

CALTECH NEWS

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PUBLISHED FOR ALUMNI AND FRIENDS OF THE CALIFORNIA INSTITUTE OF TECHNOLOGY

Survey replies reveal views of 5,555 alumni

About every ten years, Caltech gives its alumni a special opportunity to make their views known on a wide range of topics relating to the Institute. The information received is then compiled to help Caltech evaluate its current policies and plan future directions. It helps the Alumni Association to judge its effectiveness in serving alumni and learn what changes the alumni would like in Association activities; it helps the editors of alumni publications to gauge their own success.

The last survey had been conducted in 1963 and the information it had produced had become outdated. Results of a 1952 survey had long since become history.

This past March, a new, in-depth questionnaire was mailed to all Caltech alumni—a total of 11,391 names—and a follow-up mailing was sent out in April.

A total of 5,555 alumni—49.9 percent—completed and returned their questionnaires by the cutoff date. Another 400 questionnaires came in later, and a few continue to dribble in even now.

The percentage of response was lower than that in 1963—when the Institute sent questionnaires to 8,051 alumni and received a 61 percent return. Nevertheless, enough replies were received to provide an effective sampling that gave a great deal of useful information about the Caltech graduate.

This article is one of two that will appear in *Caltech News* to summarize the results of the survey. In this issue we deal mainly with the alumni themselves—how old they are, how much money they are earning in 1973, what political party they belong to, where they live, and so on. The second article—in the February issue of *Caltech News*—will deal mainly with their attitudes toward Caltech and its programs, and how they feel about their educational experience here.

Whenever possible, both articles will compare results of this survey with those of 1963 and 1952. In most cases, however, the questions as stated in earlier surveys either differ entirely or are different enough from the present tabulation to prevent a valid comparison of responses.

In the ten years since the last survey was made, the total number of graduates has grown from about 9,000 to approximately 12,000; the student body from about 1,300 to more than 1,500; Institute net assets from \$124,000,000 to \$278,000,000; and annual expenditures from \$17,900,000 to \$40,600,000. The latter figure indicates the burgeoning effects of

inflation as well as growth at the Institute.

The Alumni Today

The Caltech alumni body as a whole is not as young as when previous surveys were taken—a fact shown by current results. For the first time, Caltech alumni are about the same age as other typical alumni groups—a reflection of the increasing age of the Institute itself.

The largest percentage group of alumni—26.3 percent—includes those between 30 and 39 years of age. Only 43.3 percent of the alumni are under 40, compared with 49 percent in 1963 and 72 percent in 1952.

AGE OF ALUMNI	1973	1963	1952
Under 30	17.0	20.0	32.0
30-39 years	26.3	29.0	40.0
40-49 years	22.4	29.0	20.0
50-59 years	22.0	16.0	8 (50 & over)
60 and over	12.4	6.0	—
No answer	0.1	—	—

The largest percentage group of alumni—26.2 percent—received degrees from Caltech during the 1950's; 58.3 percent received degrees during either the 50's or 60's. Less than 5 percent of the alumni were graduated before 1930.

YEAR OF DEGREE	1973
Pre-1900	0.1
1900-1909	0.1
1910-1919	0.2
1920-1929	4.5
1930-1939	12.5
1940-1949	24.3
1950-1959	26.2
1960-1964	15.4
1965-1969	16.7
1970-1971	7.3
1972	3.7
1973	0.6

As a group, Caltech alumni are affluent. Among those responding, 60.7 percent are earning \$20,000 or more a year; 23.7 percent, \$30,000 or more a year. Only 12.1 percent are earning less than \$10,000 a year, and this statistic probably reflects the large number of young alumni who have gone on to graduate school.

TOTAL ANNUAL EARNED INCOME OF ALUMNI	1973
Less than \$7,500	9.6
\$7,500-\$9,999	2.5
\$10,000-\$19,999	27.2
\$20,000-\$29,999	37.0
\$30,000-\$39,999	14.2
\$40,000-\$49,999	4.5
\$50,000 or more	5.0

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Haagen-Smit with National Medal of Science.

Haagen-Smit presented National Medal of Science

Arie J. Haagen-Smit, emeritus professor of bio-organic chemistry and chairman of the California Air Resources Board, received one of the 11 National Medals of Science presented by President Nixon on October 10.

The distinguished scientist flew home from Europe—where he had been serving as chairman of the International Symposium on Environmental Measurements in Geneva—in order to attend the White House ceremonies.

Joined by their children, who also flew to Washington for the celebration, the Haagen-Smits spent two days in that city and then returned to Europe to continue their vacation.

The Caltech professor emeritus was honored "for his discovery of the chemical nature of the source of smog, and for the successful efforts he carried through in smog abatement."

For the past 25 years, Haagen-Smit has been a leader in the battle against smog at all levels of industry and government. In addition to serving as chairman of the California Air Resources Board, he heads the President's task force on air pollution.

The National Medal of Science is awarded to prominent scientists who "in the judgment of the President are deserving of special recognition for their outstanding contributions to knowledge in the physical, biological, mathematical, and engineering sciences."

The first medal was given to Theodore von Karman, professor of aeronautics, emeritus, in 1963. Since that time, three other Caltech faculty members have been recipients: Alfred H. Sturtevant was so honored in 1967; and John R. Pierce and Allan R. Sandage in 1971.

Pioneering physicist, Thomas Lauritsen, dies

Pioneer researcher and international expert on the nuclear reactions that give the sun and the stars their life, Thomas Lauritsen, Caltech professor of physics, died on October 16. The 57-year-old physicist had contributed significantly to man's understanding of how the sun and stars generate energy, how chemical elements are formed, and how the universe is evolving.

Lauritsen had been at Caltech ever since his undergraduate days more than 40 years ago. He had collaborated frequently with physicist William A. Fowler and earlier with his father, the late C. C. Lauritsen, pioneer nuclear physicist, inventor, and instrument designer.

Widely recognized for his work, Lauritsen was elected to membership in the National Academy of Sciences and the American Academy of Arts and Sciences. He was a fellow of the American Physical Society and a foreign member of the Royal Danish Academy of Sciences and Letters. During 1972 and 1973 he served as chairman of the Division of

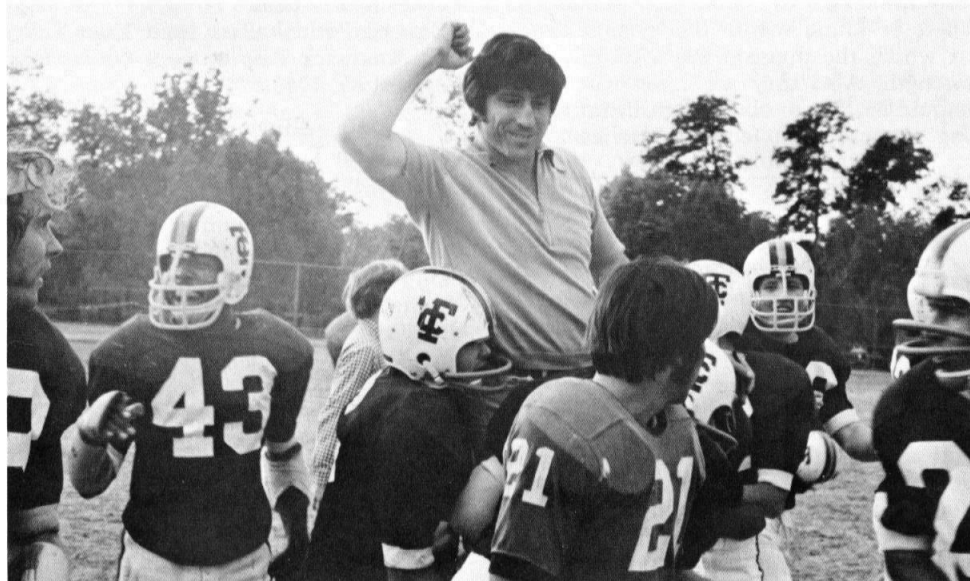
Nuclear Physics of the American Physical Society.

Born in Copenhagen, he came to Pasadena in 1926 when his father enrolled as a graduate student at the Institute. He obtained his BS degree from Caltech in 1936, and his PhD in 1939.

During World War II he was with the National Defense Research Council, working on proximity fuses and rockets, and later at Caltech where he was involved in developing and testing rockets. This work won for him the President's Certificate of Merit and the Naval Ordnance Development Award.

Lauritsen became a senior research fellow at Caltech in 1945, an assistant professor of physics in 1946, an associate professor in 1950, and a full professor in 1955.

A memorial fund has been established in Lauritsen's name. Tax-deductible contributions may be made to the California Institute of Technology with the notation that they are for the Thomas Lauritsen Memorial Fund. A use will be determined in the near future.



A 19-13 victory against La Verne College in the final game of the year brought Caltech's season total to 3-3-0—and sent Coach Tom Cutman, on the shoulders of his team, off the field and toward the showers. This was Caltech's best record during Cutman's six years as football coach and the Beavers' best season since 1957. See story on page 7.

John Baldeschwieler: a chemist who relishes a complicated structure

by Bernard Cole

His new acquaintances are often intrigued by John D. Baldeschwieler, the new chairman of the Division of Chemistry and Chemical Engineering:

By his delight in chemistry and experimentation and his obvious relish for what he considers to be the "challenges of administration;"

By his early academic preoccupation with applied research in chemical engineering and his later basic research in physical chemistry;

By his early investigations in the domain of chemical physics and his present fascination with the chemistry of biological organisms.

If one is confused enough to ask about these "contradictions," he'll patiently explain the simplicity of it all.

Born in 1933, Baldeschwieler received a bachelor's degree in chemical engineering from Cornell University in 1956, followed by a PhD in physical chemistry from UC Berkeley in 1959. Later work as a professor of chemistry at Harvard and Stanford Universities led him into the area of chemical biology.

"I suppose a common thread that has run through my scientific work is a fascination with structures and with instrumentation," he said. "Because of this fascination I was attracted initially to physics and engineering. However, when I was exposed to molecular structures, I discovered problems analogous to the classical physical models I had been studying—but with all sorts of interesting new twists.

"Those discoveries led me to chemical physics. The problems of molecular vibration, rotation, bending, stretching, and deformation, and the chance to work with a wide variety of new, sophisticated electronic instruments—all of these presented an irresistible lure."

Baldeschwieler describes himself as "very much an experimentalist," and finds that aspect of his work "just plain fun."

"In chemical physics, there are all sorts of 'nice' experiments to do, with all sorts of 'nice' twists and knots to unravel," he says. "The larger the molecule, the more interesting the experiment; and so it became natural for me to progress toward the much larger molecules and the more elaborate structures of biological organisms."

Early in his career, Baldeschwieler started working with an elaborate new scientific instrument—the nuclear magnetic resonance (NMR) spectrometer. Certain nuclei, when they are aligned, absorb specific radio frequencies beamed at them. An NMR spectrum can then be obtained by tuning a radio frequency transmitter and recording the frequencies absorbed. The way in which this spectrum is broadened and changed by a particular molecule and its movements gives scientists detailed information about that molecule's conformation.

The pioneering role played by Baldeschwieler in the development and application of this technique to chemical problems has led some of his colleagues to describe him as "the Mozart of the NMR." For, as a result of his efforts, NMR spectroscopy and similar techniques have become powerful tools in the study of biological systems.

Baldeschwieler's move into administration was gradual but deliberate.

"I don't believe that research and administration are all that different," he said. "In one sense, my shift to administration is just an extension of my interest in structures. Organizations are structures, too—made up of incredibly complicated components called human beings. Organizations can be shaped and restructured—but only through a cooperative effort on the part of the people of whom they're comprised."

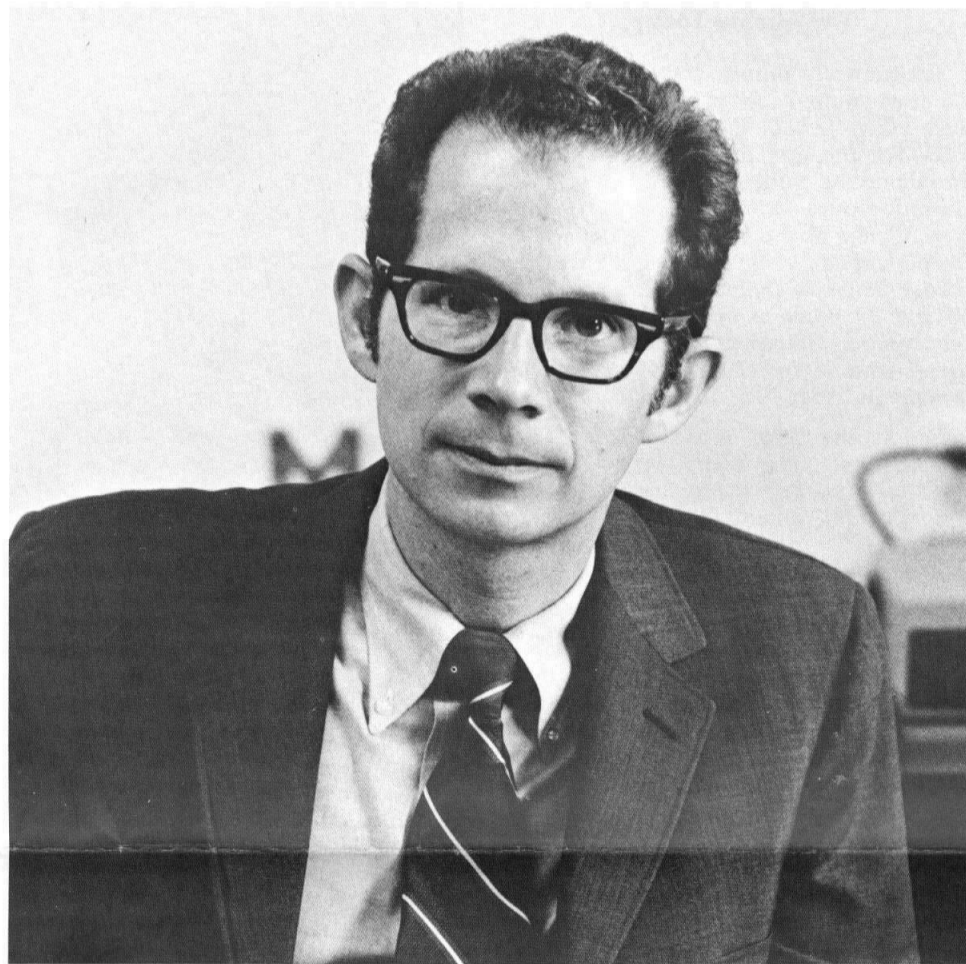
Baldeschwieler believes that this is especially true of scientific organizations.

At a deeper level, Baldeschwieler's shift to administration stemmed mainly from a concern for the direction of chemistry, but also for U.S. science as a whole—a

concern for missed opportunities and for the many problems facing a technological society such as ours.

"Currently, we have in this country what is generally described as a technical manpower surplus," he said. "I believe that description is incorrect. Rather, our problem is that of a technical manpower mismatch. We have skills and resources in search of problems to solve, and we have many aggravating problems that are susceptible to solution.

"It's hard not to want to play a role in bringing the skills and resources together with the problems."



John D. Baldeschwieler, chairman, Division of Chemistry and Chemical Engineering.

Opportunities to work along these lines presented themselves to Baldeschwieler early in his career. While a professor of chemistry at Stanford, he served on a number of national science advisory bodies, including the U. S. Army Scientific Advisory Panel, the National Academy of Sciences Committee on Physical Sciences, and the President's Science Advisory Committee.

In 1970 he was elected to the National Academy of Sciences, and soon thereafter was named by President Nixon as deputy director of the Office of Science and Technology.

"There probably was an element of self-preservation in my shift to administration at the national science policy level," Baldeschwieler said. "For scientists had better become involved in science policy and administration, or worthwhile research and development programs will fail to be funded."

While his position as deputy director of the Office of Science and Technology gave him greater insight into the problems that exist in our society—and potential ways of solving them—Baldeschwieler found that turning insight into action was difficult.

"The ship of national science policy is hard to steer," he admitted. "However, Caltech is in an especially good position to take steps that will decide the future directions of science in this country," Baldeschwieler said. "Because of our pre-eminence in many fields, whatever we do here—and do well—will be copied."

The Division of Chemistry and Chemical Engineering is in an especially pivotal position, he said, because of its unique structure.

"This division is unusual because it is vertically integrated," Baldeschwieler said. "Its research runs the gamut from pure to applied science, from the physical to the biological, from the theoretical to the experimental. All of these areas are integrated into one administrative struc-

ture. This integration gives the division a cohesion and a thrust that is lacking at most institutions."

Because of its structure, the division is in a good position to enhance its position with industry—a definite advantage, in view of fluctuating federal support for science.

"When federal funds for research were rapidly increasing in the last decade, many university chemistry departments neglected industry—a large part of their basic constituency," Baldeschwieler said. "Now it's time to correct that. Particularly at Caltech I foresee the develop-

IA conferences open to alumni in Southland

Caltech alumni living in the southern California area are being invited to attend several Industrial Associates conferences during the coming year, in a short-term, experimental program.

Alumni Association President Stuart M. Butler, Jr., explained that "the Association has investigated a number of alternatives that will provide opportunities for Caltech alumni to visit the campus and share in new research."

He said that inviting alumni to Industrial Associates conferences is one approach that is being tried experimentally—and one that probably will be continued on a long-term basis if it proves to be successful.

Butler reminded alumni that attendance at these conferences is limited, and that when they receive their invitations those who are interested should return their reply cards speedily.

Charles Elachi honored for contributions to electromagnetics

Charles Elachi, MS '69, PhD '71, has received the first Ronald W. P. King Award for "outstanding contributions by a young scientist to the field of electromagnetics." The award was established last year by former students of King, professor of electrical engineering and applied physics at Harvard for many years.

Elachi was born in Lebanon and received an engineering degree from the Polytechnic School, University of Grenoble, France, in 1968. A research fellow at Caltech, he is also a senior scientist in the Space Division at JPL.

He is mainly involved in the study of active microwave techniques that can be used by spacecraft in planetary exploration, and in applying electromagnetic theory to such fields as integrated optics, liquid crystals, magnetic levitation, and periodic media.

The 26-year-old electrical engineer was selected on the basis of his paper, "Dipole Antenna in Space-Time Periodic Media," in the *Institute of Electrical and Electronic Engineers' Transactions on Antennas and Propagations*, May 1972.

LETTERS

Editor:

This summer, while backpacking from Cedar Grove (in Kings Canyon National Park) to South Lake (in Inyo National Forest) we took a cross-country detour through the Palisades Basin. Our route took us from Lower Palisades Lake on the John Muir Trail to Bishop Pass via Cirque Pass, Potluck Pass, and Thunderbolt Pass.

After leaving our note in a Skippy Peanut Butter bottle in the cairn at the summit of Potluck Pass, we paused to look at some of the other messages. Almost all of the notes contained striking points of interest, but the most notable one was the following:

"Caltech, Pasadena
Crossed Potluck Pass from Dusy Lakes via Knapsack Pass on foot with packs, August 31, 1943.

John Allingham, L.A.
John T. Bowen, Pasadena
David H. Brown, Pasadena"

Since this cross-country route is arduous even when modern, lightweight equipment is used, we are quite impressed by the feat of our predecessors of thirty years ago.

Bob Geller '73,
Sierra Madre, California
Mike Teener '71,
Topanga, California

John W. Allingham (BS '48, MS '54) is now a geologist with the U.S. Geological Survey; John T. Bowen (BS '42, MS '46, PhD '49) is a vice president of AMF, Inc., in New York; and David H. Brown (BS '42, PhD '48) is a biochemistry professor at Washington University School of Medicine in St. Louis.—Ed.

ment of joint projects between specific industries—petroleum, chemicals, and pharmaceuticals, for example—and particular investigators in the division.

"This approach will give industry the advantage of access to specialized talent it could not otherwise afford, and will provide us with insight into applied problems in need of solution, as well as support for our basic research programs.

"Another area of promising development within the division is chemical biology, especially cancer research.

"Many important problems in biology today are chemical problems that will be solved by chemists," Baldeschwieler said. "Some of these problems concern the nature and structure of cell membranes, the chemistry of nerve action, vision, contraction of muscles, and the mechanism by which cancer spreads.

"All of these are basic biological phenomena, physical and chemical in nature, that involve changes in molecular conformation. And these phenomena are all to be found within the research areas in which the division has a tradition of strength. Also they are areas where we should be able to obtain significant funding support from federal agencies."

Alumni records computerized

Caltech's alumni records are being transferred to the Institute's IBM 370-155 computer. The first mailing to include computerized data will go out in January.

Computerization will increase the speed and efficiency of mailings to alumni; more than a day's time and labor will be saved in each mailing of *Caltech News* alone. The Alumni Association is asking alumni to notify that office if any errors appear as a result of the transfer process.



At Woods Cove, Laguna Beach, James Mayer briefs divers on underwater terrain. From left—Sandor Kovacs, graduate student who teaches basic diving course with Mayer; Joe Harris, graduate student; James Leger, a senior; E. John List, associate professor of environmental engineering science; and Javier Jimenez, research fellow in applied mathematics.

James Mayer: Caltech prof who's all wet

by Bernard Cole

James Mayer's students think he's all wet.

But that's all right—it computes, as Techers would say—because in addition to being a professor of electrical engineering at Caltech he also teaches several courses in skin diving.

Mayer's unusual sideline got its start about six years ago when his son, John, started practicing the sport at the tender age of fourteen.

"I was convinced that scuba diving was a dangerous and foolhardy sport," Mayer said. "I decided to learn as much about it as possible."

But Mayer ended up by going even further than his son ever dreamed of. For after an introductory set of instructions, he took advanced training and then two instructor certification courses.

"I still think scuba diving is a dangerous sport," he says. "Almost any physical activity is—for the untrained and the unprepared, scuba diving is a little more so. But once you know what you are doing, this sport can provide some of the most beautiful experiences in the world."

"The feelings you experience and the sights you see—as you swim beneath 30 to 40 feet of water—are almost indescribable. The kelp forests, the delicate sea plants, the rocks, the schools of fish, the colors, the flashes of sunlight—they're all fantastic."

But accompanying the beauty there is danger, he added. Between a skin diver and safety, there is only the air bottle on his back and the breathing equipment in his mouth. If a swimmer isn't able to react swiftly in an emergency the results can be tragic.

It was his concern for improving the safety of scuba diving as a sport that led Mayer three years ago—in cooperation with Warren Emery, director of athletics—to set up several advanced instructional courses.

These include:

—a three-term course for beginners, now taught with Sandor Kovacs, graduate student in physics and scuba instructor, who was one of Mayer's first students;

—an advanced course offered during second and third terms;

—a third-term course for students who work as divers with Wheeler North, professor of environmental science, at Kerckhoff Marine Laboratory at Corona Del Mar.

As the 100 or so undergraduates, graduates, and faculty members who have been in his skin-diving classes can attest, Mayer is a hard taskmaster.

"My motivation in offering these courses is to teach people who want to scuba dive how they can do it safely, and have fun at the same time," he said. "For the beginners, especially, this learning process can be sheer drudgery. This is offset, however, by the sheer joy of breathing underwater for the first time."

"Mostly my work involves teaching students a complicated set of motor skills and this requires a lot of repetition. The students must be so familiar with their

equipment that if there is an underwater emergency they will automatically perform the right action. Usually they won't have a second chance."

Mayer said the scuba program would not have been possible without the assistance of several well-trained student and faculty divers. He explained that Kovacs carries much responsibility for the basic class while graduate students Steve Decker, Bob Eager, Kilian Dill, Joe Harris, and Robert Hammond help as safety divers along with E. John List, associate professor of environmental engineering science.

Undergraduates Jim Price, Jim Leger, Philip Gschwend, and Alex Lidow are teaching assistants. Graduate student Wes Brown teaches on-the-beach marine biology classes and Wheeler North conducts seminars on marine life. Floyd B. Humphrey, professor of electrical engineering, also lends a hand.

The basic course includes instruction in physiology, gas laws, decompression, buoyancy control, pressure changes, and air consumption. The advanced courses are even more challenging—instruction in underwater navigation, limited-visibility diving, search and recovery, life saving, first aid, emergency procedures, plant and animal life identification, water movement and characteristics; and shore, bottom, and surface conditions.

"Rather than just telling them what they are to do, I feel it is necessary to explain why they are to do it," said Mayer. "If a Caltech student doesn't know why he is supposed to do something, he won't do it."

Periodically, Mayer takes his students skin diving off one of the many beaches along the Los Angeles and Orange Counties shoreline. These are usually Sunday outings. A laboratory class in the ocean is invariably followed by a seminar at Mayer's home in Pasadena, plus dinner and a long rap session about everything under the sun.

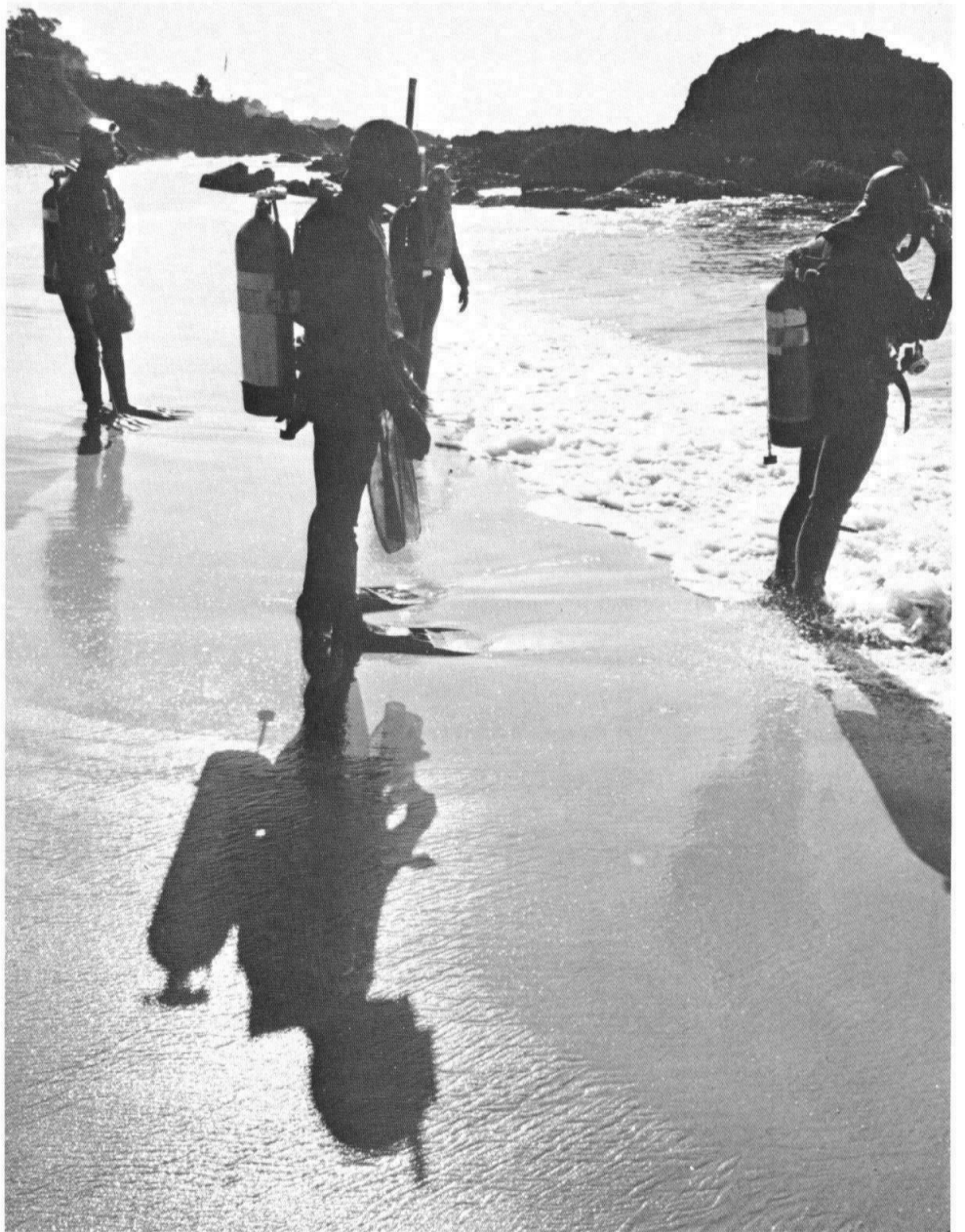
"Every time I take students out for their first ocean dive I'm useless for the rest of the day," said Mayer. "I wonder whether I got the points across, whether they listened or not, and whether their equipment is working properly. So I check and recheck everything and everybody."

But despite the strain, Mayer continues to teach his scuba diving classes because they give him a chance to get to know his students in a way that isn't possible in an ordinary academic setting.

"We're doing something together that is enjoyable," Mayer said. "We have a common basis for communication. As a result, I've made some good friends among the students."

The scuba diving classes give Mayer a chance to drive home several messages that he believes should be a vital part of a student's informal education in science.

"One of these is that the scientific life is hard and grueling, and may be merciless for the unprepared," he said. "Somehow, when related to scuba diving, that message gets through."



Divers pause for a moment before entering the surf.



Thirty feet under water, Jimenez and Mayer try to coax moray eels out of hiding.



James Mayer—a joyful diver, back on dry land.



For some alumni, Homecoming meant a chance to greet old friends (above); for others, especially those in the alumni-varsity water polo game, its effects were a bit dampening (below).



The Caltech Band provided spirited background music at lunch. At left, a tuba player industriously adds his sound to the music. Right: a youthful Beavers' booster at afternoon football game is Teddy Gutman, 7-year-old son of Caltech football coach, Tom Gutman.



Homecoming, '48 reunion draw alumni to campus



Members of class of '48 renew friendships.

by Lothrop Mittenhall, BS' 48
and
Tom Tracy, BS '48

The class of '48 held its 25th reunion from Friday afternoon, October 19, right on through Saturday night, October 20. A near-record turnout of 68 members attended, along with 63 wives and guests.

Beginning with an afternoon campus tour, the festivities got into high gear with a cocktail party on the Athenaeum patio where the alumni could view a few male and female students wandering along the Olive Walk—a gentle contrast to the alley ruckuses recalled from by-gone student days.

After each alumnus had observed how much his classmates had aged in contrast to his own youthful appearance, the would-be young Apollos went into the dining room for a sumptuous meal. Dinner was marked by animated conversa-

tion; later, Blackie Stone (Robert S. Stone, BS '48) presented a behavioral survey, and Bud Mittenhall (Lothrop Mittenhall, BS '48) reviewed the results of a class questionnaire.

Afterward there were movies and more animated conversation in the basement; some of the more dedicated reunioneers continued renewing old friendships in the Athenaeum suites where about 20 of them had elected to stay.

Saturday was devoted to sleeping, bull sessions, and taking part in Homecoming activities at Tournament Park. That evening, about 30 alumni gathered at the pool and cabana of Robert G. Stokeley, BS '48, in La Canada for cocktails and an Italian dinner. Some 16 civil engineers met at the home of Bud Carroll, BS '48, also in La Canada; according to reports, they indeed were very civil.

After it was over, everyone agreed that a good time had been had by all.

Led by Robinson:

Caltech Y-off and running



Caltech Y president, Haywood Robinson, right, with two members of the organization's executive committee—Greg Simay, left, and Paul Thomas, center—discusses plans.

The Caltech Y student cabinet, headed by Haywood Robinson, incoming president, is off to a running start on the many projects scheduled for the 1973-74 school year. Members of the Y cabinet were all chosen in campuswide elections last spring.

A senior, Robinson is majoring in biology and planning a career in medicine. He's a resident of Dabney House, and a member of the football and track teams. Last spring he tied a school track record of 9.7 seconds in the 100-yard dash, and set a new mark of 22.0 in the 220 sprint. In addition to the sprints, Robinson runs the first leg in the mile and 440-yard relays for Caltech.

Robinson emphasized, "The Caltech Y is here to serve the students. We have a number of activities planned for the

coming year that we think will be very interesting. We're extremely eager to create new programs. We intend to encourage all students to take the time to come in, talk to us, and tell us their ideas; then we'll do everything possible to carry them out."

Invitations have been extended to the many important speakers whom the Y hopes to bring to the campus during the year as participants in its Leaders of America and Life Beyond Science programs. Student services include a used-book exchange, rental of camping equipment, an emergency loan fund, a record club with more than 260 rock albums, a lounge for relaxation, an office workroom, the campus lost-and-found department, and programs that include musical entertainment, films, and trips.

FACULTY HONORS

Clarence R. Allen

Clarence R. Allen, professor of geology and geophysics, has been elected president of the Geological Society of America. Allen, who served as vice president of the Society last year, was elected to the top spot during the organization's annual meeting in Dallas, November 12-14.

The Geological Society of America has a membership of 10,000.

Michael Aschbacher

Michael Aschbacher, assistant professor of mathematics, has been awarded a Sloan Fellowship for 1973-75 in recognition of his important discoveries in the theoretical field of finite groups and combinatorial problems.

The fellowship consists of a \$15,000 grant to be used for professional purposes over the two-year period.

Harry B. Gray

Harry B. Gray, professor of chemistry, has been appointed a Phi Beta Kappa Visiting Scholar for 1973-74.

As a participant in the program, Gray will travel to eight institutions: St. Louis University, University of Missouri, Centre College of Kentucky, University of New Mexico, State University of New York at Binghamton, Colgate University, University of Vermont, and Wellesley College. During his two-day stay at each institution, he will meet with students and faculty in a variety of formal and

informal encounters—which usually include classroom discussions, seminars, and one public lecture. His lectures will cover such topics as the crisis in science education; biological iron storage and regulation at the molecular level; and research on red, purple, and blue bloods.

Robert B. Leighton

Robert B. Leighton, professor of physics and chairman of the Division of Physics, Mathematics and Astronomy, has been appointed to the Space Science Board of the National Academy of Sciences.

Leighton will serve a three-year term, from October 1, 1973 to October 1, 1976. He has been a member of the Academy for several years, and has served on other of its committees prior to his current assignment.

Cornelius J. Pings

Cornelius J. (Neal) Pings, professor of chemical engineering and chemical physics and vice provost and dean of graduate studies, has been selected to receive the Alpha Chi Sigma Award in Chemical Engineering for 1973. The award was presented at the American Institute of Chemical Engineers Honors luncheon in Philadelphia on November 12.

The Alpha Chi Sigma Award is given in recognition of "outstanding recent accomplishments by an individual in fundamental or applied research in the field of chemical engineering."

Meteorologists recall:

Caltech and a world at war

by Winifred K. Veronda

The Stage Door Canteen drew capacity crowds, every department store housed a war bond booth, and Rosie the Riveter had become a national heroine when members of the meteorology class of '43 arrived on the Caltech campus in November, 1942.

There were 173 of these special students. Most were members of the Army Air Corps, a few, of the Army or Navy. They were the first of two such groups that trained on the campus.

All of the young men who achieved a "C" average or better would receive a master's degree—but that wasn't their primary objective. After a year of training in forecasting the weather, they would go to armed-forces bases throughout the world to play an essential role in the war effort.

In Pasadena they were lodged in the Constance Hotel — in prewar days, a plush winter refuge for easterners who were lured to California by its balmy climate. They marched to the campus in the morning and they marched home in the evening; they spent an hour doing calisthenics. But no one considered their presence on the campus to be peculiar.

Said James H. Leonard, a member of that group, "In 1943 almost every student knew he might be drafted at any time. The military was an accepted part of the era—and so were we. In fact, when people in the community learned we were at Caltech, we were warmly received.

After ten months at the Institute, the students embarked on what their year-



Pulled out of storage for the occasion, yearbooks—specially prepared for the meteorology class of '43—were much in evidence at reception before reunion dinner in the Athenaeum.

book called "a grand tour of the world." They served at bases around the globe, often with some of their former classmates. Many were assigned to the Aleutians—a rude contrast to balmy, smogless Pasadena. After the war, many of them continued in careers related to meteorology; about half are in such work today.

Early in October, some 30 members of the meteorology class of '43 gathered at Caltech for their first reunion since leav-

ing the Institute—an event that was organized by Leonard. The alumni arrived from as far away as Illinois, Texas, Washington, and Utah. After a campus tour they gathered for dinner at the Athenaeum—that elegant Mediterranean structure that had so impressed them in 1942.

One alumnus commented, "Many of us came from little towns, and we were awestruck by the beauty of the campus. A lot of the buildings were sparkling new, and there was no smog to block

the San Gabriels. We were absolutely thrilled with the setting."

Reminiscing about that Caltech era, Leonard recalled that the meteorologists were compelled to spend all their after-class hours at the Constance Hotel—a fact that led them to christen that august structure "The Constance Bastille." Curfew was at 10 p.m., and one alumnus complains that his vision never fully recovered from the strain of studying under the covers with a flashlight.

But from Friday afternoon to Sunday evening, the students were free to explore the southern California area—fishing, hunting, or more frequently joining crowds at the Hollywood Canteen. One young man directed his social life into a more permanent channel—he met the secretary to Donald Clark, professor of physical metallurgy, at a social gathering on campus and later he married her.

In course content, the students were primarily concerned with learning climatology, oceanography, the theory of weather forecasting, and the structure of the atmosphere. Caltech supplied them with its scientific best. If talent wasn't available in the meteorology department itself, then specialists were imported from other areas.

A few students who had taken a heavy concentration of undergraduate science and engineering courses needed additional humanities credits before becoming eligible for a master's degree.

In describing their expectations concerning one new humanities teacher, an alumnus said, "We had heard that 'a man connected with a library' was coming to teach us history. We were a bit offended that the Institute was sending a librarian—that contrasted so sharply with the quality of instruction we'd been receiving."

But the "librarian" turned out to be J. E. Wallace Sterling, Edward S. Harkness Professor of History and Government—soon to become president of Stanford University.

"He was a tremendous teacher," the alumnus continued—"an example of the kind of talent that Caltech provided."

For one alumnus, the chance to attend the Institute as a participant in the meteorology program fulfilled a deeply rooted dream.

"In high school I had longed to attend Caltech," he explained. "I used to pore over a brochure that I'd written for. I had the grades—but not the money. So I went on to a junior college and then graduated from a four-year school. When I learned that Caltech was one of several universities participating in the training of meteorologists. I leapt at the opportunity to get to the campus."

The U.S. was still years away from victory when the meteorologists completed their training and embarked on their "grand tour." Before this October, many had not returned to the campus during the intervening 30 years. How did the Institute look after such a long absence?

"The sky is dingier and the buildings are older—and so are we," one remarked, "but the essential character is the same—and I'm glad to have been a part of it."

Robert Gray receives Carrol Award of Merit

Robert D. Gray, professor of economics and industrial relations and director of the Industrial Relations Center, was presented with the Phil Carrol Award of Merit by the Los Angeles Chapter of the Society for Advancement of Management. Gray was honored for his "outstanding national contribution to the field of personnel management."

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- 1906 Norton, Frank E.
- 1907 Miller, James C., Jr.
- 1911 Lewis, Stanley M.
- 1916 Allen, Robert N.
- 1923 Neil, W. Harvey
- 1924 Gridley, Horace V. Tracy, Willard H.
- 1925 Waller, Conrad J.
- 1926 Chang, Hung-Yuan Huang, Y. H. Yang, Kai-Jin
- 1927 Moore, Bernard N. Peterson, Frank F. Thompson, Donald R.
- 1928 Martin, Francis C. Pugh, Evan E.
- 1929 Briggs, Thomas H., Jr. Holdaway, V. Lyman Lau, Kam Hu Nelson, Julius Robinson, True W. Uytterhoeven, Willem
- 1930 Chao, Chung-Yao Moyers, Frank N. White, Dudley
- 1931 Ho, Tseng-Loh West, William T. Widess, Ruben Woo, Sho-Chow Yoshioka, Carl K.
- 1933 Brunner, Eugene Koch, A. Arthur Larsen, William A. Michal, Edwin B. Muller, Jerome J. Rice, Winston R. Rose, Robert S. Shappell, Maple D. Smith, Warren H.
- 1934 Harshberger, John D. Liu, Yun-Pu
- 1935 Antz, Hans M. Bertram, Edward A. Dourson, Robert H. Evans, M. Harrison Huang, Fun-Chang McNeal, Don Rivas, Dagoberto Snow, Neil W.
- 1936 Chu, Djen-Yuen McKillip, John C. S. Meng, Cho-Ying Tan, Chia-chen Van Riper, Dale H. Young, Larry L.
- 1937 Burnight, Thomas R. Cheng, Ju-Yung Davis, Roderic C.
- 1944 Alpan, Rasit H. Amster, Warren H.

- 1948 Au, Yin Ching Bunge, James A. Chu, Tao-Hung Chuang, Feng-Kan Clark, Albert R. Collins, Burgess F. Crawford, William D. Holm, John D. Hsiao, Chien Hsieh, Chia Lin Latson, Harvey H., Jr. Mason, Herman A. Oliver, Edward D. Roe, George W., Jr. Slusher, John T. Swain, John Sabin Tang, Yu-Wei Voelker, William H. Whitney, James E. Winniford, Robert S. Woods, Marion C. Yanak, Joseph D.
- 1949 Allen, Thomas E. Andrews, Thomas J. Baumann, Laurence I. Bottenberg, William R. Brown, John B. Bryan, Wharton W. Cheng, Che-Min Cooper, Harold D. Dodge, John A. Foster, Francis C. Hardy, Donald J. Heiman, Jarvin R. Hylton, Frank G. Krasin, Fred E. Krauss, Max Leroux, Pierre J. Lowrey, Richard O. McEligott, Richard H. Mitchell, Max O. Orme, Eric M. Parker, Dan M. Petty, Charles C. Ringness, William C. Roesch, William C. Solomon, Salim Stubbins, Robert L. Wilkening, John W.
- 1946 Allison, Charles W., Jr. Austin, Benjamin L. Behroun, Khosrow Bowen, Mark E. Brinkhaus, Harvey H. Burger, Glenn W. Chen, Ke-Yuan Dyson, Jerome P. Esner, David R. Fateh, Hassan F. Fong, Conrad T. O. Freire, Luis E. Halvorson, George G. Lewis, Frederick J. Maxwell, Frederick W. Prasad, K. V. Krishna Ross, Willard A. Salbach, Carl K. Shepard, Elmer R. Sledge, Edward C. Smith, Harvey F. Srinivasan, Nateson Tung, Yu-Sin
- 1947 Asher, Roland S. Atencio, Adolfo J. Chung, Fa-San Clarke, Fredric B. Clements, Robert E. Collins, Hugh H. Dagnall, Brian D. de Witte, Leendert Eggenberger, Byrne Giamboni, Louis A. Hsu, Chi Nan Huang, Ea-Qua Leo, Fiorello R. Linton, William M. Manoukian, John Molloy, Michael K. Moorehead, Basil E. A. Olson, Raymond L. Sappington, Merrill H. Swatta, Frank A. Thompson, Russell A., Jr. Vanden Heuvel, George R. Wan, Pao K. Wellman, Alonzo H., Jr. Wimberly, Clifford M. Winters, Edward B., Jr. Ying, Lai-Chao
- 1950 Alexander, Joseph B. Badger, Frederick C. Bryan, William C. Forrester, Herbert A. Li, Chung Hsien McLellan, Albert E. Nelson, Donald J. Pao, Wen Kwe Paulson, Robert W. Picciotto, Roger A. Schmidt, Howard R. Schneider, William P. Tang, You-Chi Welte, Robert S. Whitehill, Norris D.
- 1951 Arosemena, Ricardo M. Davison, Walter F. Goodell, Howard C. Lafdijan, Jacob Paresch Li, Cheng-Wu Lo, Shih-Chun Padgett, Joseph E., Jr. Summers, Allan J.
- 1952 Arbo, Paul E. Arcoulis, Elias G. Bissett, Charles F. Bucky, Smith V. Lang, Frank C., Jr. Lunday, Adrian C. Luo, Pellin Robison, William C. Sutton, Donald E. Weeks, Richard W. Wilson, Howard E.
- 1953 Dirickson, Luiz H. Hruby, Ronald J. Lennox, Stuart G. Muss, Daniel R. Peters, Alphonse P. Slodowski, Thomas R. Takahashi, Nobuyoshi
- 1954 Biles, Shelton B., Jr.
- 1955 Guebert, Wesley R. Henry, Irvin G. Jimenez, Herberto Rogers, Berdine H. Scott, Francis F.
- 1955 Birdwell, Carl, Jr. Bjornerud, Egil K. Brethes, Alain Huber, William E.
- 1956 Bradford, Robert E. Edwards, Robert W. Feige, Jacques Foster, James R. Gold, E. Mark Harney, Donald J. Hill, David W. Kelly, James L. Konartatos, Antonios N. MacDuffie, Duncan E. Moody, Roland G. Spence, William N. Srinivasan, Prabandam
- 1957 Barston, Eugene M. Edsforth, John F. Farley, Alan E. Rockenbauer, Wolfgang Trever, Andre V. Uthoff, John C. White, Ray H.
- 1958 Braham, Harold S. Byles, David G. LaCrouts, Jean P. Lemaitre, Jean Palmiter, Hugh D. Rieunier, Jacques M. Stenberg, Gunnar E. Valbert, Jon R.
- 1959 Baekelandt, Victor Byun, Chai B. Carroll, Clark E. Christensen, Ronald A. Guillemet, Michel P. Hamel, Armando Hemmingway, Richard E. Moerjono, Harry Moise, Norton L. Morane, Didier Roth, Stanley Rouvillois, Xavier M. Smith, Homer L.
- 1960 Arveson, William B. Cauley, Joseph M. Lagarde, Jean B. Rix, John R. Rubin, Arthur M. Widess, Paul R.
- 1961 Kastan, Peter Kitten, Roland Schweitzer, Glenn E. Smith, Lewis L. Wilkinson, John F.
- 1962 Audet, Clement C. Cousin, Michel M. d'Arbaumont, Michel Dorhae, Jean-Pierre Meirelles, Osorio C. Noel, Jean M. O'Riordan, Padraic D. Otani, Bunso Pines, Barry N. Ruddick, Robert C. Wang, Duen-pao
- 1963 Abarbanel, Henry D. I. Dash, Jan W. Facon, Pierre J. Lau, Jarck C. Samuelson, Lee W. White, Warren H. Wu, John Y.
- 1964 Atkin, Curtis L. Chang, Tzu-Ching Fisher, Cary A. Mager, George E. Nathanson, Stanley N.
- 1965 Puhl, Andreas Roberts, Thomas S., Jr. Skalbania, Nelson M. Szu, Charlie Ts'ao, Hsueh-sheng Waits, Harold P.
- 1965 Conn, Robert W. House, Richard A., II Scott, Robert B. Solehac, Bernard C. Stephens, Melvin M., II
- 1966 Angel, James R. P. Bowman, Robert M. Chi, Ko-Chuan Eris, Altan K. Greenwood, Robert W., Jr. McDaniel, Patrick J. Serafin, Robert E. Strauss, Ellen G. Street, Donald R.
- 1967 Adodra, Surendra N. Ames, William L. Blundy, Philippe J. M. Dillehay, Larry E. DuPont, Michel P. Goldwasser, Robert E. Hammond, David A. Hatch, G. Laurie Komai, Ralph Y. Little, Gary W. Potter, Franklin G. Scavenec, Michel A. Shim, Sang Chul Simpson, William B.
- 1968 Bell, Robert L. Bendix, Peter B. Cole, Ronald S. Fisher, James E. Fowler, William G. Friedlander, Carl A. Lehman, John M. Schaffner, Charles A. Spencer, Charles C.
- 1969 Andrew, James B. Aney, Donald L. Burke, Richard R. Cerne, James P. Gregg, Ronald L. Hadler, Stephen C. Jennings, Scott W. Jerath, Navin Kaufman, Elton N. Keller, Barry R. Moriwaki, Yoshioki Young, Kenneth
- 1970 Apostolakis, George E. Dalal, Uma R. Defouw, Richard J. Doyle, Richard F. Hocker, William C. Horwitz, James J. Hutchinson, James D. Imbert, Nicole H. Jain, Atul Lee, Man K. Leon, Juan E. Majerovicz, Isaac A. Peterson, George A. Steimle, Juan L. M. Stevenson, John A. Stover, Howard H.
- 1971 Berman, Leonard C. Graham, Ralph B. Hernadi, Stephen I. Lam, Clement W. Rude, Jeffrey D. Swanson, Ronald J. Tamura, Yukio
- 1972 Boissaye, Eric R. LaBonte, Barry J. Lee, Lou-Chuang Miller, Robert N. Mohsen, Mona M. Spencer, Robert M. Yip, Ka Bing

1973 Alumni Survey responses described

continued from page 1

Nearly 80 percent of all alumni are in one of four occupational areas—business or management, education, engineering, or scientific fields. Of these, the largest proportion—31.1 percent—are in business management.

OCCUPATION	Percent
Business Management, Proprietors	31.1
Education	20.2
Engineering	18.0
Scientist	9.7
Retired	7.0
Graduate Students	6.3
Other (including Medicine, Military, etc.)	7.7

In terms of their occupational industry, a substantial portion of the alumni who responded—46 percent—are working in manufacturing, business, or aerospace. Another 29.1 percent are in education. The remainder work in a variety of areas.

OCCUPATIONAL INDUSTRY	Percent
Manufacturing, Business, Aerospace	46.0
Education	29.1
Government	7.9
Transportation, Public Utilities, Communication	3.6
Services	3.5
Military	3.2
Other	2.8
Don't Know or No Answer	3.9

Among the alumni reporting, there are fewer who received undergraduate degrees in engineering and applied science than was true in 1963—only 50.1 percent this year compared with 66 percent in 1963. Between 1952 and 1963 the proportion of alumni who graduated in engineering had remained relatively stable, increasing during that decade by 4 percentage points.

The Division of Biology experienced a slight increase in the percentage of alumni who had been undergraduate majors; however, the publicized growth in the number of students studying biology has not yet had time to show up in alumni statistics. Alumni who received their undergraduate degree in biology now make up only 3.7 percent of the total, an increase of 1.7 percentage points since 1963—but still the smallest percentage except for the 0.8 percent of alumni who are humanities graduates. As small as it is, however, the percentage of biology majors has almost doubled since the last survey.

The largest increase in the proportion of majors was registered by the Division of Physics, Mathematics and Astronomy—up 10.6 percent since the previous survey.

DIVISIONS WHERE ALUMNI EARNED UNDERGRADUATE DEGREES	1973	1963	1952
Biology	3.7	2.0	2.0
Chemistry and Chemical Engineering	16.7	15.0	17.0
Engineering and Applied Science	50.1	66.0	62.0
Geological and Planetary Sciences	5.2	4.0	5.0
Physics, Mathematics and Astronomy	23.6	13.0	14.0
Humanities and Social Sciences	0.8	—	—

Among divisions where alumni earned their master's degree, the Division of Engineering and Applied Science continues to lead by a substantial margin—with 68.2 percent. Trailing considerably behind are Physics, Mathematics and Astronomy, and Chemistry and Chemical Engineering, where 10.6 percent of the alumni earned a master's degree.

DIVISION WHERE ALUMNI EARNED GRADUATE DEGREES	MS	Eng	PhD	Net
Biology	1.1	2.1	8.2	4.2
Chemistry and Chemical Engineering	10.6	7.9	29.5	16.9
Engineering and Applied Science	68.2	87.4	30.6	51.8
Geological and Planetary Sciences	8.3	1.3	6.6	6.4
Physics, Mathematics and Astronomy	10.6	1.3	25.0	21.2

The vast majority of Caltech alumni—a whopping 82.8 percent—are married. No comparisons can be made concerning changes in alumni family patterns over the past decade, since questions relating to marital status were not asked in 1963.

MARITAL STATUS	1973
Single	12.5
Married	82.8
Widowed	0.8
Separated	0.8
Divorced	3.0
No answer	0.2

More than 60 percent of all alumni live in California—an interesting statistic because only 36 percent of the alumni were born there, and only 46 percent spent most of their pre-college days in the state.

The survey reveals that a smaller percentage of alumni are Republican than in 1963. This percentage has decreased from 55 percent to 44.3 percent; meanwhile, the percentage of Democrats has increased by 5.1 percent.

POLITICAL AFFILIATION	1973	1963
Republican	44.3	55.0
Democrat	27.1	22.0
Independent	25.7	23.0
Other party	0.7	—
No answer	2.1	—

That Caltech alumni are interested and involved in current affairs is borne out by the proportion who said they had voted in the last presidential election—90.4 percent of those responding.

Survey results showed that few alumni have relatives who attended Caltech—predictable for an institution that has a fairly small student body, is relatively young, and has not yet generated a large alumni population.

ALUMNI WHOSE RELATIVES ATTENDED CALTECH	1973
Yes; either parent attended	1.6
Yes; grandparent attended	0.1
Yes; other relative attended	8.8
No to all of the above	89.9

College Years

In the 1973 survey, alumni were asked several questions about their college years that had not been asked in previous surveys. Two of these questions related to their financial status when they were students; the answers revealed that the vast majority earned a portion of their

college expenses, or received some form of financial assistance, or both.

The most frequent means by which students contributed to their own educational costs was through holding a summer job. Of the alumni who responded, 67.4 percent had held a summer job while in college; 45.5 percent had worked during the school year.

FINANCIAL ASSISTANCE	1973
An undergraduate scholarship	27.1
An Institute loan	16.4
A government loan	10.1
A school-year job	45.5
A summer job	67.4
None of the above	19.0

Of those reporting, 91.4 percent had earned some part of their school expenses; the amount varied widely between 1 and 100 percent, but the largest percentage group—16.3—had earned between 21 and 30 percent.

PERCENTAGE OF SCHOOL EXPENSES EARNED	1973
None	8.6
1-10%	14.2
11-20%	14.7
21-30%	16.3
31-40%	7.6
41-50%	12.9
51-60%	1.9
61-70%	1.5
71-80%	5.0
81-90%	1.9
91-100%	11.4
No answer	4.0

Early Background

A larger proportion of the present alumni body grew up in large cities than when earlier surveys were taken—indicative of a nationwide trend toward population concentration. Among the Caltech alumni reporting in 1963, 42 percent had been raised in large cities; in 1973, this percentage had increased to 49 percent.

Particularly striking was the increase in alumni who had grown up in a metropolis. This percentage has risen from 27 percent to 35.2 percent over the last ten years.

TYPE OF PLACE WHERE ALUMNI GREW UP	1973	1963	1952
Farm	4.8	6.0	6.0
Small town	9.7	10.0	11.0
Small city	19.0	22.0	22.0
Medium city	17.5	20.0	22.0
Big city	13.8	15.0	14.0
Metropolis	35.2	27.0	25.0

A similar trend is evident in the kind of community where alumni spent most of their years since college, and where they are living now. Of those reporting, 69.9 percent had spent most of their post-college years in a metropolis or a large city; 68.2 percent are living in such an area today.

WHERE ALUMNI HAVE SPENT THEIR POST-COLLEGE YEARS

	1973
Farm	0.4
Small town	1.4
Small city	8.9
Medium city	16.5
Big city	14.2
Metropolis	58.7

WHERE ALUMNI ARE LIVING NOW

	1973
Farm	1.1
Small town	2.7
Small city	11.5
Medium city	16.5
Big city	12.0
Metropolis	56.2

Reflected in survey results is a shifting in the geographic distribution of Caltech students—indicative of the fact that Caltech has grown in its role as a national institution. A smaller percentage of today's alumni grew up in southern California than was the case in 1963; a larger percentage came from the Midwest and the East.

In 1963, 43 percent of those alumni responding had gone to high school in southern California; today, that percentage has dropped to 37.6 percent. Meanwhile, the proportion of alumni from the Midwest has risen from 14 to 16.5 percent, and the proportion from the East from 11 to 13.6 percent.

The proportion of alumni who spent most of their pre-college years in California has followed the same trend; this percentage had dropped from 56 percent in 1952 to 51 percent in 1963 and to 46 percent in 1973.

GEOGRAPHIC AREA WHERE ALUMNI WENT TO HIGH SCHOOL

	1973	1963	1952
Southern California	37.6	43.0	53.0
Other western states	20.5	22.0	17.0
Midwest	16.5	14.0	12.0
South	3.7	6.0	6.0
East	13.6	11.0	8.0
Foreign	5.2	4.0	4.0
No answer	2.8	—	—

Melee at Throop site:

Messy madness marks Mudeo

Caltech students conducted their traditional fall melee—the Mudeo—in a new setting this year: the old Throop site. Not yet transformed into an island of greenery and cascading waterfalls, the site was converted (with a minimum of effort on the part of B & G) into a mud pit rivaling the Alumni Swimming Pool in size.

This was the 59th Mudeo-type event since Caltech students initiated the Pole Rush in 1915. This forerunner of the modern Mudeo featured a climb by a freshman to the top of a greasy pole. There the freshman was supposed to chew off a piece of canvas (kindly provided for him) in no more than 20 minutes.

This year's contest consisted of traditional events: the tug of war, sack race, wheelbarrow, horse and rider, tire spree, and leapfrog. Winners of the last-named competition—an all-girl event—were declared the Mudeo queen and princess. These august titles went to sophomores Audrey Liebross and Shelley Smith.

The first event (for which no points were awarded) was an innovation. The freshmen were asked to wade into the glop—supposedly so that they could adjust to it before their veteran opponents entered. However, some cynical observers concluded that the real purpose was to use freshman feet to clear craggy bits of Throop off the bottom of the pit. In this unofficial event Throop seriously outnumbered the freshmen and was declared the winner.

The mudeo featured the usual run of unforeseen developments: the sophomore tug-of-war participants—badly outnumbered by the frosh—tied one end of the rope to the railing of north Throop steps



Oblivious to commotion, freshman Ann Orel finds treading mud a delightful experience.

and finally the event was declared a tie. Rules of the sack race were changed mid-mud after two slimy free-for-alls developed because of attempts to steal an opponent's sack. The original objective had been to complete ten laps across the pit; the revised rules simply read, "first sack onto dry land wins."

When the final event, the tire spree, was awarded to the freshmen, the judges fled into the steam tunnels to escape their traditional dunking at the hands of the losers. There was some confusion as

to which team had won, and eventually both sides began to chase the judges—who by this time were far away. Only one straggler met his doom.

The remaining judges stayed out of sight for an hour and then spread the word—the Mudeo was officially over and the sophomores were victorious. One observer commented that probably this Mudeo will be especially memorable to one group on the campus—the members of B & G—who were left with the task of cleaning up all the mess.

3-3-0:

Beavers' season record best since '57

There were only five minutes left in Caltech's last football game of the 1973-74 season and head coach Tom Gutman was smiling broadly. In fact, he was almost laughing.

He turned to his two team managers—Carol Stevens and Margo Robe—and said, "I think we've got it."

Then he handed his wallet, change, pens, and notebook to the two girls. "Give these back to me later," he said. "I think the kids are going to shower me after the game."

He was right. When the gun went off, ending the game, Caltech's Beavers had

Whittier pass and ran 51 yards. In the end, however, Caltech lost, 27-20.

In their game against Claremont-Harvey Mudd College's Junior Varsity, the Beavers broke a ten-game losing streak by beating the opposition 28-0—at that point, Caltech's largest shutout margin since 1956.

Things were fairly quiet in the first quarter since the Beavers found it hard to get up a running attack. They did, however, prevent their opponents from scoring, with a goal-line stand on the five-yard line.

In the second quarter, the action got

Hopes were high for another win against Mt. San Jacinto Junior College on October 20. But the Beavers were simply overwhelmed by the sheer size and number of the opposition, and they lost, 19-7.

The situation didn't seem to be too bad during the first half. A fourth down pass from Nelson to Hoit, and a point after touchdown by Pohorsky gave the Beavers a 7-6 half time lead. But that was all the scoring the Beavers could accomplish. Caltech wound up with a net of five yards' rushing and 43 yards' passing, compared with Mt. San Jacinto's 160 yards' rushing and 187 yards' passing.

The second game against Claremont-Harvey Mudd on October 27 was the greatest performance by a Caltech football team since the 67-0 win over Cal Baptist in the opening game of the 1956 season. The score against Claremont-Harvey Mudd was 42-0.

The scoring began with an 11-yard touchdown pass from Nelson to Steubs, followed closely in the first quarter by a 39-yard touchdown pass to Hoit, a two-point conversion from Nelson to Steubs, and a safety by Frank Hobbs, who tackled a Claremont quarterback in his own end zone.

28-0 at half time

In the second quarter, Nelson threw two more touchdown passes—a 39-yarder to Hoit, and 6-yarder to Steubs. At halftime, Caltech was ahead, 28-0.

The third quarter began with a 93-yard kickoff return by Steubs, bringing the Beavers to within 33 points of their 1956 victory margin when John Morton took the conversion across. The scoring was completed when Hoit ran 21 yards for a touchdown.

The Caltech team came into its last game of the season against La Verne, hot for a victory. The Beavers kept the opposition from scoring throughout most of the first quarter, but in the closing minutes La Verne whipped through the Beaver defense to score 13 points.

The situation was beginning to look hopeless as half time approached and Caltech had not yet scored. But with 36 seconds left in the second quarter, Hoit grabbed a pass from Nelson and ran 40 yards for a touchdown.

Five minutes into the third quarter, Bruce Harrow intercepted a Whittier pass on the 12-yard line. A pass to Steubs from Nelson brought the score to 13-12. A point after touchdown by Pohorsky tied the game.

With five minutes left in the third quarter, Neal Askew grabbed a pass from Nelson and got the ball to the four-yard line. John Morton then went over the center of the Whittier line to score, pulling Caltech ahead, 19-13.

After a fourth-quarter holding action, the Beavers marched off the field—victorious.

Fleming House cannon saved from kidnappers

Fleming House's unique trophy—the 1.7 ton, 97-year-old French cannon that students "borrowed" from Southwestern Academy about a year ago—narrowly escaped an inglorious capture by representatives of Claremont-Harvey Mudd College.

The hero responsible for its rescue was Officer Tom Tullius of the Pasadena Police Department. After a call from campus security guards, Tullius arrived on the scene at 5:15 a.m., Saturday, October 27—the morning after Harvey Mudd's second football defeat at the hands of the Beavers.

Mudd students were using a block and tackle to roll the old firing piece up a ramp onto a waiting truck. Tullius ordered them to return the cannon to its original position; and Mudd lost yet another round to its opponents.

Early the next day a crowd of about 200 Caltech students, carrying signs and shouting their appreciation to Tullius, appeared at the Pasadena Police Department.

The cannon came to the campus in October 1972; it was "kidnapped" (with the owner's permission) from the front lawn of Southwestern, a preparatory school in San Marino. Almost 100 Flems, softly shod and armed with ropes, dragged their prize stealthily through quiet, pre-dawn streets to the Institute.



In game against Mt. San Jacinto Junior College, dogged Caltech player is tackled.

beaten La Verne College 19-13. And Gutman was carried—off the field and to the showers—high on the shoulders of his team.

That win brought Caltech's season total to 3-3-0, the best record in Gutman's six years as football coach, and the best the Beavers have had since 1957. This brings the school's record over 78 years of football to 104 wins, 309 losses, and 16 ties.

These totals might lead an observer to think that no one at Caltech can play football. According to Gutman, however, this definitely is not the case. There are talented players at Caltech. But there simply aren't enough of them.

"No other school in the country faces the problems we do in terms of lack of experience," he said. "Many of our kids never played varsity football in high school, and some don't even know the basics of the game when they go out for football here."

Another problem is that not many students are willing to go out for the team.

Lack of Depth

"As a result of the small turnout, most of our players have to play both offense and defense," said Gutman. "We usually play our opponents pretty evenly in the first half, but during the second half our lack of depth starts to show. Our players begin to tire and that's when the opposition starts scoring on us."

Caltech's first game of the season, against Palo Verde Junior College on September 28, illustrates vividly many of Gutman's problems: only 15 players suited up. As a result, the Beavers were beaten 20-0.

Things started to improve significantly during the second game of the season on October 6 against the Whittier College Junior Varsity. To the middle of the fourth quarter, the game belonged to Whittier. Then, with five minutes and thirty seconds left to go, Caltech was fired up by the passes of quarterback Norm Nelson, and scored 20 points.

The first touchdown occurred when Nelson threw a 50-yard pass to John Steubs. Two minutes later the ball was recovered and Nelson threw another successful pass—this time 45 yards to Greg Hoit. Nelson and Hoit then combined for a two-point conversion. Steubs scored the third touchdown when he intercepted a

off to a fast start as Nelson threw a six-yard touchdown pass to Hoit. A little later Nelson threw a 20-yard touchdown pass—again to Hoit. In the third quarter, Nelson threw his third touchdown pass, 32 yards to Steubs. The scoring was completed in the fourth quarter when Steubs picked off a Claremont pass and ran 90 yards for a touchdown. Steve Pohorsky rounded things out by connecting on all four points after touchdown.

When giants walked the earth:

Alumnus recalls big '68 bonfire

Caltech's most recent football triumph called to mind a previous victory day and the activities that followed. One alumnus present at the game and the ensuing celebration recalled the events in the October 19 issue of THE CALIFORNIA TECH.

by Edward A. Schroeder IV, BS '70

The 1968-69 football season was the first in which Caltech played its home games in Tournament Park—in recent years, anyway. The athletic department hoped that a change from the Rose Bowl to a more convenient location would lead to greater support for the home team; they were correct.

On November 9, 1968, Caltech won its first game in four years—defeating San Diego, 34-31. A large crowd was on hand, for the word had gotten around that UCSD might be beatable. In this event, Caltech would end a four-year losing streak and probably would celebrate in the traditional way: with a large bonfire on a major Pasadena intersection.

The game itself was exciting and unpredictable as each team's offense ran up impressive yardage totals. UCSD rushed for more than 230 yards, while Caltech's fullback, Mike Brennan, gained 140 yards on the ground, and quarterback Tom Burton completed 14 passes—11 of them to split-end Lonnie Martin. Those three players were stellar performers that year the equals of any in the conference.

As the teams traded touchdowns UCSD fell behind in extra points and was unable to convert two-point effort. to catch up. As the final minutes passed,

Tech fans watched intently as UCSD tried to score again, but the clock ran out with the Beavers ahead, 34-31.

At the final gun the spectators went wild, rushing the field. Head Coach Thomas Gutman was given an impromptu ride by his team, and the Techers brought down the wooden goal posts.

As the sun set, plans were laid for the bonfire. A certain lack of experience in staging a bonfire was an inevitable result of a four-year victory drought; a second handicap was that many were caught by surprise when we actually won a game. But Caltech ingenuity soon took over, and plans proceeded.

Students launched various diversionary activities while the main task force descended on the intersection of Lake Avenue and California Boulevard. (By the time it had occurred to the participants that this intersection was blessed with two gasoline stations with full complements of water, it was too late for a change in plans.)

The main pyre was constructed in an incredibly short time and barricades were placed at the intersection to protect unwary motorists. At its highest, the bonfire was an impressive sight, but the Fire Department quickly arrived and dampened it.

The firemen and policemen seemed unwilling to enter into the spirit of the event; no sooner had they arrived than they cast around for a suitable student to collar. They selected one who stood about 5' 3" and was doing nothing at all—other than adding some fuel to the fire.

Actually, the pint-sized student was a wrestler, but he wisely decided that this

was not the time for a demonstration. As he sat in a police car waiting to be taken away, several Blacker residents concocted ingenious rescue plans. These were vetoed, however, on grounds that they might incite the police unnecessarily—and anyway, the student's handcuffs would have been a problem. (He was released later that evening without charges—a nice gesture.)

Although the bonfire had been quenched, the night's activities were far from over. One of the football heroes decided it would be an Interesting Thing to see if he could steal a fire hose. He might have succeeded except that the hose was attached at the other end. Firemen and policemen took his fun in bad part, but they released him without charges.

A couple of Blacker residents set a bonfire atop Throop, to the surprise of observers and to the annoyance of the Fire Department. Firemen used a stream of water to dislodge the fire, which proved to be gasoline and sand in a large can. Later a Techer tried to convince a fireman that someone was setting fire to a palm tree on San Pasqual—as was indeed the case. The tree resisted the flames, and suffered no particular damage.

At one point several Flems relit a previously lighted diversionary fire at California and Arden; firemen arrived once more—no doubt hoping that the coming weeks would begin a long season of Caltech football defeats. This time the students were willing to peacefully terminate the pyrotechnical aspects of their celebration—and to file the rare victory away in their memories.

PERSONALS

1926

RICHARD D. POMEROY, MS '27, PhD '31, president of the consulting firm of Pomeroy, Johnston and Bailey, of Pasadena, California, was awarded the 1973 Rudolph Hering Medal from the American Society of Civil Engineers, along with John Parkhurst of Los Angeles. The award, given for their paper, "Oxygen Absorption in Streams," was presented in New York City at the Annual and National Environmental Engineering Meeting of the Society. The medal is awarded to the author, or authors, of the paper that contains the most valuable contribution to the increase of knowledge in the environmental branch of civil engineering.

1938

THOMAS V. DAVIS, MS '47, AE '48, writes: "Returned to Seattle, Washington, in time to celebrate my 25th anniversary with Boeing. Thirteen and a half years of representing Boeing in southern California is a fond memory. I'll be 'home' in Altadena for Christmas." Davis had formerly been deputy manager of The Boeing Company in La Canada, California.

1944

ROBERT E. LAUTERBACH is a sales manager for the General Electric Company in Lynchburg, Virginia.

After reporting in the October *Caltech News* that DAVID F. WALKER, BS '44, had died on May 24, we were pleased to receive a call from him informing us that he is alive and remembers nothing unpleasant happening on the date of his reported death. Walker is an engineer with the Roscoe Moss Company in Los Angeles.

1948

DOUGLAS C. STRAIN, president, Electro Scientific Industries, Inc., Portland, Oregon, was presented with an award from the Instrument Society of America. The award, presented in Houston, Texas, was for achievements in leading a successful instrument company and developing widely accepted measurement techniques and calibration standards for electrical units.

1949

HOWARD J. COHAN, chief of the division of general research of the Bureau of Reclamation, Engineering and Research Center in Denver, Colorado, has been presented with the Department of the Interior's second highest honor, the Meritorious Service Award, for notable service in the field of water resource management. Cohan is an authority in the field of desalination and has been with the Bureau of Reclamation since 1948.

1951

ROBERT E. COBB, a former staff geologist with Mobil Exploration, Australia Pty., Ltd., in Melbourne, Australia, is a staff explorationist for Mobil Technical Services, Inc., in Dallas, Texas.

CARL O. HOLMQUIST, AE, PhD '53, will be joining General Dynamics' Convair Aerospace Division, San Diego operation, as senior adviser-Navy. Rear Admiral Holmquist recently retired from the Navy where he had been chief of naval research at Headquarters, U.S. Navy, Arlington, Virginia, since June 1970.

1952

GEORGE W. MAYLE, MS, is head of the real-time systems group of Systems Development Corporation in Santa Clara. Formerly, he had worked for that corporation in Santa Monica, California.

THOMAS L. RUSSELL, MS '53, PhD '58, president of the Iran California Oil Company, has moved to London, England. He had been with the Standard Oil Company of California as a senior adviser of the Foreign Operations Staff.

1955

KEITH L. HENRIE, MS, is manager of the Titan II program of the Aerospace Corporation in El Segundo, California.

1959

YOUNG C. KIM, MS, associate professor of engineering at California State University, Los Angeles, has been promoted to full professor.

KAYE D. LATHROP, MS, PhD '62, has been elected to the Board of Directors of the American Nuclear Society. Lathrop is transport and reactor theory group leader of the Theoretical Division at the University of California's Los Alamos Scientific Laboratory in Los Alamos, New Mexico.

HENRY LUMING, MS, formerly an associate professor of mechanical engineering at the University of Dayton, is an advisory engineer in the corporate equipment engineering division, the Chicago Technical Center of Continental Can Company, Inc., in Chicago.

WILLIAM W. PARKER is a project engineer in programming for the Burroughs Corporation in Goleta, California.



Carl O. Holmquist, AE, PhD '53

1962

JAMES B. IFFT, PhD, was promoted to Dean of the Division of Natural Sciences at the University of Redlands in Redlands, California, effective last July 1. He had been an associate professor in the department of chemistry there. In November, Ifft's first book was published; it is entitled *Readings from Scientific American in General Chemistry*. His co-author was JOHN E. HEARST, PhD '61, UC Berkeley.

1964

TSUN-YUNG CHANG, MS, is a specialist engineer with the Stone and Webster Engineering Corporation in Boston, Massachusetts.

ROBERT F. DAVEY, MS, PhD '71, a former member of the professional staff of TRW Systems in Redondo Beach, California, is manager of the defense research department of Meteorology Research, Inc., in Altadena, California.

LELAND A. De PRIEST is a member of the technical staff of the Hughes Aircraft Company in El Segundo, California. He had been a graduate student at the California State Polytechnic College in San Luis Obispo.

HANS W. GRELLMANN, AE, is the father of a baby boy, born October 15 and named Albert Gregory. Mother and child are both doing well. Grellmann is an engineering specialist in the Aircraft Division of Northrop Corporation in California.

CHEE L. HO, MS, PhD '68, a former research scientist at the Rockwell International Science Center in Thousand Oaks, California, is attending the Pritzker School of Medicine at the University of Chicago.

MICHAEL N. MISHELOFF, a former instructor in physics at Princeton University, is a research fellow in the physics department at the University of Nebraska in Lincoln.

MICHAEL P. MORTELL, MS, PhD '68, who had been an assistant professor at Lehigh University in Bethlehem, Pennsylvania, is a lecturer in the department of mathematics and physics at University College in Cork, Ireland.

1965

STEPHEN H. GARRISON, MS '66, who was an area investment manager with the Systech Financial Corporation in Century City, California, is an executive vice president of 1901 Century Financial Corporation, a real-estate investment firm with offices in Century City. President of the firm is FREDERICK J. HAMEETMAN, BS '62.

1966

PAUL C. DENNY, PhD, a former assistant professor in the zoology department at UCLA, has been appointed assistant professor of biochemistry at the USC School of Dentistry in Los Angeles.

1967

WILLIAM B. MILLER, formerly a management systems analyst with the Burroughs Corporation in Detroit, Michigan, is a management consultant with Touche, Ross and Company in San Francisco, California.

REAGAN W. MOORE is a graduate student in physics at UC San Diego. He had been a staff member of the Mission Research Corporation in Santa Barbara, California.

STEPHEN A. MUSCANTO, MS, is manager of material operations of the computer manufacturing division of Control Data Corporation in St. Paul, Minnesota. He had been with the Burroughs Corporation in Goleta, California, as manager of management systems.

1968

WAYNE M. MOORE, MS, is a second-year student at the Georgetown University School of Law in Washington, D.C.

GREGORY R. MARKOWSKI, a former graduate student at UC, Berkeley, is a research engineer with Meteorology Research Inc.

JOHN NELLA, MS, is a member of the technical staff of the Hughes Aircraft Company in Culver City, California.

HAROLD M. STOLL, MS, is a member of the technical staff with the Aerospace Corporation in El Segundo, California.

DANIEL A. PRELEWICZ, PhD, formerly an assistant professor at Washington University, is a senior engineer with the Westinghouse Electric Corporation in West Mifflin, Pennsylvania.

EDMUND A. PRYCH, PhD, formerly with Omar J. Lillevang as an engineer, is now a hydrologist with the U.S. Geological Survey in Tacoma, Washington.

1971

JAMES E. JUSTISS, a former associate computing analyst at Caltech, is a member of the technical staff of the Hughes Aircraft Company in El Segundo, California.

JONG H. KIM, PhD, a former research fellow in mechanical engineering at Caltech, is a research associate in the applied research laboratory at Pennsylvania State University, State College, Pennsylvania.

AARON J. OWENS, MS, PhD '73, assistant professor of physics at Lake Forest College, Lake Forest, Illinois, is the author of an article, "Will Zero Population Growth Hammer Scientific Creativity?" in the October issue of *Physics Today*.

1972

JUNGSUH P. KIM, PhD, a former research fellow at Caltech, is a postdoctoral fellow in biophysics at Pennsylvania State University, State College, Pennsylvania.

JOHN R. MYERS, PhD, is a senior scientist for Systems Applications, Inc., in San Rafael, California.

CHARLES B. THOELE has been selected to receive the George S. May Fellowship at the Graduate School of Business Management of Northwestern University in Evanston, Illinois, for the 1973-74 school year. The fellowship is presented by the George S. May International Company, management consultants, of Park Ridge, Illinois.

1973

DENNIS Y. D. LOH is attending Harvard Medical School as a member of the Class of 1977.

OBITUARIES

1918

MILTON W. WELDON on September 22 at the age of 76. He had retired in 1962.

1919

BRUCE BURNS on October 27 in Torrance, California. He was the last surviving member of the Class of 1919.

1922

PAUL R. AMES on September 27. He retired as a patent attorney with Esso Research and Engineering in 1962.

1923

RICHARD U. SEARES in Pasadena on September 18, after a short illness. He had worked as an architect in San Clemente and Santa Barbara, and as an engineer—initially with the C F Braun Company, and then for many years with the Signal Oil and Gas Company in Los Angeles. He retired in 1965 to become a consultant.

Trustees

JOHN E. BARBER on October 2 at the age of 86. Barber was elected to the board in 1954 and became a life trustee in 1966; he had served as both vice president and treasurer. He also was a life member of The Associates, and had been president, vice president, and secretary of that organization. Barber had been president of various financial organizations which today are components of Security Pacific National Bank. In retirement he was closely associated with Disney Enterprises.

NORMAN CHANDLER on October 20 at the age of 74. Chandler had been a trustee since 1941, and was a life member of The Associates. He joined the *Los Angeles Times* after graduation from Stanford and became assistant general manager in 1934. In 1944 he was appointed publisher of the *Times*, a post he held until 1960. Since that time he had been board chairman and chief executive officer. The Norman Chandler Memorial Fund at the California Institute of Technology has been established; the Institute is working with Mrs. Chandler and other family members to establish a fitting memorial.

CALENDAR

There is an eight o'clock curtain for all evening performances. Further information may be obtained by calling 795-6811, ext. 1652.

Friday and Saturday, December 7 and 8, with a matinee on Saturday at 2 p.m., Beckman Auditorium. THE BAYANHAN PHILIPPINE DANCE COMPANY portrays the legendary tales of its country's heritage in dance accompanied by authentic musical instruments from the Philippines.

Monday, December 10, Beckman Auditorium. The Earnest C. Watson Caltech Lecture Series: HOW DOES CHINESE WRITING WORK? by Nicholas W. Tschoegl, professor of chemical engineering. Free.

Sunday, January 6, 3:30 p.m., Beckman Auditorium. THE COLEMAN SERIES with the Beaux Arts Trio performing Beethoven, Ravel, and Schubert.

Sunday, January 13, Dabney Hall Lounge. The USC Ensemble performing chamber music composed by Couperin, Monteverdi, Schütz, and Britten. Free.

Monday, January 14, Beckman Auditorium. The Earnest C. Watson Caltech Lecture Series: TO IMITATE THE SUN by Roy W. Gould, professor of electrical engineering and physics. Free.

Sunday, January 20, 3:30 p.m., Beckman Auditorium. THE COLEMAN SERIES with the Juilliard Quartet performing music by Mozart, Elliott Carter, and Debussy.

Wednesday, January 23, Beckman Auditorium. WEDNESDAY NIGHT AT THE SILENT MOVIES with Chauncey Haines and the organ.

Friday, January 25, Beckman Auditorium. ARMCHAIR ADVENTURE SERIES: a travel film about Norway.

Saturday, January 26, Beckman Auditorium. Shakespeare's THE MERCHANT OF VENICE, by the New Shakespeare Company of San Francisco.

Monday, January 28, Beckman Auditorium. The Earnest C. Watson Lecture Series: ALTERNATE LIFE STYLES: MAKING A LIVING IN CENTRAL AFRICA by Thayer Scudder, professor of anthropology. Free.

Thursday, January 31, Beckman Auditorium. Margaret Mead, anthropologist, speaking on WOMEN—PRIMITIVE AND MODERN, presented by the Caltech Faculty Committee on Programs and the L. S. B. Leakey Foundation.