."

"Our size, along with our preoccupation with excellence, forces us to specialize in the things we do," Brown said. "The education obtained here should provide some flexibility in vocation and profession, and a capability both as a person and as a citizen to understand the world, its traditions and trends, and the people in it. But there is an inevitable tension—educational tension, institutional tension, and, of course, financial tension—between the goals of specialization and of flexibility."

Brown told the commencement audience that it was his personal view that Caltech could and should facilitate diversity by indicating that it gives an education that is science-based and leads to graduate or professional study.

"Few of our undergraduates will end their academic education with their bachelor's degrees at Caltech," he said. "It seems to me at least possible that a larger fraction of them will be going on to professional education, not only to graduate work in science and engineering, but perhaps law or medicine or business or government."

Raising the possibility of putting more



Faculty members, garbed in traditional robes, join in procession to the steps of Beckman Auditorium for the 79th annual commencement.

emphasis in the curriculum on problem-oriented projects, Brown said, "Getting students interested in projects early in their academic careers is more than a possibility; many of them do it on their own initiative now. My observation is that we at Caltech now make such initiative possible; we certainly don't discourage it, but we don't push it very hard. I have heard estimates that 20 percent of the undergraduate students at Caltech do some research project work now; I fear that this is more a measure of their initiative than of our flexibility."

"It ought to be possible to put more emphasis on the problem-solving approach; I think a substantial subset of our students would then find their undergraduate careers more interesting and more productive."

"Such a move might very well change the mix of students attracted to undergraduate education at Caltech. It is likely to correspond more closely with what increasing numbers of them will do when they finish their professional training, and it will give them an earlier start on thinking in terms of working on a real

problem in a career outside the university.

"Inevitably the thought that an increasing fraction of Caltech undergraduates may later have careers outside the physical sciences or engineering raises the question of some of the Institute requirements, specifically those in math

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STUDENT AWARDS

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unusual understanding and commitment to science, and excelling in independent, long-term study and research.

The \$150 award was established by Mr. and Mrs. Coleman Fisher of Silver Spring, Md., in memory of their son who was killed during his junior year as a physics major at Caltech. The General Electric Foundation also contributes to the fund under the matching plan of their Corporate Alumnus program.

Green Prize

Michael Franz Yoder of Albuquerque, a junior, and Richard Francis Lyon of El Paso, also a junior, each received \$500 as co-winners of the George Green Memorial Prize for research and creative scholarship.

Yoder, a math major, won the prize for a paper describing original research which his professors say will make a substantial contribution to the field of mathematics. An engineering student, Lyon was selected for two papers on electronic communication that his professors describe as graduate level in quality.

Hinrichs Award

One of Caltech's first four women undergraduates—Sharon Long from Denver—and Russell Eugene McDuff from Suisun were co-winners of the Frederic W. Hinrichs Jr. Memorial Award. Each received \$100. This honor goes to seniors making the greatest contribution to the student body and showing outstanding leadership and citizenship.

McKinney Prize

Two seniors shared this annual prize for proficiency in writing. Bob Flake of Federal Way, Wash., and Hal McGee of Elmhurst, Ill., each received \$300. J. Kent Clark, who headed the selection committee, termed their writing "of high professional caliber."

Macpherson Prize

Chosen as the graduating senior in engineering who best exemplified excellence in scholarship was Lawrence C. Widdoes Jr. of Houston, who was awarded the David Joseph Macpherson Prize. Widdoes graduated in computer

science and will begin a PhD program in computer science at Stanford in September.

Froehlich Award

Gregory Paul Stone of Glennville, Calif., a junior, was recipient of the \$500 Jack E. Froehlich Memorial Award. This honor goes to the member of the top five percent of the junior class showing the most potential for an outstanding professional career.

Sigma Xi Award

Stanley Ernest Whitcomb, Englewood, Colo., designer of a new lightweight cosmic ray electron spectrometer telescope for deep space missions, received the \$500 Sigma Xi Award. A senior, he was chosen for his outstanding research in experimental physics.

Honeywell Award

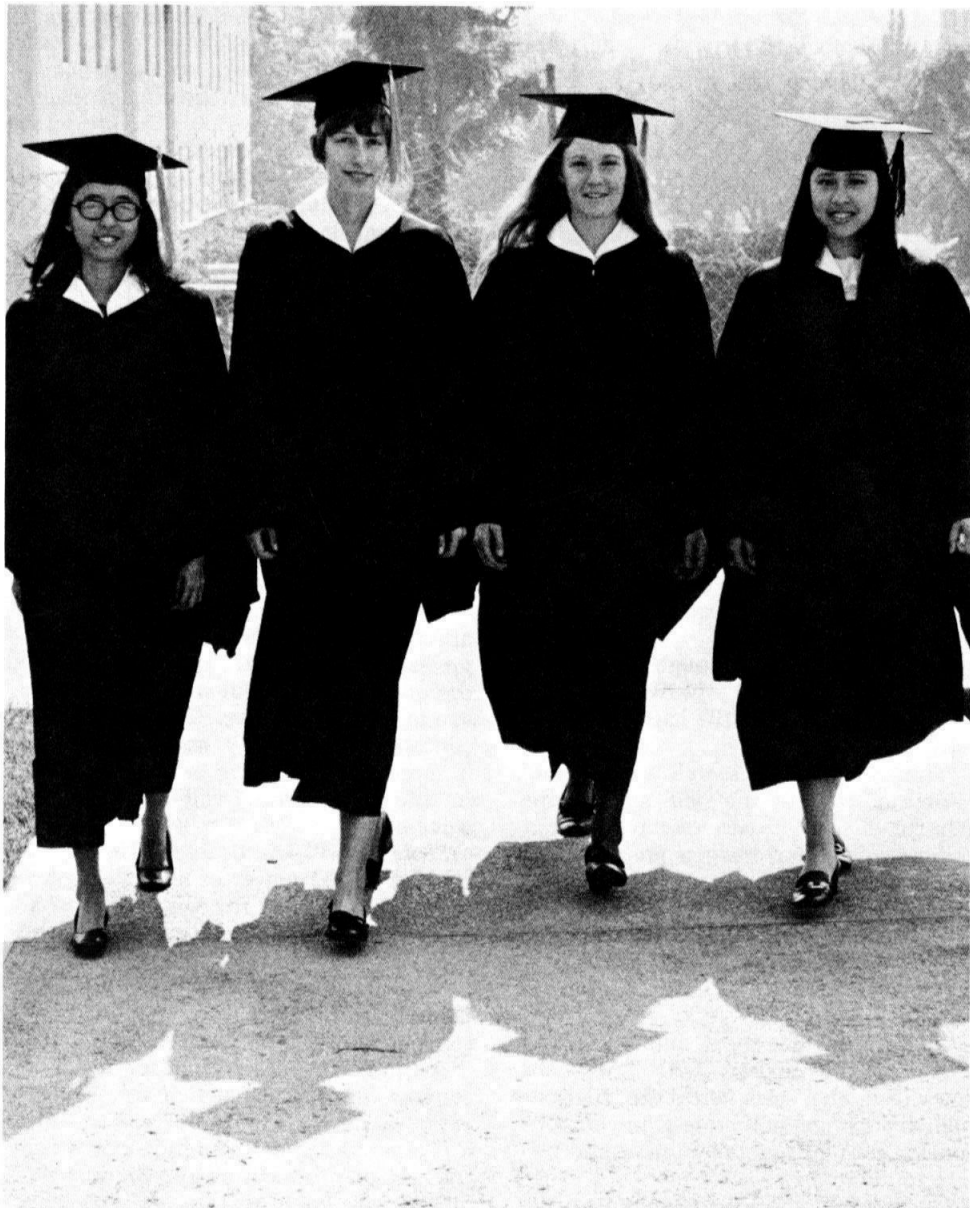
Thomas Herman, a junior, was given the Honeywell Award as the undergraduate student showing the greatest individual performance in engineering and science. He received \$200 and a silver tray. A native of Torrance, he is working toward a BS in electrical engineering, and is especially interested in semiconductor devices and integrated circuits.

Bell and Ward Prizes

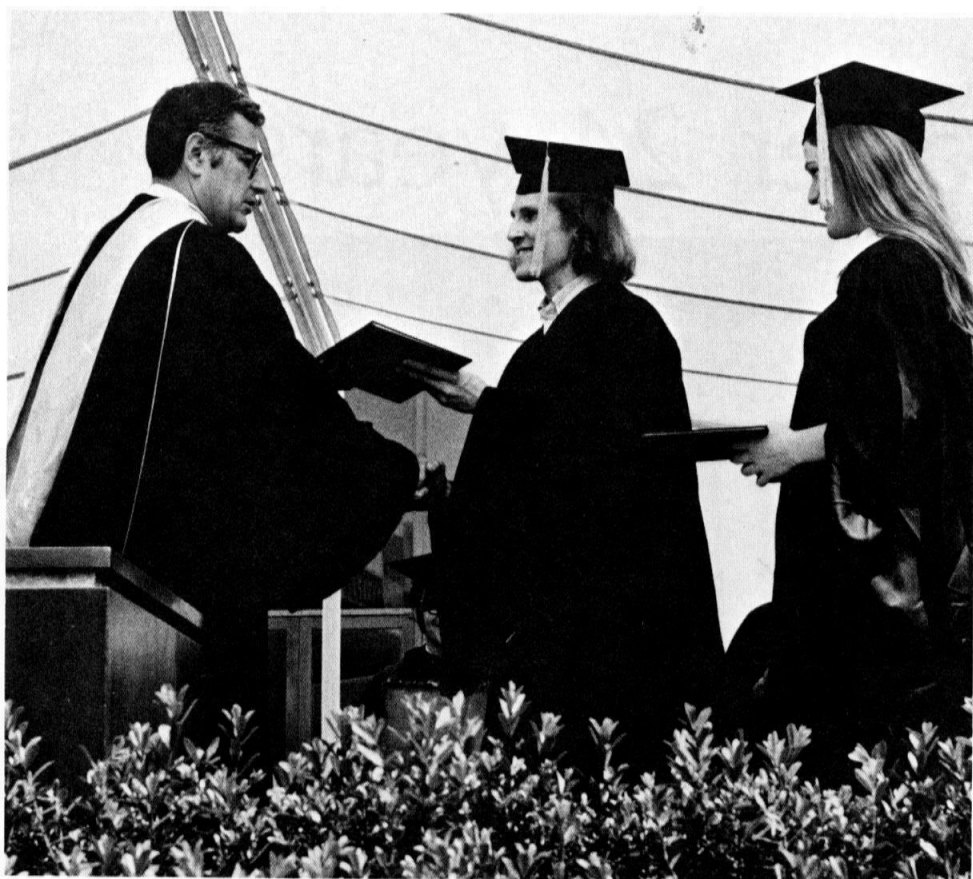
Bruce Reznick, a senior, was awarded the Eric Temple Bell Undergraduate Mathematics Research Prize of \$150 for his paper entitled "A Uniqueness Criterion for Fractional Iteration." James Shearer, a freshman, received the Morgan Ward Prize for his solution of a geometric problem concerning quadrilaterals. Both prizes are financed by funds awarded the mathematics department for the outstanding performance of its students in the William Lowell Putnam national mathematics competition.

Silver Medal

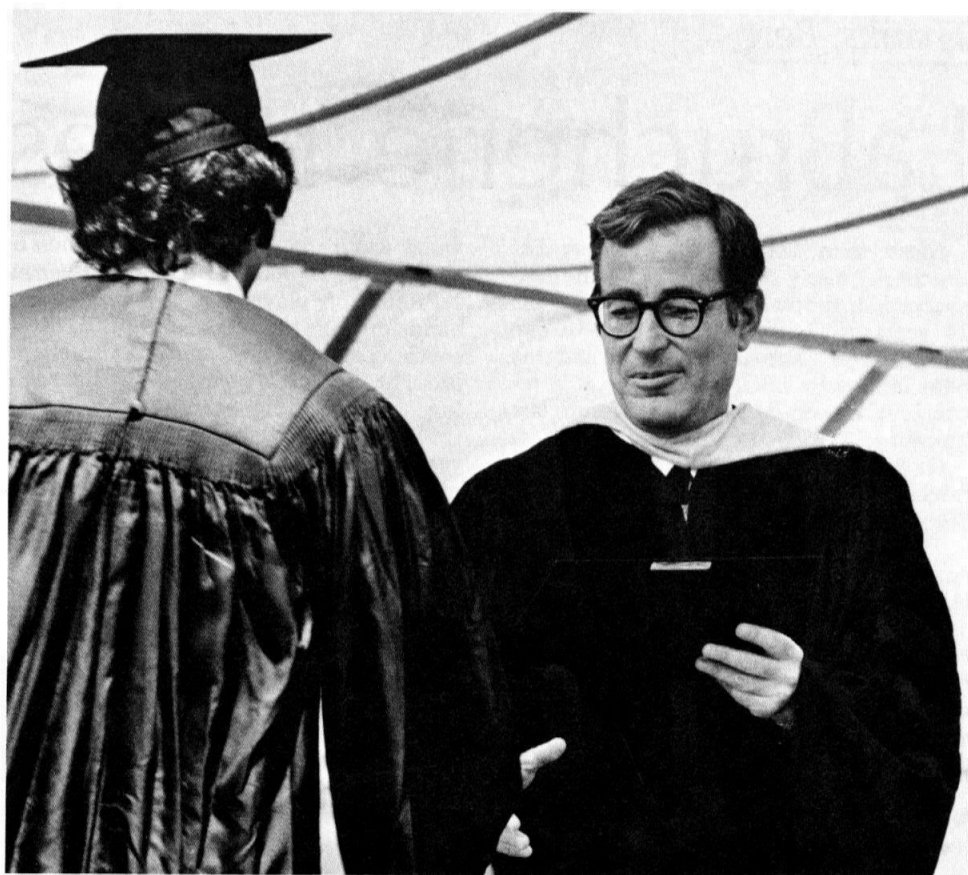
Bestowed by one of Great Britain's oldest learned societies, the Silver Medal of the Royal Society went to Thomas David Howell, a senior from Mountain View. Howell was chosen for his excellent scholastic record and his participation in student activities.



Walking together are the first four women to receive BS degrees from Caltech—(from left) Flora Wu, Stephanie Charles, Sharon Long, and Deborah Chung.



Seniors Russell McDuff and Sharon Long shared this year's Hinrichs Award.



Harold Brown presents one of the 387 degrees conferred June 8.

Brown suggests curriculum changes

Continued from page 4

and physics. A serious examination is needed of possibilities of somehow changing those two requirements (I would like to think I mean shortening, but admit I would not flatly rule out easing or diluting).

"I have wondered whether it is possible to give a two-year course in physics whose first year is a satisfactory terminal course. My tentative conclusion has been that it is not. But I am told that at least one member of the physics faculty now teaching Physics I and II suggests that if he were giving it he would find it possible to give a one-year course which was terminal for biology majors but introductory for physics majors.

"In the case of mathematics, I wonder whether it is not possible to require an additional year of mathematics after Math I, but allow a choice of when the next course is taken and what it is, to make it more suitable to the particular professional or subsequent graduate—or

even cultural—interest of the individual student.

"A part of that principle might conceivably be applied to Physics II so that a biology major or a premedical student, for example, could take his second year of physics sometime after the second year so as to give him more time early on for biology.

"Then there is always the possibility, which I think less satisfactory, of giving two-year courses in physics and mathematics for physical scientists, engineers, and mathematicians, and different one-year courses in each for others. The danger there is well known; you inhibit transfers among options, tend to lock people in, and create two classes of citizens. In the old days it would have been clear who was first-class and who second under these circumstances. With biologists and biology riding high, it might not be quite so clear any longer. But in any event, it would fragment the under-

graduate student body.

"Given the quality of our students, I think we can afford to do some experimentation. We might have to do some further selection within our student body, but I think that you could, for example, take 10 or 15 students in the incoming freshman class and say to them, 'You are all going to have complete pass/fail grading right from the beginning.'

"Or, conceivably, you could go even further and say four years residence is all we will require of such an experimental group; hence no grades at all. I am not terribly enamored of such an idea, and I think that some of the students who participate in such experiments could well get hurt, especially when it comes time to get admitted to graduate or professional school elsewhere.

"I think we can afford to do some such experiments, and I am sure that you—both faculty and students—can devise

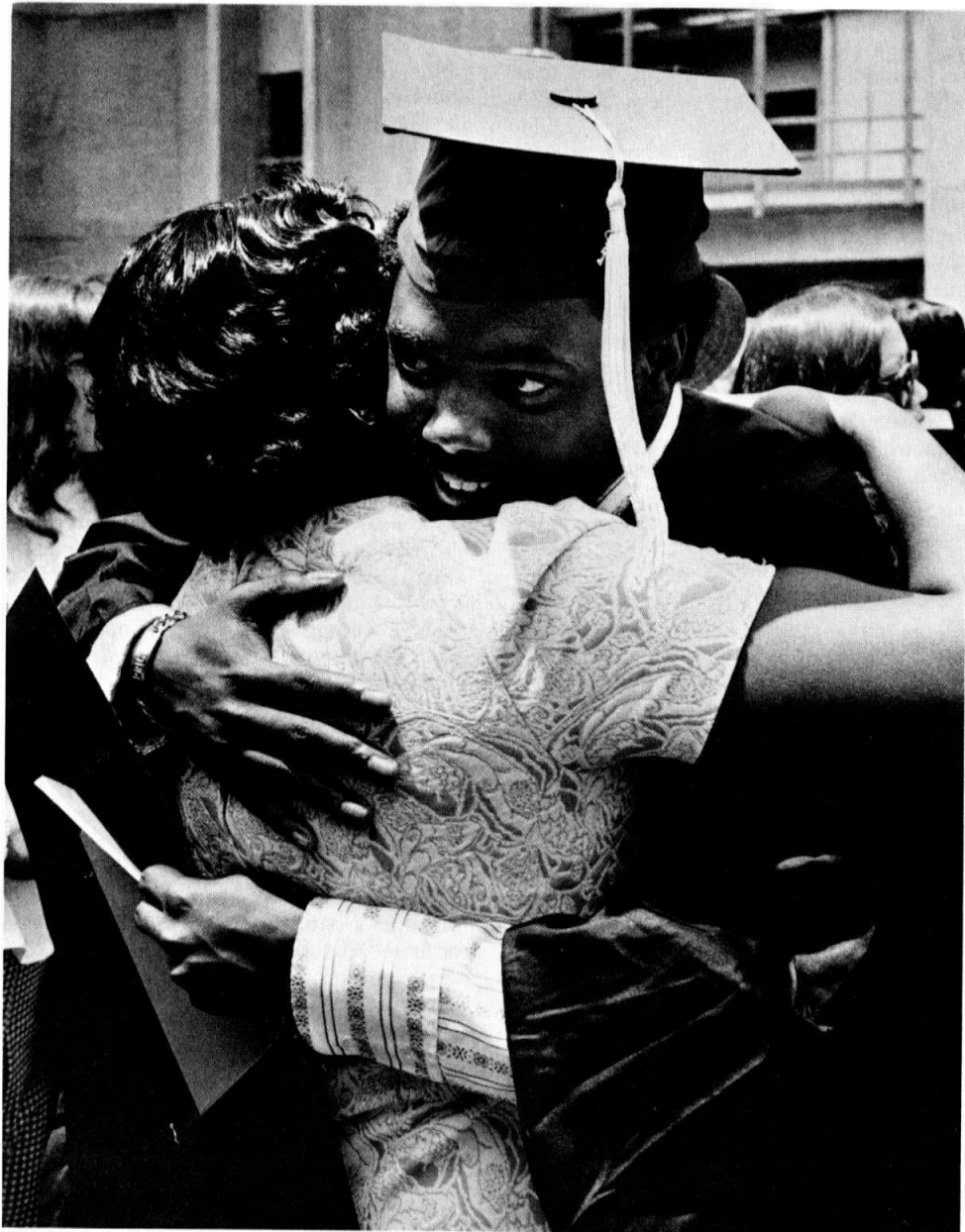
better experiments and better curricula along these lines than I can."

Brown concluded by asking the new alumni to provide the Institute with information on the results of their education.

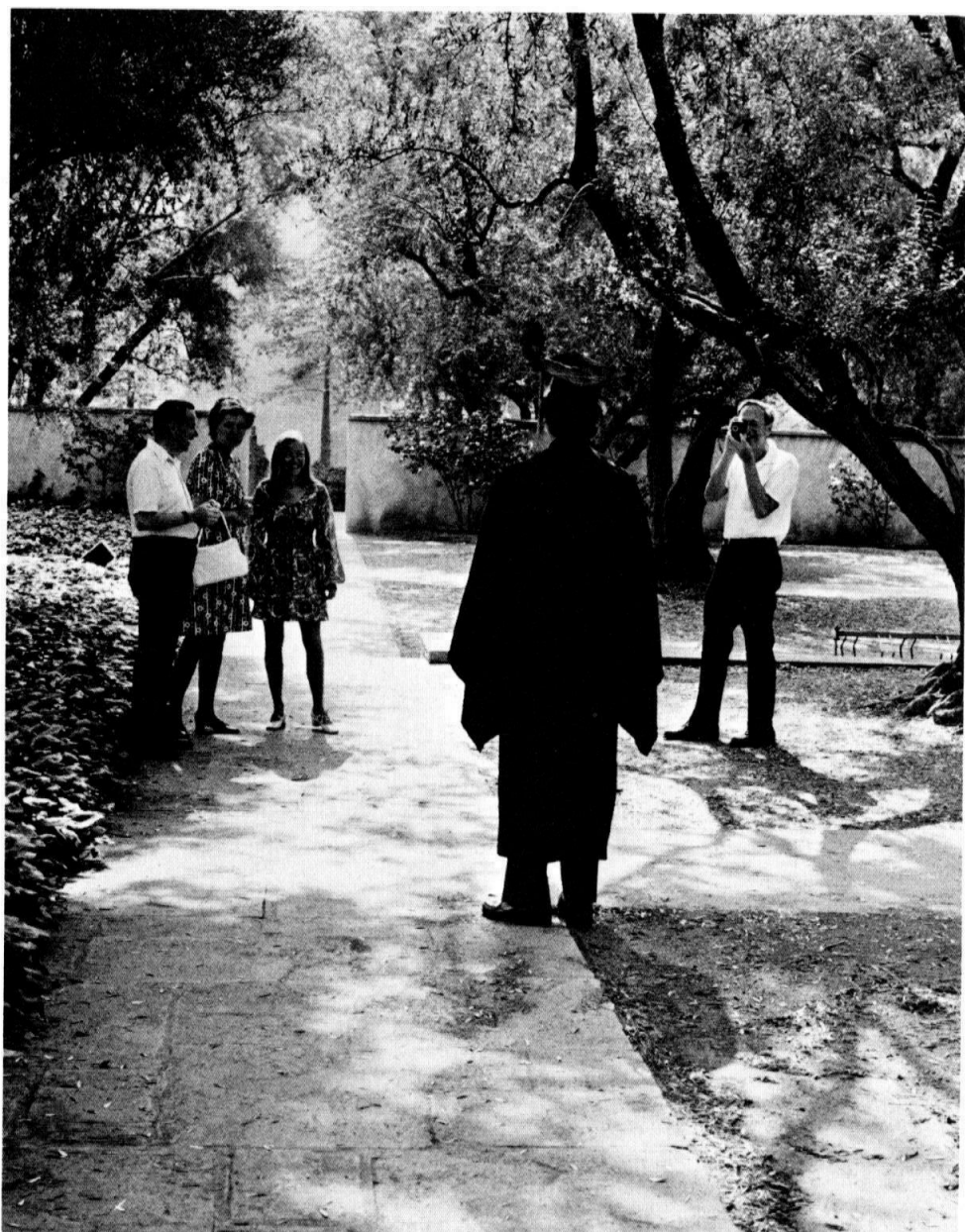
"We get too little feedback from our students after they have left about what it was during their undergraduate and graduate careers here that was most helpful (or harmful) to them in their later professional careers and in their lives as a whole.

"We do get quite a lot of feedback while you are here. We try to pay some attention to that. But to know how what has happened here has affected you for good or ill afterwards would be an enormous help."

In his final words to the graduates, Brown said, "All of you take our best wishes and fondest hopes for happy and productive lives. Good-bye and God bless you all."



Price Walker Jr. gets a hug from his proud mother at the end of graduation ceremonies.



A new graduate pauses in Dabney Gardens for a picture he will remember as an alumnus.

Thanks, Bert

LaBrucherie retires after 24 years

More than 200 friends of Bert LaBrucherie, many of them alumni he had coached in football and track during his 24 years at Caltech, turned out to say "Thank you" and present Bert and his wife Enis with a trip to Europe at a retirement dinner at the Athenaeum last month.

One of those who came was Joe Hendrickson, sports editor of the *Pasadena Star-News*, who later wrote:

"When I was a boy, I read Frank Merriwell stories. My experiences with colleges and universities as my newspaper career unwound were unlike those of the Merriwell books. Where was that little college where everyone cared, where the coach was the inspiring campus legend, where the athlete showed up and tried out for the team to win or lose as his skill and energy would permit? Where was that old gym, the field of glory with its stands for 200, the campus with the big oak tree where one would pause to gain inspiration?

"Somehow the LaBrucherie farewell dinner brought Frank Merriwell college life back to this reporter.

"Alums Dick Van Kirk, Phil Conley, and Don Stocking told of their experiences while playing under LaBrucherie's coaching at Caltech. Van Kirk and Stocking starred on Bert's only winning Caltech football team, the 1957 outfit that assured its winning season with a triumph over Cal Poly in the Rose Bowl. Conley, although he never threw the javelin in high school, was undefeated in this event at Caltech and went on to make the 1956 Olympic team.

"These three speakers and emcee Dr. William Corcoran brought out the LaBrucherie attributes of inspiration, dedication, enthusiasm building, fun, hard work.

"A 'modern' Caltech athlete also spoke. He was a delightful young man, Hay-

wood Robinson, who broke all kinds of Caltech track records this past season.

"Robinson played on the high school band during his high school days in south Los Angeles, but LaBrucherie brought out track greatness in this smiling, husky young man. Haywood ran the 100-yard dash in 9.7 at Caltech this year, the 220 at 21.5. The Caltech trackmen who made some kind of history this year included Greg Griffin, Al Kleinsasser, Charles Almquist, Brent Sweitzer, and Greg Hoit. They set seven school records.

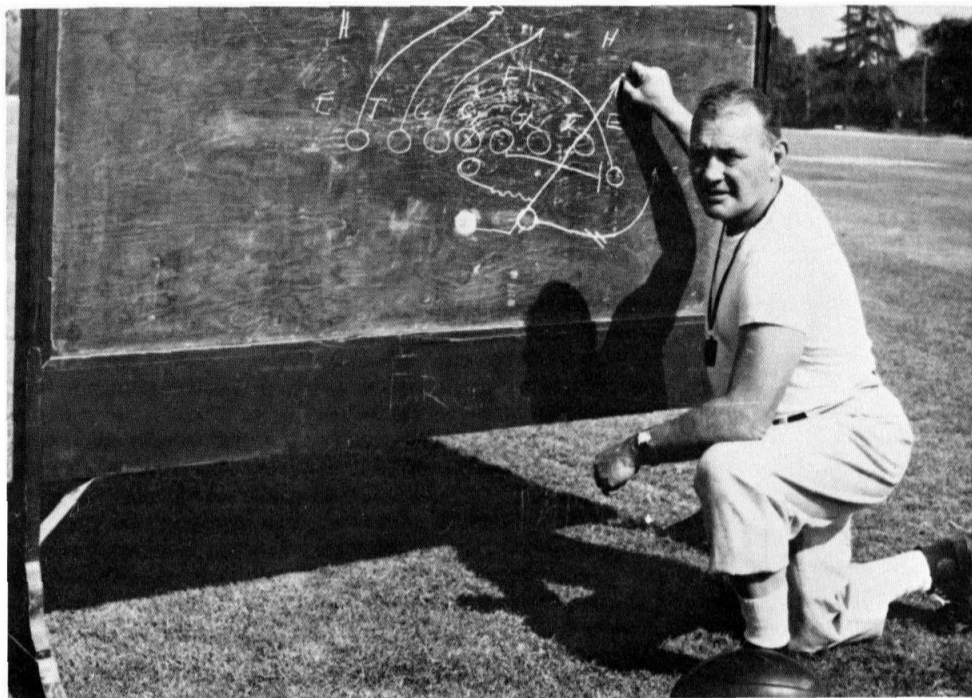
"Robinson expressed the theme of their participation. 'I ran for this man Mr. LaBrucherie,' said record-smasher Robinson. The other Caltech tracksters nodded in agreement. Dr. Corcoran concluded that truly was the theme of the farewell party for the 68-year-old coach who had a 44-year career at Los Angeles High School, UCLA, and Caltech.

"As a reporter, I am pleased that I found a Frank Merriwell setting after all these years. Thank you, Caltech, for a delightful experience—better to have reached it late than never."

Among LaBrucherie's friends who were not able to be at the dinner was Caltech president Harold Brown, who wrote:

"We honor you because at Caltech you have inspired undermanned teams time and again to give outstanding performances in the best tradition of athletics. And we honor you because you have discovered and developed athletic talents here, often to the surprise and always to the benefit of the students involved. I haven't heard of any students coming here in order to become athletes. But a good many, thanks to you, have experienced the pride of doing well something they hadn't known was in them.

"We are all fond of you because of your excellent rapport with students and faculty, a rapport reinforced by a fine



It was quite a switch for Bert LaBrucherie when he came to Caltech from UCLA in 1949.

sense of humor.

"Because you have been with us for 24 years, Bert, it is our expectation and hope that Caltech has become such a habit that you won't be able to stay away for long. Hurry back, Coach. Often!"

Russ Pitzer, BS '59, now a professor of chemistry at Ohio State, wrote:

"One play that I enjoy remembering is one we scored on against Oxy in the Rose Bowl in 1957. You had told Van Kirk earlier in the week that a trap was one of several good plays to call against a seven-man line.

"We made it down to their 12-yard line and Van Kirk called the trap play to the right. Why he chose it I don't have the slightest idea because they hadn't shown a seven-man line at all that far in the game. Dick would probably claim that it was superior scouting and analysis, but more likely it was blind luck.

"They lined up in a seven-man line and I pulled out to make the trap block. I barely got across in time before I felt the breeze of Stocking going through behind me with the ball. The rear ends of those stretch football pants were pretty thin, you know, and sensitive to wind and temperature. When I first wore that type I was sure there was a rip back there.

"My man had come across several steps and had time to see the big hole with Don headed toward it, and even time to swear before I hit him. Fred Newman always claimed that he cleaned out their middle linebacker on that play, but, judging by his usual blocking form, I never knew how much of his story to believe.

"Well, best wishes on your trip and whatever else you get into next, Bert. You used to call me the lawyer because I ran with my mouth open; I would try

to come up with a good line to come back at you with, but you always seemed to be too sharp with the repartee for me to mix with you."

Chuck Siegel, BS '61, a major in the U.S. Air Force stationed in England, told Bert:

"On occasions like this, people are supposed to drift back to the fond, if partially glorified, memories of past events. And I am no exception. I remember a pep talk you gave me in 1959 during which you absolutely convinced me I could be an all-conference halfback. Logic dictated otherwise as my talent for dropping the ball was compensated for by lack of speed and agility. But after our talk I believed. You've got to be the ultimate proponent and practitioner of psychological warfare.

"Then there was the Pomona game in the Rose Bowl. As defensive left cornerback, you instructed me not to worry about their end for pass coverage as he wasn't in their patterns. As they approached our end zone, I said, 'Sure hope Coach is right.' Then one play, as I watched the end flash by me, I said, 'Self, Coach may have been wrong; that guy had a funny look in his eye.'

"I raced back, leaped 14 feet in the air and, with incredible dexterity, knocked the ball down, got my feet knocked to the horizontal, and did a Jack Schmitt 'moonfall' without benefit of 1/6 gravity. Coach, I think I should have covered him sooner."

A letter recalling an earlier era of LaBrucherie's coaching came from science-fiction writer Ray Bradbury, who said:

"There's no reason why you should remember one student—L.A. High, 1938—out of the tens of thousands you have coached since the mid-Thirties, but I saw your picture in the *Caltech News* last night and with a resurgence of memory decided to drop you this note, and one of my books, signed, enclosed herewith.

"The person I have become is one thing. The boy I was is something else again. I was irreverent, loud-mouthed, and, I guess, smart-assed. You put up with me in your dry and somewhat skeptical way, and took the mild insults that I and my friends Ross Simpson and Jack Schmidt passed at you. Only on one occasion did you jog us off to Mr. White who did proceed to rip our skins off, which, I know now, we richly deserved.

"The important thing is this: I was a lousy athlete. I knocked down just about every hurdle I ever jumped over. I was blind as a bat and dropped every football or baseball tossed at me. But, at the end of a semester, lo and behold, LaBrucherie gave me an A. And I knew you were grading me for Trying with a capital T. My fondness for you grew multifold.

"So, you see, you have a student here with a long memory. And before this note grows too long and insufferable, I'll cut it short. I just wanted you to know you are remembered and liked and appreciated.

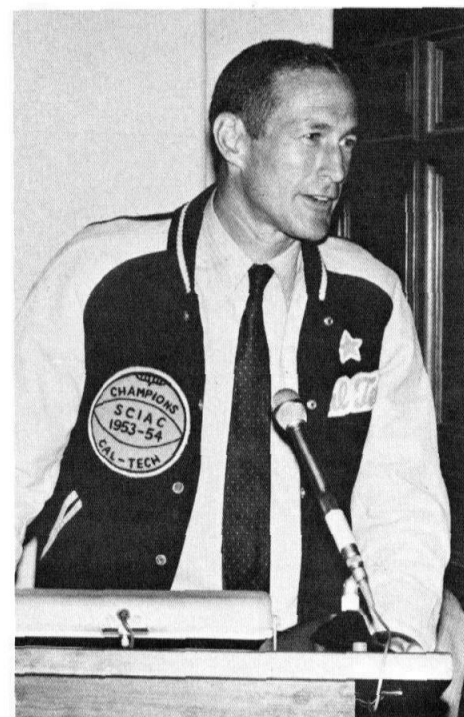
"Thanks for being Bert LaBrucherie."



William H. Corcoran, vice president for Institute relations, presents tickets for trip to Europe to Bert LaBrucherie and his wife Enis at retirement party in the Athenaeum.



Haywood Robinson, record-breaking sprinter, gives LaBrucherie a stocking cap as a token of his appreciation.



Phil Conley, BS '56, reminisces.

Track team wins big one for coach

A 71-70 dual meet win over Whittier was the highlight of the 1973 season for Caltech's track team. It was most important because it made the difference in a losing or winning record for Coach Bert LaBrucherie in 24 years of dual meet competition at Caltech.

The victory gave the veteran coach 107 wins and 105 losses, which may be the best performance in the country, considering the fact he has had to start from scratch in training most of his athletes down through the years.

Because of the few men available to compete in collegiate competition, Caltech's teams have usually been underdogs in dual meets and the affair with Whittier was no exception. With only 12 men, including pole vaulter Bob Brewington who had never competed in a college meet before, the Techers' chances seemed as bad as the bitter cold weather and poor track conditions at Whittier.

Brewington didn't win any prize for style, but his vault of 9 feet was better than anyone from Whittier could do and he gave Caltech 5 critical points.

After 16 events, the meet was still undecided until the mile relay when Caltech's foursome of Charlie Almquist, Al Kleinsasser, Heywood Robinson, and Greg Hoit turned in their best time of the year—3:27.2—to win by a large margin and give Coach LaBrucherie a winning record for his retirement.

Caltech finished the season with an even 4-4 mark in dual meets and placed eighth in a field of 17 teams in the NAIA District III meet. Although they didn't win any events, Greg Griffin, Brent Sweitzer, Hoit, Kleinsasser, and Robinson put together 22 points for Caltech's highest finish in years.

Griffin, Kleinsasser, and Robinson wound up the season at the NAIA championships in Arkadelphia, Arkansas. Griffin finished 17th in the 26-mile marathon and Kleinsasser and Robinson did not reach the finals, but they picked up some experience that should help them in next year's competition.

With only Almquist graduating from this year's squad, Caltech should have the nucleus for one of its strongest teams in years next season.

This year Griffin set school records in the 2-mile, 3-mile, and marathon runs. Sprinter Robinson tied the mark in the 100 and set a new standard in the 220. Kleinsasser lowered the school marks in the 880 and mile events. By next season, all three men should be strong contenders in the NAIA.

Hoit, who was handicapped by a leg problem much of this season, could be a real threat for conference honors in the 440-yard dash and the 440 hurdles if he returns to his top form next year. Sweitzer, who received the team's Outstanding Frosh award, and sophomore Doug Herbert should provide strength in the shot put and discus events. John Steubs will be back in the 440 and 220 sprints and Dave Webster is expected to improve his distance in the long jump.



Members of Caltech's 1973 track team are: (from left, front row) Coach Bert LaBrucherie, Greg Griffin, Greg Hoit, Dave Webster, Brent Sweitzer, Terry Miller, Haywood Robinson, Charlie Almquist, and managers Karen Maples and Bill O'Meara; (back row) Steve Bienz, Doug Herbert, John Steubs, Al Kleinsasser, Brad Page, Bob Miller, assistant coach Larry Knuth, and alumni director Jim Black.

Saturday School

Caltech helps young scientists

In 1970, Robert Tajima was a ninth grader with no plans to make science his career. But a friend persuaded him to come to Caltech's Saturday School for junior high and high school students who are talented in science and math, and his enthusiasm for science began increasing rapidly.

With the help of Lee F. Browne, Caltech's director of secondary school relations, and the Caltech students who teach in the program, Tajima learned what high school courses he would need to complete his entrance requirements early, and he was admitted to the Institute last fall after finishing the 11th grade at Muir High School in Pasadena. He plans to make biology his option.

Tajima says he found the pressures facing him as an early enrollee to be within the limits of toleration.

"Caltech courses weren't as drastic a change as I thought they'd be," he remarked. "Certainly they could have been worse."

In June, Tajima and Steven Wake from Compton—who also was admitted after the 11th grade—successfully completed their freshman year. Two others have attained sophomore status who were admitted after the twelfth grade. The first participants in the highly successful Saturday School to enroll at the Institute, these four are by no means the last.

Four others have been accepted for admission in the fall, including two who are enrolling after their junior year: Claudia Spiro from Muir and Peter Lu from

Pasadena High School. Browne believes there will be a continuing stream of incoming students from the Saturday School ranks.

"These students have an excellent opportunity—through their contacts with Caltech faculty and students—to learn what courses they'll need for early admission and to get a feeling for the campus," Browne said. "Besides coming down on Saturday, some of them are here a couple of times during the week to visit and to talk with teachers about course requirements."

Since 1969, the Saturday School has been giving bright but frequently unmotivated junior high and high school students the chance to explore various areas of science and mathematics and then delve into the topic that interests them most. Some of these areas have included physics, astronomy, space technology, geology, electronics, and computer science.

In classes that contain an average of nine students, they attend lectures, conduct laboratory experiments, and discuss their interests with the Caltech graduate and undergraduate students who are their teachers. During the last two years, boys and girls have been equally represented.

Browne explained that the school draws upon a student's enthusiasm for science to strengthen his interest in other subjects—and to build his overall academic competence.

"For example, if a boy is interested in space technology, we point out to him that he'll need skill in mathematics, and in oral and written communication, as

well as in technological areas," Browne said. "His enthusiasm for science tends to spill over into these fields as well, and his overall achievement increases."

Since the Saturday School was launched, Caltech has received inquiries from school districts throughout the United States that are interested in modeling a program after it.

Students throughout southern California have shown an interest in the program. Recently 14 junior high students from Palos Verdes visited Caltech and signed up for the fall after touring the campus. This year there were participants from as far away as La Jolla and Anaheim, although most are from Los Angeles County.

Browne anticipates he will have about 500 applications for the Saturday School that begins in the fall, and he is setting a limit of 300 students.

When the new students attend an orientation meeting in mid-September, they'll list their first, second, and third choices among science topics, and the curriculum will be built around these choices.

"The Saturday School works differently from courses in public school," Browne explained. "In public school, the classes are built around a prescribed curriculum—and the interests of the teacher. Here, the program is built to accommodate the interests of the kids."

This year the school was funded by a \$8,500 grant from the John A. McCarthy Foundation, established in 1956 by the late businessman and philanthropist for whom it is named.

Turning over the keys



Richard A. Abbink (right), who retired as custodial supervisor after 30 years at Caltech, turns over the keys to Institute buildings to his successor, John Durden.



Freshmen Robert Tajima (left) and Steven Wake got a start in science at the Saturday School.

PERSONALS

1933

GREGORY K. HARTMANN has retired as technical director of the Naval Ordnance Laboratory in White Oak, Maryland. Hartmann, who received a BA from Oxford University in England while there as a Rhodes Scholar and a PhD in physics from Brown University, worked 32 years as a civil service employee of the U.S. Navy. He received the Navy's highest civilian honor, the Distinguished Civilian Service Award, for his contributions to the Bureau of Ordnance during World War II.

1935

FRANK J. MALINA, MS, AE/36, PhD/40, has received the Distinguished Alumnus Award from Texas A&M for his accomplishments as a scientist-administrator and as an artist. A former director of research for UNESCO, Malina lives in Paris with his wife Marjorie. They have two sons, Roger, 21, and Alan, 20.

1938

STANLEY T. WOLFBURG, administrative officer in the division of engineering and applied science, has been elected vice president of Region XII of the American Institute of Industrial Engineers. He will be responsible for the overall operation of 13 chapters located in three states.

1944

CHARLES S. COX has been appointed chairman of the Ocean Research Division of Scripps Institution of Oceanography at UC San Diego. Cox, a professor of oceanography, has been associated with Scripps since 1955 and received his PhD there in 1954.

1945

JEROME HARRINGTON, MS/47, is now manager of computer components business at Micro Switch, a division of Honeywell Incorporated at Freeport, Illinois. He joined Micro Switch in 1950 and has been director of engineering since 1971.

1946

STEPHEN BABCOCK, formerly vice president of Magnetic Devices Incorporated in San Diego, has established Trans-Magnetics, a new company that will manufacture magnetic transformers and transportation lighting systems in El Cajon. Babcock has been in the field of magnetics for the past 27 years.

FLETCHER L. BROOKS, MS, has been promoted to senior special agent for the Hartford Insurance Group's service office in Kilgore, Texas. He has been with Hartford since 1948 and has been a special agent since 1956.

ALI B. CAMBEL, MS, formerly dean of the College of Engineering of Wayne State University in Detroit, is now corporate vice president and deputy director of the Systems Group of General Research Corporation in Washington, D.C. He is responsible for corporate level planning and marketing and regional management in the Washington area.

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 for opportunities although I am not contemplating a change.

Name

Degree(s) Year(s)

Address

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FLOYD C. FISHER has joined the Harza Engineering Company in Chicago as senior electric utilities consultant with primary responsibilities in management services and system analysis. He was vice president of Consumers Power Company in Jackson, Michigan.

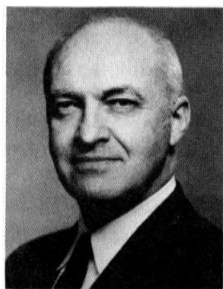
1947

JEAN G. GOPPERT, MS, a colonel in the Air Force, from El Campo, Texas, received the Legion of Merit before retiring with more than 29 years' service in the fields of aeronautical aerospace systems maintenance, research, and development.

1952

RICHARD E. KENNAN is now manager of capacitor equipment engineering for Westinghouse in Bloomington, Indiana. He recently received an MBA degree from Indiana University.

CHARLES R. MILLER, PhD/62, has been promoted to the rank of full professor at Trinity College in Hartford, Connecticut. Miller has been chairman of the physics department since 1971. He joined the Trinity faculty in 1961.



Hartmann '33



Wolfburg '38

1954

G. NEAL HUNTLEY, MS/55, has been appointed vice president in charge of operations for the Martin Brower Company, a subsidiary of the Clorox Company. He was manager of buying for Clorox in Lafayette. This information was provided by his father-in-law, EMMETT M. IRWIN, BS/24, of Corona del Mar, who is also the father of WILLIAM P. IRWIN, BS/52, of La Habra.

1955

HARRY A. GRIFFITH, MS, has been promoted to brigadier general. He is district engineer for the U.S. Army Corps of Engineers in Mobile, Alabama.

JAMES P. LEWIS, formerly technical director and manager of operations for Distrigas Corporation, is now project manager of an LNG terminal facility for Transco Terminal Company in Houston, Texas.

1956

ROBERT C. KAUSEN has been appointed manager of high modulus technology and operations at the Narmco Materials Division of the Whittaker Corporation in Costa Mesa. He was manager of quality assurance at Narco, a manufacturer of resin-impregnated graphite tapes.

1957

MICHAEL B. DUKE, MS/61, PhD/63, lunar sample curator at the Johnson Space Center in Houston, has been awarded the NASA Exceptional Scientific Achievement Medal.

MARTIN C. TANGORA is now an associate professor of math at the University of Illinois at Chicago Circle.

"The Science Research Council of Great Britain has invited me to spend 1973-74 at Oxford as a Senior Visiting Fellow," he writes, "and I've accepted, oddly enough."

"I've become deeply involved in architectural preservation in the Chicago area. At present I am a vice president of the private Landmarks Preservation Council and devoting the greater part of my spare time to research, writing, and lobbying for preservation of the masterpieces of Wright, Sullivan, Root, Holabird, et al.

"In June I will be married, to a California girl, Polly Perry, of Walnut Creek and Sutter Creek. We expect to live in Chicago after the year in Oxford. We met in Mexico City in 1971. Polly is a kindergarten teacher and a potter."

1960

GARY A. ZIMMERMAN, associate professor of chemistry, has been appointed dean of Seattle University's School of Science and En-

gineering. He has been a member of the faculty since he received his doctorate from the University of Wisconsin in 1964.

1962

ROBERT L. KRUSE, MS, PhD/64, has joined the mathematics department of Emory University in Atlanta as an associate professor. For the past two years he has been a visiting professor at the University of Canterbury in New Zealand under the Fulbright-Hays Program.

1963

PAUL J. NAHIN, MS, formerly an assistant professor of engineering at Harvey Mudd College, will do postdoctoral research at the Naval Research Laboratory in Washington, D.C. His work will be in the applications of pattern recognition to radar signature processing.

ALFRED C. PINCHAK, PhD, received an MD degree from Case Western Reserve University School of Medicine and will intern in anesthesiology at University Hospitals in Cleveland. Pinchak also holds a BS from Case Institute of Technology and an MS from Purdue University.

1965

JOHN GUNN, MS, has been promoted to head of the selective-dialing telephone department of Bell Telephone Laboratories in Indianapolis.

ROBERT O. WINKLER, MS, formerly a petroleum production engineer for the Humble Oil and Refinery Company, is now a technical adviser for producing operations at Esso Australia, Ltd., in Sydney.

1966

WILLIAM F. ORR earned a PhD in mathematics from the University of Wisconsin, where he was also a lecturer. He is now working as a free-lance science-fiction writer.

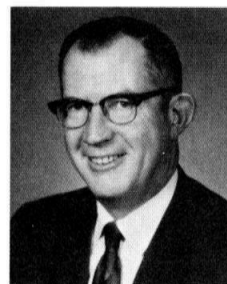
JOHN P. WALTER married Mary Louise Horney of Indiana in August 1971. He is now an assistant professor of physics at Brandeis University.

1967

JAMES E. PEARSON, MS '68, PhD '72, has joined the staff of the Los Alamos Scientific Laboratory to work with the laser research and technology division. He is a member of the Institute of Electrical and Electronic Engineers and the Optical Society of America.



Harrington '45



Fisher '46

JOHN S. WILLIAMS has been awarded first-year honors at Harvard Business School and expects to receive his MBA degree in June. Williams also holds an MA degree from UC Irvine and an MS from UCLA.

1969

WILLIAM H. LONG JR. has been commissioned a second lieutenant in the U.S. Air Force and is now an education and training officer in the Aerospace Research Laboratory at Wright-Patterson AFB, Ohio.

1970

ARTHUR OGAWA completed his graduate studies at UC Berkeley and has been appointed senior project engineer of the electronics division of Micon Industries in Oakland.

RAYMAN Y. WONG finished his studies at the University of Houston and is now a graduate student and teaching assistant in chemistry at UCLA.

1971

METIN MANGIR and his wife, Tulin, received master's degrees in electrical engineering together at USC. They both will continue

their graduate work as doctoral candidates in electrical engineering at USC.

ERIC SCHIFF has completed his graduate work at Cornell University and is now a programmer with Jarell Ash Company, a division of the Fisher Scientific Company, in Waltham, Massachusetts.

HAROLD M. SPINKA, JR., PhD, has joined the faculty of the physics department at UCLA as an adjunct assistant professor. He was a postdoctoral fellow at the Argonne National Laboratory.

SHU K. WONG, MS, has left the Autonetics division of Rockwell International to join the technical staff in the nuclear survivability department of TRW Systems Group at Redondo Beach.

1972

ROBERT J. KINNEY, MS, was named an honor graduate and commissioned a second lieutenant upon graduating from the U.S. Army's infantry officer candidate school at Ft. Benning, Georgia.

DAVID J. MCGINTY, PhD, formerly with Proctor and Gamble, is now a research chemist for the Pioneering Laboratory in Wilmington, Delaware.

CHARLES THOELE is presently a student at the Graduate School of Management at Northwestern University, Evanston, Illinois.

OBITUARIES

1935

CARL R. ESTEP, in Los Angeles. He had been an electronics engineer with Earl C. Anthony, Incorporated.

1937

DEAN NICHOLS, in Phoenix, Arizona. He was an MD and a consulting radiologist. A Life Member of the Alumni Association, Nichols was active in many Caltech support activities. He was a founding member of the visiting committee in the division of biology and an area chairman of the Science for Mankind Campaign. Both Nichols and his wife, Mareen, who survives him, were members of the Caltech Associates.

1941

CHARLES L. COBB, MS, in Bay City, Texas, on December 16, 1972. He was a professional rancher.

1946

WALTER H. GOODWIN, MS, ME '47, in Sierra Madre on May 10, 1973. He was senior engineer scientist with the Douglas Aircraft Company in Long Beach.

1954

WALTER C. HAMILTON, PhD, in Upton, New York. He was deputy chairman of the chemistry department in the Brookhaven National Laboratory.

Employee

PATRICK J. HARRIS, on May 3, 1973, after an extended illness. He had been employed since 1956 as a gardener in the physical plant/grounds department. Harris is survived by his wife, Vera.

Caltech's first MS recipient

PAUL DEVRIES MANNING, on June 30 in La Jolla. Recipient of the first master's degree conferred by Caltech, in 1917, Manning went on to a distinguished industrial career in chemical research and development and returned to Caltech in 1958 as a member of the faculty. As a professor, he developed courses that were inspiring to his students and stimulated their interest in chemical engineering. He received the Distinguished Alumnus Award in 1969, the highest honor that the Institute confers on an alumnus. In addition to serving as a professor at Caltech, he also taught at Columbia University, Stanford University, and the University of California at Davis. He was the author of 80 papers on subjects ranging from food engineering to explosives to the genesis of oil shales. Manning was born in Omaha, Nebraska, in 1893, received his BA degree from Stanford in 1916, and his PhD from Columbia University in 1927. He is survived by his wife, Hortense, and two sons.