CALTECH NEWS

August 1982

Know, understand, do — and dream, Liepmann urges graduates

Caltech students — like all of humanity today — struggle under the Chinese curse: "May you live in interesting times!" This was the observation made by Hans W. Liepmann (the Charles Lee Powell Professor of Fluid Mechanics and Thermodynamics) to members of his audience in his commencement address: "To Know, To Understand, To Do."

"Leaving Caltech to face the interesting times, you should have two assets," said Liepmann to the prospective graduates, "— competence and confidence. What I hope you will keep throughout your life is the pleasure of learning, the pure joy of understanding, and the urge to contribute.

"Felix Bloch recalled that at a similar state in his life, he proudly declared to his teacher, Heisenberg, that space is simply the field of linear operations. 'Nonsense,' said Heisenberg. 'Space is blue and birds fly through it!'

"With all the encyclopedic knowledge and techniques stored in your memory banks now, it is well to remember that there is an outside world to see and to enjoy. Add a fourth dimension to my title: To Know, to Understand, to Do, and to Dream."

Liepmann counseled Caltech students to "watch your pride; your way of education is not the only one. In your professional daily life you will meet people who know without understanding, understand without

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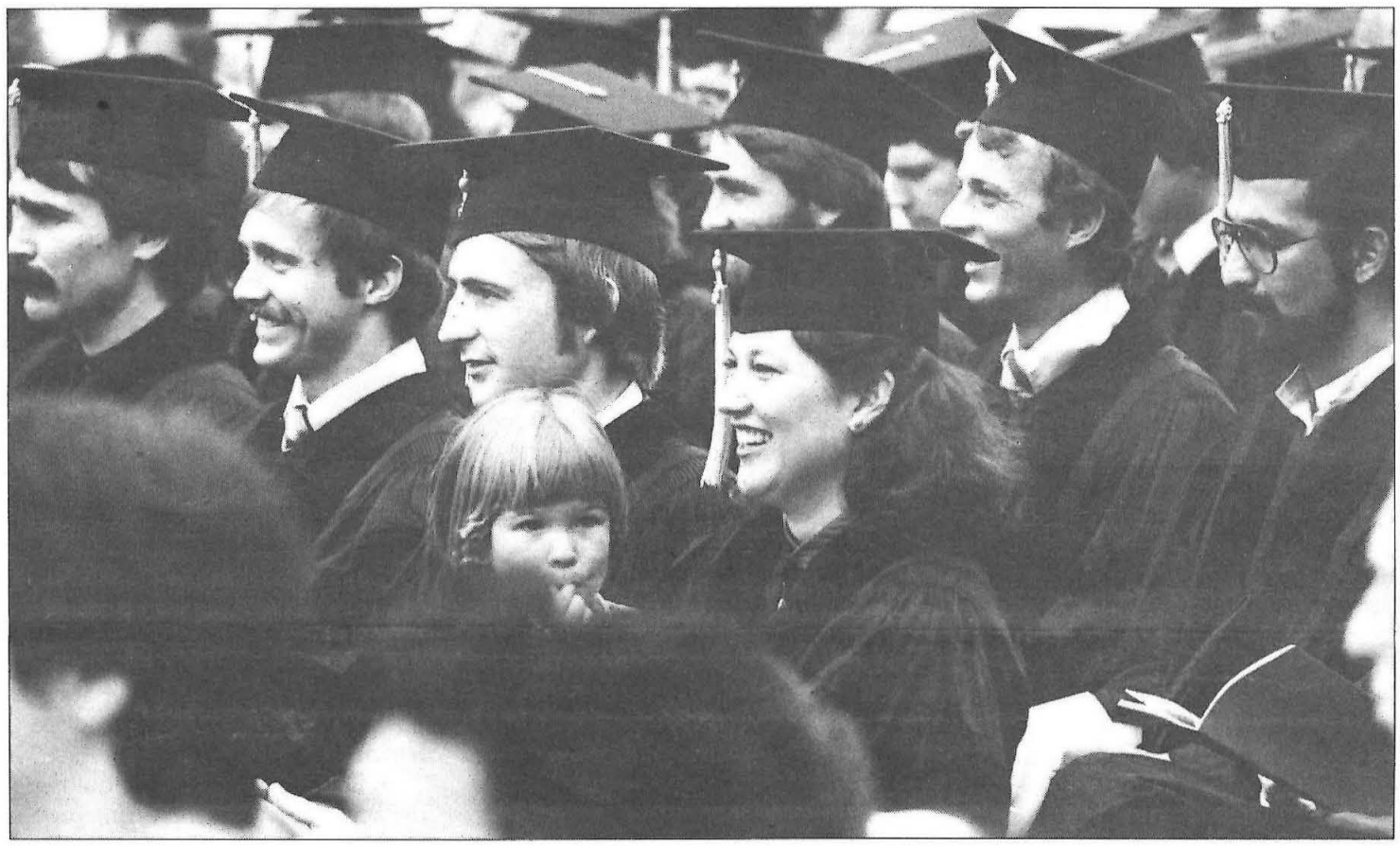

Candidates for PhD degrees are joined by a small visitor, four-year-old Katherine Brown, who sits on the lap of her aunt, Lisa Anderson (BS '74, PhD '82). Anderson is a research engineer with Chevron Oil Field Research Company in La Habra, California.

Caltech welcomes 361 to alumni ranks

Caltech welcomed 361 new alumni at commencement exercises as it granted 421 degrees — 60 to graduates who had already received degrees from the Institute. A total of 167 BS, 130 MS, 3 Engineer, and 121 PhD degrees were conferred. Undergraduate degrees were pretty evenly distributed between engineering and science, Caltech President Marvin L. Goldberger told the audience, as he warned the new graduates that "the Alumni Association will find you, no matter where you go." Goldberger noted that 49 percent of the seniors were graduating with honor (B+ or better).

Goldberger admonished the graduates, "You are stepping out at a critical time in U.S. and world history. Leaders have it in their power to kill half a billion people in 20 minutes with a greater number of casualties afterward — and with possible destruction of life on the planet. This represents the gravest moral problem the world has known. I hope that some of you will join in this fight.

"This problem seems to be soluble," Goldberger said, "but other problems are much more difficult. We face the challenge of how to survive on an over-populated and under-resourced planet; here you can make a clear contribution."

The U.S. economy is fighting for its life, Goldberger stressed, and he said, "You can join this fight — whether in public life, graduate school, industry, or academia. The U.S. needs your help in keeping at the forefront with respect to scientific scholarship and technical knowledge. It needs your help to survive with respect to short-term competition, and over the long haul."

The graduates absorbed Goldberger's remarks and then strolled down the Olive Walk with family and friends for wine and cheese at the Athenaeum. Their walk was punctuated by an unscheduled act from the roof of Dabney Hall: new alumni Joe Garcia and Juanito Villanueva in a guitar and vocal duet. Their selection was "I'm Free," amplified by a sound system powered through an electrical output in a Dabney Hall office.

Caltech: "hard work plus comradeship"

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knowing, and act without understanding. All permutations are possible and the results are by no means always bad."

Caltech students will have many challenging issues to face, he noted, as he recounted the story of "the first practitioner of thermodynamics, Prometheus.

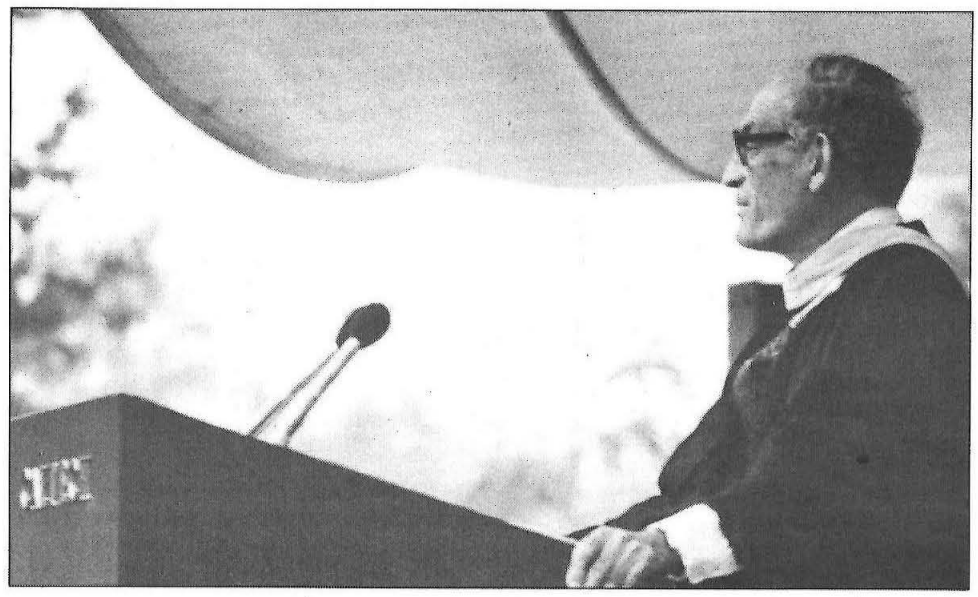
"Prometheus challenged the gods and they sent the alluring Pandora to earth. His simple-minded brother permitted the fatal box filled with evil to be opened.

"In our times, a Pandora appears every few years, alluring as ever in her guise as atomic energy, computers, lasers, or genetic engineering, each time with real promise and real danger. I do not believe that there is a way to escape the Pandora syndrome. Somebody, somewhere, is bound to open the box. This syndrome may well provoke your public reaction, but before you climb a soap box, make sure it is very solid, and remember that responsibility, exhibitionism, and vanity are often hard to distinguish."

Liepmann told the graduates, "You and I have in common that we came here to Caltech to learn, to understand, and eventually to be able to use the learning and understanding to contribute to a chosen field in a chosen way. How to design an institution, a system, that enables these goals to be reached in an optimal way and still remains inhabitable, is a subject of much theory and even more experimentation . . . .

"The common, rigorous, core program in the natural sciences with a strong backing in the humanities, together with the deliberate restrictions in size and the aim toward excellence in selected disciplines only, defined the enclosure since the beginning of Caltech . . . .

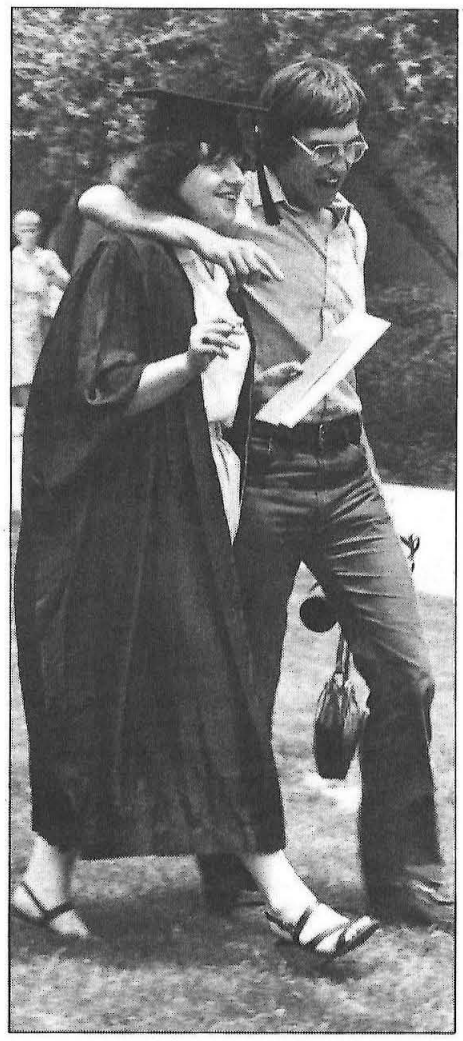
"Within this framework, which sets us apart from other large schools, we should be able to create and preserve an atmosphere which combines intensity and rigor of study and warmth and companionship. An atmosphere in which learning and teaching facts is an enjoyable challenge with enough slack and leisure



In his commencement address, Liepmann suggests adding a week to Christmas and spring recesses, or a free week around midterm — a measure that "would go a long way in helping to regenerate and revitalize souls downtrodden from an excess of problem solving."

to understand old ideas and pursue new ones. An institution in which the faculty has enough time to interact with students and each other and where research at the leading edge diffuses through the whole educational process. A fraternity of scholars where ambition and striving for excellence is free of petty jealousies."

But such a goal, said Liepmann, is difficult to achieve because "we deal with people with abilities and idiosyncrasies not easily codeable on an IBM card."



"With the help of some spies," Liepmann said he had sought the association of students on the campus to the word "Caltech."

"The result was quite positive," he said. "Hard work plus comradeship sum it up quite well. But I realize that experiment and experimenter are not independent. There does exist discontent and resentment.

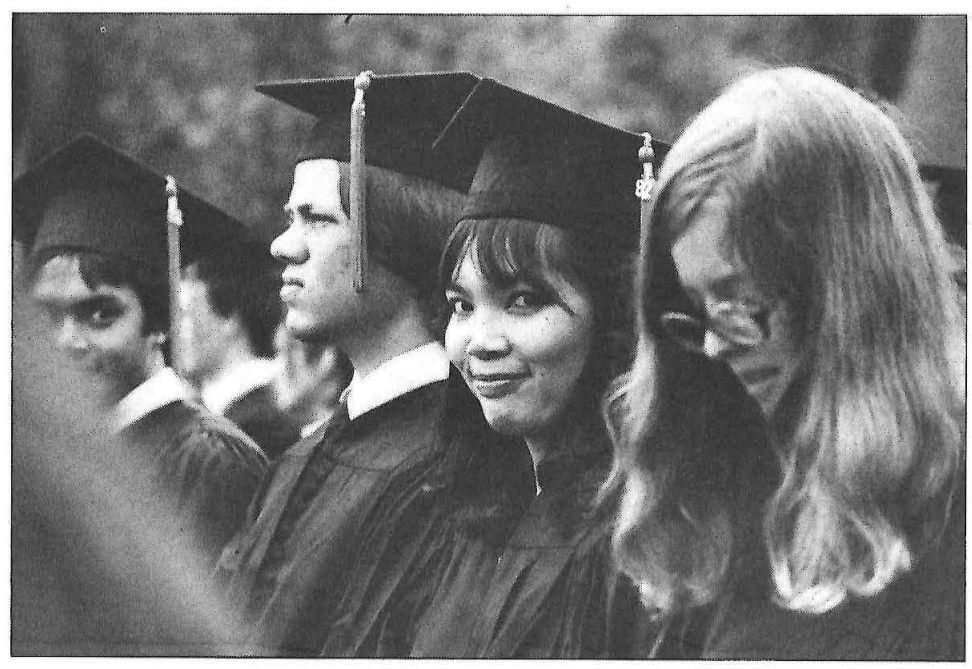
"I, like some or most of you, regret the apparently ever increasing problem-set syndrome — the feeling of always being behind. I also regret the increasing tendency to rigid curricula since both reduce the time for contemplation, exploration, and fertile leisure, and thus tend to eliminate or at least reduce the enthusiasm for learning as well as any cross fertilization. There are a number of reasons for this trend but one outstanding one: the rapid explosion-like expansion of the limits of all fields in natural science and engineering.

". . . The usual way for a faculty to approach the structure of a curriculum is to begin with a question like this: What should an applied physicist, say, know today? If this knowledge is to be supplied entirely by formal classroom teaching, the result is obvious: a dense set of tough required courses that leaves little time for electives and even less for musing.

"This type of approach is quite difficult to avoid, but it is, I believe, orthogonal to the real aim of Caltech. The aim has been and should be to turn out professionals that are not narrow specialists, but on a basis of solid fundamentals are *able* to specialize and *change* specialization. Required courses should, like publications, follow Gauss's maxim — *pauca sed matura* — few but excellent!"

In this context, Liepmann suggested adding a week to Christmas and spring recesses, or a free week around midterm — a measure that "would go a long way in helping to regenerate and revitalize souls downtrodden from an excess of problem solving." Furthermore, Liepmann added, "A way has to be found to convince all universities and industry that grades here mean what they say; that a Caltech C is a respectable grade and not a consolation prize for flunking out!

"We have not yet reached the ideal for a university and we probably will never quite get there," Liepmann observed. "But the spirit of academic fellowship and the drive toward excellence is still alive here. Caltech remains an irreplaceable singularity among the schools in this country that we hope to preserve intact and that one does not leave lightly."



Alumni Fund challenge: new Irvine program

The Irvine Foundation has invited Caltech's Alumni Fund to participate, over the next three years, in a new challenge gift program that can bring the Institute a substantial increase in unrestricted funds for general operating expenses, according to Harry J. Moore, Jr. (BS '48), national Alumni Fund chairman.

Caltech is one of 19 private colleges and universities in California invited to participate in the program, Moore said. He explained that the Irvine Foundation's objective is to help private institutions in California to increase their levels of alumni support. The Foundation would like these colleges and universities to achieve levels of alumni giving comparable to those attained by many in the East.

Under provisions of the program, the Irvine Foundation will match, up to agreed limits, *increases in total contributions* from alumni for each of three successive years, beginning in 1982-83. Increases in gifts from alumni who graduated within the last 15 years will be matched dollar for dollar. Increases in gifts from alumni who graduated more than 15 years ago will be matched by one dollar from the Foundation for every two-dollar alumni gift increase.

Moore explained that the reason for the difference in the matching formula is to encourage younger alumni to begin to contribute on a regular basis to their alma mater. Matching funds from the foundation are unrestricted — as are contributions to the Alumni Fund from alumni.

"Caltech alumni have been generous in their support of the Institute and its programs," Moore said. "Contributions through the Alumni Fund are now roughly comparable to the income from $20 million in endowment. Now we have another challenge — and another opportunity. I know our alumni will respond generously in meeting new goals under the Irvine program, and in helping keep Caltech at the top."

Moore noted that the new program can increase funds from three sources: 1) from the Irvine Foundation itself; 2) from additional contributions of alumni donors who respond to the challenge; 3) through a resulting increase in matching corporate gifts from employers of alumni. (One out of eight dollars given to the Alumni Fund is matched through corporate gift programs.)

Moore pointed out that the Irvine Foundation program begins at the conclusion of a highly successful fund year — thus making the Irvine challenge even greater. The Alumni Fund Council set goals for 1981-82 of $1.2 million from 5,300 alumni with help from 650 volunteers; they finished the year with almost $1.2 million from 5,743 alumni with 868 workers.

For 1982-83, the Fund Council has set goals of $1.4 million from 6,500 donors with the help of 1,000 volunteers.

"We've built up a lot of momentum," said Moore. "By maintaining it, we can meet the challenge of the Irvine Foundation program."

Harry Moore to head 1982-83 Alumni Fund

By Winifred Veronda

Harry J. Moore, Jr. (BS '48), the 1982-83 national Alumni Fund chairman, planned on being an engineer when he enrolled at Caltech in 1940 — but four years of technological work for the Air Corps, including a stint in the South Pacific, shifted his interests away from technology. Back at Caltech in 1947, he met Robert Gray, the director of Caltech's young Industrial Relations Center, then tucked away in an office in the basement of Culbertson Hall.

"I may have been lost when I found the office," Moore says.

Lost or not, Moore stopped in to chat with Gray, and the conversation led to talk about the possibilities of a career in business for a Caltech graduate. "Plunge into business and get some experience," Gray advised him, and Moore did just that. A firm that was rapidly expanding in electronic technology — International Business Machines — came to campus to conduct interviews for customer engineering positions. Moore followed up on these contacts and was offered a position in sales.

The offer looked good to Moore, and he went to work as a salesman in IBM's Electric Accounting Machine Division in Los Angeles. The professional match was to last for 34 years — until Moore retired from IBM early this year to go into business for himself.

From Los Angeles, Moore transferred to Bakersfield as branch manager, and in 1953 to Endicott, New

York, as part of IBM's manufacturing operation there. In 1956 he went to New York City to become director of purchasing and traffic for IBM, and in 1969 he became IBM director of manufacturing services for the corporation. He held this position until he retired from IBM early this year.

But retirement from IBM doesn't mean a life of leisure for Moore — far from it. He is president of Columbia Management Services, a consulting firm offering help in materials management, and he is partner in a second consulting firm and in a company that provides prizes for golf tournaments. (Moore was an avid golfer, even before he joined Caltech's student team in 1941.) "This is my fun company," Moore says.

Moore has also devoted much time to professional organizations such as the American Management Association. He is a Fellow of AMA and a former vice president of its purchasing division, and is currently a member of its President's Council.

In addition to his work and professional affiliations, Moore has been busily involved in Caltech alumni activities since he came to New York in 1956. That year he became active in the alumni club in New York, and shortly thereafter served as its president.

This led to work for the Science for Mankind development campaign, and to a role as area chairman for New York when the Alumni Fund was reactivated in 1972. When the Alumni Fund expanded its volunteer organization to include regional chairmen, he accepted the task of regional chairman for the northeastern United States. This year he has moved into an even more important

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1981-82 Alumni Fund sets donor, dollar records

The 1981-82 Alumni Fund set new records for dollars, donors, and number of volunteer participants, according to David L. Hanna (BS '52), 1981-82 national fund chairman.

This year, 868 volunteers raised $1,169,712 from 5,743 alumni — compared with $1,079,000 from 4,735 graduates in 1980-81. These figures represent an 8-percent increase in dollars, and a 21-percent increase in donors — up from 37 percent of all graduates in 1980-81 to 43 percent last year.

(In 1980-81, 40 percent of all MIT alumni contributed to the fund for that institution, and Stanford logged a 31-percent contribution rate. Figures for 1981-82 for these and other private universities are not yet available.)

Especially dramatic was the increase in number of volunteers who worked for the fund. Last year, 490 volunteer workers participated, compared with 868 this year. This represents a 75 percent increase.

"The volunteers made the difference," said Hanna. "They started early, worked hard, and were well organized. Last summer, we designated 1981-82 as 'The Year of the Volunteer,' and indeed it was."

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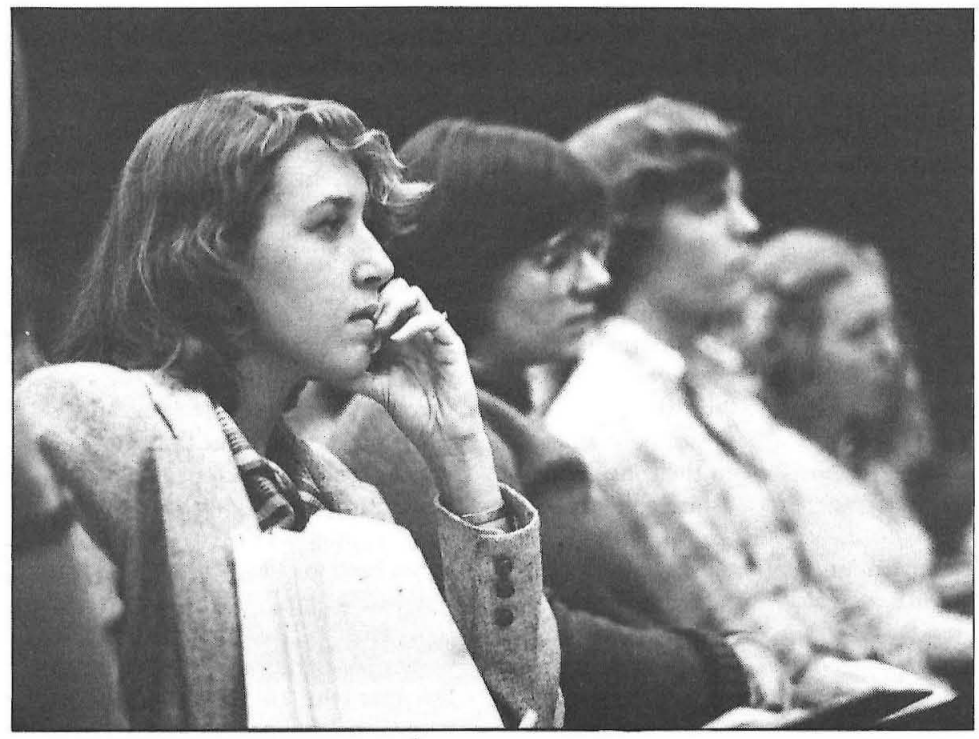
Women at Caltech: improving the ratio

By Phyllis Brewster



In 1970, 30 undergraduate women entered Caltech — the first to be enrolled at the Institute. This fall — 1982 — the number coming in is slightly higher — 41. (In September 1981 the total in the 860-member student body was 134.) This is the largest number of women to enter a Caltech class thus far. But the relatively small increase over a 12-year period — during a decade in which substantially greater numbers of women entered the fields of science and engineering — raises a question in the minds of some of the faculty, staff, and students at Caltech who have been working to move the ratio of women to men off its 1-to-6 imbalance. Why?

A look at the statistics on page 5 points up some curious comparisons. The number of women *applying* has more than tripled — from 77 in 1970 to 289 this year. The number *admitted* has just slightly more than doubled — from 39 to 80. But the number of acceptances has increased by only 37 percent, from 30 to 41. And the percentage of "admits" to applicants has fallen from 51 to 27, while the number of women actually coming to Caltech compared with the number admitted has gone from 76 down to 52 percent.

There may be differences of opinion on *why* Caltech's female population isn't greater, but there is general agreement that the Institute would benefit from a more balanced undergraduate student body.

"Anyone who interacts with undergraduates is impressed by the women undergraduate students here," says Jerry Pine, professor of physics, who has served on the admissions committee for a total of nine years. Pine believes that not even the most conservative faculty members feel that too much attention is being paid to getting more women here.

So, how to best go about it?

Those on campus who have analyzed the statistics and the situation don't claim to have conclusive answers. But there are plenty of educated guesses, opinions, and theories, based on experience, observation, attitudes and convictions — and even preferences.

One of the people on campus with convictions is Kathy Crandall, associate director of admissions for the past three years.

"There's no doubt that more and more qualified high school men and women are hearing about Caltech," she says, pointing to the growing size of the applicant pool (chart, p.5). Crandall is the person most directly responsible for the recent official outreach specifically directed to high school women. (This includes a color poster picturing women students in research activities, a brochure featuring women talking about their lives at Caltech, and a telephone network of Caltech students contacting high school women who have indicated an interest in the Institute.) This is in addition to the 13,000 copies of *Facts about Caltech* that are sent annually to men *and* women who have scored in the top 3 to 4 percent in math and verbal SATs.

In spite of these mail and telephone efforts, Caltech's recruitment program has never been considered particularly strong. "We have always put our efforts into admissions, concentrating on school visitations in the spring to interview the best applicants, rather than visiting in the fall to encourage potential applicants," says Stirling L. Huntley, director of admissions since 1973.

Accordingly, Crandall has been convinced for some time that the best way to increase the number of women at Caltech was for the admissions committee to broaden its perspective on selection proceedings.

"Basically, Caltech's admissions procedures haven't changed in 30 years," says Professor of Mathematics Gary Lorden, himself a member of the admissions committee from 1971 to 1975. "We still base it on college board scores, recommendations from science teachers and advisers, and impressions from interviews by Caltech faculty." However, Crandall believes that over the past few years there has been a change in outlook that promises to continue to increase the number of women admitted.

"In the past the admissions committee was basically looking for women who looked like men on paper," Crandall says. "Now they are beginning to look for women who resemble the "picture" that is characteristic of success in undergraduate women at Caltech in the recent past."

This is not to be interpreted as meaning lower standards, she is quick to add — an accusation that many people on campus — particularly undergraduate women — are sensitive about. The guidelines on SAT scores used by the admissions committee are the same for all applicants (in the 700s on math, in the high 700s on math level 2, and in the 600s on verbal).

The "picture" Crandall refers to shows the different ways in which the records of high school women indicate that they are exceptional, and also shows the different ways in which women contribute to the Caltech community once they are here.

For example, a high school woman applicant is more likely to have a higher verbal SAT and higher grade point average and a lower math SAT than her male counterpart. She is also more likely to have been a valedictorian. She will probably have had fewer science activities and more non-science extracurricular activities.

This latter point may reflect what Professor Pine has found from his experience on the admissions committee — that high school men are more apt to have had a long-time commitment to science; women to have decided just this year that they are going to be engineers.

Pine agrees with Crandall about the gradual change in perspective of the admissions committee. "Members have definitely given special consideration to women," he says. "Not academically; women *have* to have the grades and the scores. But we have adapted our point of view regarding the non-scientific contributions."

Dave Wood, professor of materials science, who was associate dean of students the year women were admitted to Caltech and has sat on the admissions committee ever since, has similar opinions.

"We choose the best 215 people to fill the freshman class — regardless of sex." But he adds that committee members probably look at women applicants more carefully, purely on the basis of numbers.

"If it is a female applicant, and she's not in the absolutely top group, we might look a little more carefully and see if there are other factors to be considered."

Director Huntley reiterates this point of view. "Our recruitment booklet for women says, 'We have a special interest in you because you are a woman,' and the actions of the admissions committee reflect this attitude. When it comes to the 'marginal' men and women [by marginal, Huntley means the whole group just below the "absolutely top"], we can express our preferences and expand the acceptance of women — and, in recent years we have."

Huntley also cautions against the sometime accusation that the com-

mittee admits women for less than the regular academic standards. "They do *not*," he says emphatically. "We are talking here about the application of non-academic standards, all else being equal."

The evaluation of the performance of women in past Caltech classes also has had an effect on the attitudes of the admissions committee members.

"The simple facts are that Caltech women do better at Caltech than Caltech men," Crandall says. "Their GPAs are somewhat higher, and a larger percentage of them graduate — 79 percent compared with 69."

Professor Lorden, who is creator of the PA index (Probability of Admissions), a yardstick by which admissions committee members measure the applicant pool, also thinks that women applicants are given special consideration because they seem to survive well here. (Crandall objects to the term "special consideration" and corrects that to read "looks at different predictors of success.")

Then there are those difficult-to-measure contributions — sometimes called qualitative criteria — like Pine's statement that "women bring maturity and sometimes a more humane view to campus."

Whatever the reasons, there is the slow climb in numbers. What still remains puzzling, and, which may or may not have a bearing on future approaches to admissions procedures, are the fluctuating women's admissions statistics over the past decade. Why were close to 50 percent of the applicants admitted in the early years (compared with close to 30 percent in recent years)? And why did between 64 and 76 percent of those admitted come to Caltech (compared with between 32 and 68 percent in the last nine years)?

Pine believes that part of the answer is that the first batch of women who applied were a very special breed — willing to be the first 30 among 700 men.

Lorden agrees in principle. "The women who applied in the early 70s were more self-selective," he says. "They knew they were pioneers, roughing it in a male population." They were, he thinks, very certain of their own abilities and motivations.

In the last six or seven years, the situation has been "leveling out" — becoming "more normal." The ratios of admits to applicants and acceptances to admits for women are now very similar to those of men.

Some of the explanation for the dip in acceptances in the middle years may be due to an attitude that Professor Wood has encountered in his interviewing that leads him to believe that a significant number of women are fearful of coming to Caltech because of the social and sexual pressure.

"Women are more socially oriented, and most applicants realize that social life at Caltech is strange," he says.

Huntley offers "group dynamics" of the admissions committee as a possible explanation of the variation in numbers of female admits over the years. "The attitudes and ideas of the members of the committee differ from year to year," he says, "and that has had some effect on how many women have been admitted."

As for the growing pool of applicants, the director of admissions gives credit for that to the fact that increasing numbers of high school women have become interested in careers in science and engineering. Admissions, in general, are up at schools, and in divisions and departments of schools, that specialize in these fields. Huntley also credits Caltech's program of special outreach to women — the booklet, poster, and phone calls.

Whatever the statistics and the opinions and the qualitative factors, many people on campus will be watching with interest and concern and expectations as Caltech moves further into its second decade of educating undergraduate women.

CALTECH ADMISSIONS

	Total Men and Women					Women				
YEAR	Appl. ①	Admits ②	% ③	Accpt. ④	% ⑤	Appl. ①	Admits ②	% ③	Accpt. ④	% ⑤
1970	1405	327	23%	220	67%	77	39	51%	30	76%
1971	1124	346	30%	218	63%	86	44	51%	29	65%
1972	889	384	43%	230	59%	81	40	49%	26	65%
1973	920	367	33%	214	58%	92	45	49%	29	64%
1974	901	383	42%	203	53%	94	35	37%	20	57%
1975	952	401	41%	222	55%	81	33	41%	18	54%
1976	1178	388	32%	224	57%	117	55	47%	23	41%
1977	1391	375	26%	212	56%	152	62	41%	20	32%
1978	1482	386	26%	213	55%	168	45	27%	31	68%
1979	1392	381	27%	215	56%	175	56	32%	34	60%
1980	1378	388	28%	207	53%	192	61	32%	34	55%
1981	1518	387	25%	217	56%	221	62	28%	35	56%
1982	1665	427	26%	215	50%	289	80	27%	42	52%

① Total Applicants ② Admits ③ Percentage of Admits to Applicants
④ Acceptances ⑤ Percentage of Acceptances to Admits

Rockwell Trust commits $500,000 to Caltech research

Basic studies at the Institute affecting technologies ranging from advanced aircraft and rocket engine design to laser beam communications systems will be supported by the Rockwell International Corporation Charitable Trust. Rockwell has made a $100,000 grant to Caltech, the first installment of a $500,000 commitment over the next five years.

The initial grant will aid basic research on turbulence and on solid-state lasers. Turbulence studies are headed by Anatol Roshko, professor of aeronautics, and Paul Dimotakis, associate professor of aeronautics and applied physics. Using water tanks, instrumented combustion chambers, and other devices, Roshko, Dimotakis, and their colleagues will study the structure of turbulence in fluids and how it affects flow and transport of material — a step toward a better comprehension of the basic nature of turbulence.

An understanding of turbulence has applications for such engineering areas as aircraft laminar flow control, combustion control and efficiency, optimal design of such devices as after-burners and high-power chemical lasers, understanding infrared emissions from rocket and jet exhausts, controlling environmental pollution, mixing and dispersing contaminants, and jet noise reduction.

The laser studies are conducted by Amnon Yariv, the Thomas G. Myers Professor of Electrical Engineering and professor of applied physics. Yariv is working on basic problems involved in the development of communication systems based on tiny solid-state lasers the size of a grain of sand.

These systems appear promising, but frequency instabilities in the lasers reduce the rate at which they can transmit data, and are an important reason why these systems are not yet in wide use. Yariv will experiment with new ways of constructing lasers made of such materials as gallium arsenide and of integrating them monolithically with high-speed electronic transistors to form new optoelectronic circuits.

Students honor seven on faculty for superb teaching

Seven Caltech faculty members have been named recipients of awards for teaching excellence by ASCIT. They are Chris E. Brennen (professor of mechanical engineering) for his course in fluid mechanics, Richard P. Feynman (the Richard Chace Tolman Professor of Theoretical Physics) for his class in relativity, David L. Goodstein (professor of physics and applied physics) for Physics 1, Robert D. Middlebrook (professor of electrical engineering) for his course in electrical circuitry design, Ray D. Owen (professor of biology) for his genetics course, David Sundelson, (Mellon Postdoctoral Instructor in Literature) for his course in literature and Shakespeare, and Robert R. Wark, (lecturer in art) for his art classes.

The selections were made by the educational policies committee of ASCIT on the basis of student ratings of courses taught during the 1981-82 academic year. The results are published in a booklet, the Teaching Quality Feedback Report, that contains statistics and comments on questionnaires evaluating the instructors' clarity, enthusiasm, command of the subject, rapport with the class, and interest in students as individuals.

Corcoran honored for contributions to ASEE

William H. Corcoran, the Institute Professor of Chemical Engineering, has been selected a recipient of the 1982 Distinguished Service Citation of the American Society for Engineering Education. Corcoran was selected for his "many significant accomplishments and especially for his dedicated service to education for engineering and engineering technology" through participation in ASEE and its work. He was one of two recipients of the annual award.

Copies of the 1980-81 President's Report are available at the Public Relations office. Any reader wishing to obtain a copy may do so by contacting the office at 1-71, Caltech, Pasadena 91125.

Sue VandeWoude:
She's one of the "Top Ten College Women"

By Phyllis Brewster

She once milked cows, tended pigs, plowed and planted 20 acres of corn, raised Rhode Island Reds, and had an egg route when the going rate was 60 cents a dozen. All this before and after school and on weekends.

Now she has completed four years at Caltech. She graduated with honors on June 11 with a BS in chemistry, was president of the student body and a member of the women's soccer team, and spent many after-class hours and summer weeks cloning genes for Professor of Biology Tom Maniatis. She plans to enter veterinary school at Virginia Polytechnic Institute in the fall.

Her name is Sue VandeWoude, and, in addition to all the above, she has just been named by *Glamour* magazine one of the 1982 Top Ten College Women in the country, selected from among 869 women entered in the competition.

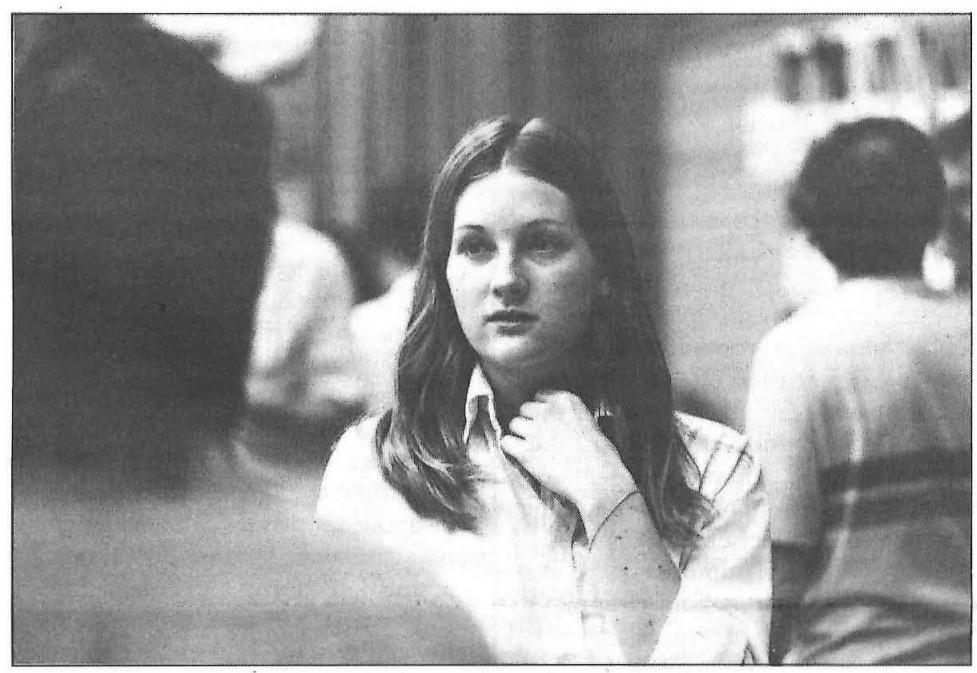
With so much going for her, what does Sue think about this latest, and uncharacteristic, honor?

"Well, my youngest sister will probably approve of me now," was one of her comments, referring to her sibling's current interest in makeup, hairstyle, and clothes.

While the trappings of beauty and fashion have not been Sue's priorities in the past eight years (her friends call her "naturally attractive"), the bases for *Glamour*'s selection were not beauty and fashion anyway, but achievements in academics and activities. Those definitely have been Sue's priorities.

Since the first weeks Sue VandeWoude entered Caltech, in 1978 — one of 120 women among 800 undergraduates — she has pitched in to improve and enliven campus life, the same way she pitched in at home, as the eldest of four daughters living on her parents' 100-acre farm in Clarke County, Virginia. As a freshman at Caltech, she was elected social chairman of Lloyd House. Her talent for organization is characteristic. "She's orderly and methodical. Everything she does is well thought-out," says one fellow student. So, when Sue, as president of the student body last year, put together a faculty-student conference that involved dealing with the varied temperaments and vested interests of dozens of faculty, students, staff, and administrators, no one was particularly surprised that she did an excellent job.

Balance in her life is also characteristic. "She keeps her priorities straight," one person close to her says. "She's made considerable contributions to student government, been a strong member of the soccer team, she's done some really good research, and through it all she's kept a 3.6 grade point average."



As ASCIT president, Sue VandeWoude played a major role in organizing the second Faculty-Student Conference. Here, at the conference, she talks with a fellow student.

Sue's interest in research started during her freshman year when she heard Professor Tom Maniatis, now at Harvard, talk about his work cloning globin genes from human DNA. Before long she had an assignment to work six hours a week in his lab, helping isolate genes from rabbit DNA. The following year, she upped her hours to ten a week, and in the summer, through a funded summer undergraduate research program on campus, she was able to devote full time to the lab, working primarily on comparisons of normal and abnormal genes in a study of thalassemia. The next summer Sue spent at Harvard, where Maniatis was working on a new technique to clone embryonic globin genes. At the end of the summer she helped him teach a three-week course in eukaryotic gene cloning at Cold Spring Harbor, New York.

"The research over the past three years has helped me to apply the facts I learned in classes to real situations. It has been very exciting for me to help with experiments that lead to new and interesting concepts," Sue says.

During her junior year at the Institute, Sue was chosen to receive Caltech's Robert L. Noland Leadership Scholarship, awarded to a student who has been outstanding in helping inspire other students to fulfill their capabilities, and at the end of her senior year she was a co-recipient (with Edward M. Lambert) of the Frederic W. Hinrichs, Jr., Memorial Award. This award goes to the senior who has made the greatest contribution to the welfare of the student body and whose qualities of leadership, character, and responsibility have been outstanding.

Substantial as her achievements are, Sue is definitely not all seriousness. According to her friends and teachers, she has a good sense of humor. When she first came to Caltech, she identified herself by announcing, "If you ever want to know anything about plowing, ask me," which earned for her — at least for a couple of years — the nickname "Farm Girl."

In choosing veterinary school, Sue is harking back not only to her life on the farm, but also to her father's early career interests. When his first daughter (Sue) was born, George VandeWoude was a graduate student in biology at Rutgers. Three years later, after receiving his PhD, he spent nine years at Plum Island, New York, doing research on hoof-and-mouth disease. While he commuted by boat between Plum and nearby Southold (Long Island), his family of daughters grew up fishing and water-skiing and loving rural life.

So in 1972, when Dr. VandeWoude accepted an assignment with the National Institutes of Health in Washington, D.C., no one in the family, including himself, wanted to live in the city. Their alternative was a 150-year-old house on 100 acres of land 60 miles west of D.C. — and a very busy schedule. At high school in Berryville (2,000 population and two stoplights) many of Sue's 120 classmates lived on farms, but "very few of the other girls did the kind of farm work that my sisters and I did," she says.

Still Sue took time to read — a lot — dictionaries, encyclopedias and life science books, among others. She wrote poetry — still does — and was business manager of the yearbook and assistant editor of the student newspaper. Through Tri-Hi-Y she went to the model general assembly in Richmond, and through 4-H Club to the 4-H congress at Blacksprings.

She had never been west of Virginia before she came to Caltech, a fact she admits had something to do with her choice of a college. So did Caltech's size and its reputation.

Why, in the fall of her senior year on the California campus, did she enter the *Glamour* contest? The $1,000 scholarship was the motivation, Sue says, though she insists she never expected to win. "I was filling out a lot of forms, for graduate schools and for other scholarships, and I thought, 'Why not this one?' " Why not, indeed?

And so now, along with the nine other national winners of *Glamour*'s contest (from Boston, Rollins, Spelman, Grinnell, and Wellesley colleges; and from Arizona, Iowa, and California (Long Beach) state universities, and Harvard), Sue will receive a $1,000 cash prize, and her picture will appear in *Glamour*'s August college issue.

[THE WAY IT WAS]

1932

Albert Einstein, after two months at Caltech, sails on March 5 with Frau Einstein for Germany, according to the Pasadena *Star News*. "Further development of his unified field theory will remain the dominant incentive for his labors in the near future," the paper reports. Meanwhile, in a statement to the press, Robert A. Millikan says that Einstein "tells me he has been greatly stimulated by his intimate contact with Tolman, Zwicky, Oppenheimer, and with the work of Hubble, Epstein, Bateman, Bell, Michael, Houston, and DuMond, as well as some of the younger men in whose work he is taking an interest."

Caltech historian William B. Munro, in a radio talk, calls on public officials to cut expenses to the point of self-sacrifice, just as individuals have done over the past few years, the Pasadena *Post* relates on April 24. "Public officials should realize," says Munro, "that governments, like individuals, must live within their means. They are not justified in maintaining a scale of expenditures they cannot afford. The existing high cost of government is a serious obstacle on the way to economic recovery . . . ."

1952

The Caltech Seismological Laboratory will start construction of a

Albert Einstein and Frau Einstein talk with attorney Samuel Untermeyer while the Einsteins are in southern California for a visit to the Caltech campus.

What do Caltech men seek in a wife? The Pasadena *Star News* elaborates on this question on April 23: "Once upon a time, when today's grown men were emerging from the adolescent, the tradition was to look for a life mate among the homemakers, the potential mothers, and the politely accomplished. Nowadays, this is but one of the 'When I was a boy' cracks that has been relegated to the dusty attic of memory . . ." In a questionnaire given Caltech students, the boys were asked what they would like in a wife. Intelligence was the prime essential . . . ."

sensitive new seismograph in the fall, designed to record strains in the earth's crust of one part in 100 million, according to November *Engineering & Science* magazine. "The instrument will be used primarily to record and measure long-term strains in the earth's crust which produce earthquakes . . . At some distant date (maybe centuries from now) these measurements and others may bring seismologists within reach of one of their elusive goals: earthquake forecasting."

1972

Mariner 9, launched at Cape Kennedy on May 30, 1971, is now in orbit around Mars. "It is the first spacecraft to orbit another planet," reports *E&S* in January as the publication describes preliminary findings. "The mission, managed by NASA, will map about 70 percent of the surface of Mars, and will provide more data than all previous planetary missions combined."

Meanwhile, Bruce Murray has rounded up a blue-ribbon panel of experts to join him in a symposium in Ramo Auditorium on "Mars and the Mind of Man." The panelists, along with Murray, include science fiction writers Ray Bradbury and Arthur Clarke, and planetary scientist Carl Sagan. "Whether there is life or not on Mars now, there will be by the end of the century," asserts Clarke in January *E&S*. The more conservative Murray observes that "Mars has so grabbed hold of man's emotions that it has actually distorted scientific opinion about it. We want it to be like the earth . . . We're all such captives of Edgar Rice Burroughs and Percival Lowell that the observations are going to have to beat us over the head and tell us the answer in spite of ourselves."

Computer scientist Carver Mead remarks in February *E&S* that "in the next ten years almost every facet of our society will be automated to some degree. Whether this will change for good or bad will depend on how it is done. It will be good if it can be done in a humanizing way . . . It will be destructive if people have to learn the language of the machines and deal with them on *their* terms to exist at all . . . ."

The building having been declared unsafe by structural engineers after the 1971 earthquake, a wrecking crew moves in on Throop Hall in mid-November. *E&S* reports that Throop, campus center for 62 years, "is reluctantly marked for demolition by Caltech Trustees."

Goldberger to address alumni in three cities

Caltech president Marvin L. Goldberger will speak to alumni on Caltech, its current circumstances and future plans, at dinners during September in Pasadena, San Francisco, and New York City.

Southern California alumni will hear President Goldberger on Friday, September 10, at the Athenaeum. Social hour is at 6:30 p.m., and dinner at 7:30 p.m. Bay Area alumni will meet at the San Francisco Airport Hilton on September 11 for a social hour at 7 p.m. in the Savoy Room and dinner at 8 p.m. in the Terrace Ballroom. (Cost of the Pasadena dinner is $12.50; of the San Francisco dinner, $15.) Details of the dinner in New York City will be announced.

Three young Caltech scientists named Sloan Fellows

Three young scientists at Caltech have been selected by the Alfred P. Sloan Foundation as Sloan Research Fellows. They are Bradford H. Hager, assistant professor of geophysics; Kenneth C. Janda, assistant professor of chemistry; and Brent P. Smith, assistant professor of mathematics.

Sloan Research Fellowships are awarded to young scientists who have demonstrated special creative ability in the physical sciences, mathematics, neuroscience, and economics. This year, 88 recipients were selected from about 400 nominees.

Hager will use his grant in support of research on convection in the earth's mantle, the hot, viscous layer beneath the crust, and will also study the mechanism by which the earth's crust moves about on the mantle. Hager came to Caltech in September 1980 from the State University of New York at Stony Brook, where he was an assistant professor. He received his PhD and AM degrees from Harvard and his BA degree from Amherst College.

Janda came to Caltech in 1978 as an A.A. Noyes Instructor in Chemical Physics and became an assistant professor in 1980. He received his PhD and AM degrees from Harvard and his AB degree from Hope College.

He will use his Sloan Fellowship support in his studies of the effects of very weak chemical bonds. Weak bonds are responsible for many important properties — the structure of liquids, for example — but are not well understood. Janda uses laser spectroscopy to study these bonds at very cold temperatures (−450° Fahrenheit) where their properties are easier to comprehend.

Smith, whose mathematical specialty is harmonic analysis, will use his grant in studies of Fourier analysis — efforts to understand the behavior of Fourier series and integrals of special signals. Smith came to Caltech in 1981 from Illinois State University where he was an assistant professor. He received his BA degree from Reed College and his PhD degree from Louisiana State University.

Einstein and the class of '32: They remember him well

By Winifred Veronda

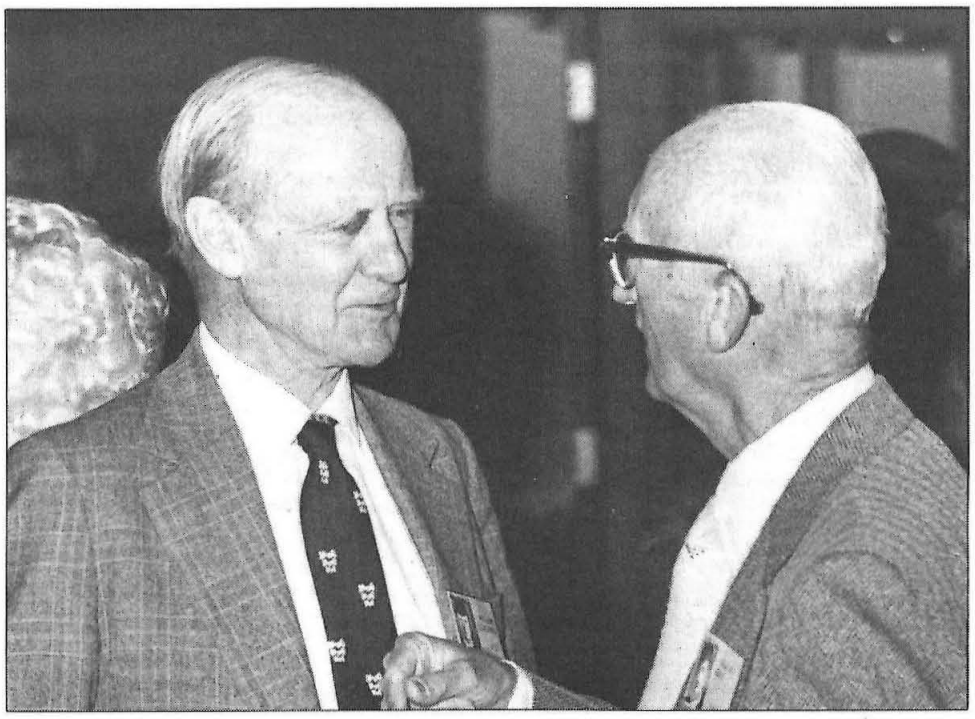
Albert Einstein's presence loomed large on the Caltech campus when he visited here for two months in 1932 — and more than 50 years later, memories of the great scientist were much in evidence as members of the class of 1932 gathered for the Half Century Club luncheon.

Of the 107 living members of the class of 1932, 48 came back to campus with their guests for a full day of reunion activities — including the luncheon, campus tours, and dinner at the Alumni House. David K. Wong came the farthest, traveling from Hong Kong. A native of China, he is planning to retire to southern California, Mrs. Wong's original home. Clark Goodman summed up the sentiments of most of the classmates when he said, "Damn glad to be here!"

As the alumni reflected on their years at the Institute, Millard Barton recalled that Einstein's visit to southern California almost made Barton famous. He was driving down Colorado Boulevard and swerved to avoid hitting someone; his near-victim turned out to be the famous physicist. Bruce Rule remembered meeting Einstein and Robert A. Millikan on the Caltech campus during the Long Beach earthquake. As the ground quivered under their feet, Millikan asked Rule to assure Einstein that this really *was* an earthquake.

Bryant Fitch wryly related a more mundane incident. Through Throop Hall's glass doors, he saw the great man outside, preparing to enter the building. He opened the door for Einstein, who responded, "Thank you."

Other faculty members of the era drew their share of attention. Albert W. Atwood, editor of the 1932 *Big T,* spent two years on campus as a resident engineer after graduation. It became his unofficial duty to turn off Theodore Von Kármán's automobile engine each morning — an act that the famed aeronautical engineer almost invariably forgot. Miles Hodge remembered that Caltech mathematician and theoretical physicist Harry Bateman hardly ever smiled. Hodge and Royal W. Sorensen (professor of electrical engineering) encountered



William H. Pickering (BS '32, MS '33, PhD '36), president of the class of 1932, talks with a former classmate at the Half Century Club luncheon.

Bateman, beaming broadly, at the Athenaeum one noon hour. "I've been working on a problem all morning," said the mathematician with pleasure, "and I still haven't been able to solve it!"

Campus life in the prohibition era also drew some attention. One alumnus recalled that he and his brother ran an independent off-campus brewery and were asked to furnish a case of beer for a Gnome Club dance. They got only as far as Lake and California before the beer started exploding, thus leaving the Gnome dance dry if not high.

Other memories reflected the turbulence of the years that followed. Tetsuo Iwasaki and his family were evacuated from the West Coast to a relocation camp in Arizona in May 1942. One of the first to arrive at the camp site, Iwasaki helped to build the center.

He then obtained permission to travel to Nebraska with several other Japanese-Americans to pick potatoes. On the way back, while waiting for a train in Denver, he answered a want ad and got the job. He was given permission by camp authorities to stay in Denver and to bring his family there. Over the years Iwasaki worked for several instrument companies, on the Apollo program, and as an engineer for Sun Oil Co.

Memories of the past were much in evidence at the reunion, but a concern for the present was equally strong. William H. Pickering (BS '32, MS '33, PhD '36), president of the class of 1932, presided at the luncheon, and introduced Robert E. Foss, chairman of the class gift committee. Members have contributed $50,300 for the student loan fund, Foss announced — a gift particularly welcome as the Institute faces cutbacks in federal funds available for student aid.

(The class gift will not go as far toward supporting student loans as it would have in 1932, Foss noted; in that year, the annual tuition was only $250. This year it is $7,500.)

The class heard a report from President Marvin L. Goldberger, who stressed the importance of Caltech and institutions like it to the country as a whole. "Within the private sector, there is increasing awareness that our country is in an economic race for its life," he said. "We can win, but only with strong underpinning from science and technology. Many industries are in serious trouble — because society has lost the need for them, or because they are losing their technological lead to another country. In these cases, they must look to science and technology for innovations."

Because they realize the importance of technological innovation to our country's economic future, firms are giving major grants for academic work, Goldberger said — both to graduate students and to professors. "They realize that we cannot cut off technological innovation at its source," he remarked.

The decrease in number of college-age students, nationwide, has not affected Caltech's applicant pool, Goldberger told the alumni, nor has the quality of applicants been affected by quality of science and mathematics teaching in high schools. "But for the country as a whole, the catastrophic state of high school math and science teaching represents a very serious problem, and we will pay a major price for it," he said.

Other classes also converged on the campus in June for their own five-year reunions, except for the class of 1957, which held its reunion in May. The reunions followed a traditional format, with campus tours, social hours at the Alumni House or Athenaeum, and dinner at the Athenaeum.

Schweickhart, Burch named recipients of Clark Awards

Russell B. Schweickhart and Jerry R. Burch are winners of the 1982 Donald S. Clark Awards. The $500 awards are given annually to one sophomore and one junior who show outstanding leadership and scholarship qualities.

Schweickhart, a junior majoring in engineering, has been chairman of the Interhouse Committee, composed of house presidents, and a member of the board of ASCIT. He played trumpet in the Caltech Brass Quintet and was a member of the diving team.

Burch, a sophomore majoring in engineering, has been a member of the Men's Glee Club and Apollo Singers, and he performed in student musicals.

The Clark Awards were established in memory of the late Donald S. Clark, who was associated with the Institute for more than 50 years, first as a student (he earned BS, MS, and PhD degrees at the Institute) and then as a faculty member until his death in 1975. At that time he was professor of physical metallurgy, emeritus, and secretary emeritus of the Alumni Association.

Kent Clark is welcomed to the ranks of honorary alumni by Phil Reynolds, the 1981-82 Alumni Association president.

Association welcomes Kent Clark, Phyllis Jelinek as honorary alums

Caltech literature professor Kent Clark and Phyllis Jelinek, executive director of the Alumni Association, were welcomed as honorary alumni at the annual meeting of the Association in June. Jelinek is the first woman to be so honored.

Outgoing president Philip L. Reynolds (BS '58, MS '59) passed the gavel of presidency to William J. Karzas (BS '49, PhD '55). Arne Kalm (BS '56, MS '57) was elected as vice president, Carole L. Hamilton (PhD '63) as secretary, and Donald P. Wilkinson (BS '48) as treasurer.

Elected as directors of the Association were: Robert B. Leighton (BS '41, MS '44, PhD '47), Lee W. Ralston (BS '27), Sidney Schafer (MS '36), and Paul H. Winter (BS '44). Harry J. Moore, Jr. (BS '48), the national Alumni Fund chairman, will also serve on the Board of Directors.

Harry Moore leads Alumni Fund

Continued from page 3

role — as national chairman for the Alumni Fund.

Moore became national chairman at the conclusion of a highly successful fund year, as the fund met an ambitious dollar goal of $1.2 million and increased its number of donors by 13.5 percent over 1980-81. Its donor goal was 5,300; 5,743 alumni contributed to the fund.

Following such a successful year creates a special challenge to do even better — but one that Moore is ready for. "We've generated a lot of momentum," he says, "and this should carry us forward into an even more successful year in 1982-83."

"What has made the fund so successful," says Moore, "has been personal contact between the Fund volunteers and alumni. Last year, 868 volunteers contacted other graduates, asking for their support for Caltech. This year we want to expand such personal contacts even more, focusing on classes, and on the concept of classmates talking with classmates."

The Irvine Foundation challenge gift program, which matches increases in total contributions from alumni for each of three successive years beginning in 1982-83, will offer alumni a special opportunity, Moore said. "We want to make sure that alumni understand this program, and what it can mean to the Alumni Fund and to the Institute," Moore said.

A graduate of Woodrow Wilson High School in Long Beach, Moore became a member of Fleming House and was active in sports at Caltech. He played football until it was discontinued for the duration of the war, and he played basketball for four years and was a member of the golf team. During the war, while he was stationed briefly in Long Beach, he married a former high school classmate, Jane Stutsman. The couple have two sons: Craig, a physician in New York, and John, a businessman in Boston. "They've lived in the East since they were a few years old," says Moore. "They think they're Easterners."

And by this time, so does Moore — a young man from California who shifted his emphasis from technology to business and his home from Long Beach to New York — but who never wavered in his capacity for hard work and dedication as a Caltech alumnus.

Letters from alumni

Dear Editor:

There seems to be some extra interest developed lately on the ancient history of Caltech football. This issue of the *News* (June) contained a letter from Sam Johnson (BS '33) about the teams in the 1930 and 1931 seasons. Sam is OK as far as he went, but his history research apparently does not cover the 1920s. Since I played on the 1923 team and was line coach when Sam was playing for us, I remember something about it all.

I wouldn't say the 1923 team was better than the two we had in 1930 and 1931, but its members were the first as champions. We played nine games in 1923 and won six of them. The conference was composed of Pomona, Occidental, Whittier, Redlands, UCLA, and Caltech.

The standings at the end of the season in 1923 showed Caltech and Pomona tied for first place. But we beat Pomona, and so by any calculation in this business we won the bloody championship. The schedule was a tough one: Caltech 7, USC 18; Caltech 0, USS California 7; Caltech 0, Whittier 8; Caltech 13, Pomona 6; Caltech 7, USS New York 0; Caltech 34, Redlands 0; Caltech 13, Oxy 6; Caltech 7, Sherman Indians 0; Caltech 59, UCLA 6.

A lot could be said about that 1923 team, as it played USC and UCLA in the same year. However, UCLA wasn't the power then that it became a bit later. Caltech football in those days was a different thing from the game it has to play today. But the change from 1923 to 1930 wasn't very much. We had 11 "iron men" in those days and in 1930 and 1931 they also had 11 "iron men." Substitutes were hard to come by.

It is nice to see articles in the *News* from time to time about Caltech football but it would appear now that from the standpoint of being a contender it is passé.

STUART SEYMOUR, BS '26

Dear Editor:

I admire your decision to present the Shroud of Turin as an unsolved scientific problem in the *Caltech News* . . . . RALPH MILLER, MS '68

Dear Editor:

A headline on page one of the June 1982 *Caltech News* says "Caltech students may lose $300,000 in financial aid under Reagan budget." Perhaps some readers will conclude that President Reagan is personally responsible for this situation.

However, news articles of these days would indicate that the national economic situation, huge federal debt, and budget deficits, are the reasons for the need to cut back on many federal programs and President Reagan is not responsible for this situation . . . .

The article states that nationwide the student loan default rate is 16.5 and for Caltech it is 2.87 percent. For me, these are intolerable figures and represent a sick situation. Where is the personal sense of justice and responsibility that have been factors in making the USA the greatest nation in the world?

It hurts my pride in being an alumnus to realize that even one Caltech student would default, particularly given that he should have superior intelligence and earning capabilities.

Recently Douglas Moore, President of the University of Redlands, spoke to the Redlands Kiwanis Club about the University and the problems he sees in its future. He said that students on aid or loan programs constituted a significant economic factor but he was not going to lose hope because of some losses. He said the U of R would attempt to discover other ways to help deserving students . . . He sees less and less government aid in the future and believes that may be healthy in the long run. So do I.

Yours truly,
CHRESTEN M. KNUDSEN, BS '47

Ed. note: Caltech, as the *News* article points out, is hard at work looking for ways to help deserving students who may lose federal aid. Gifts from private sources earmarked for student aid, such as that from the class of 1932, make a valuable contribution.

Personals from the class of 1957

This spring, members of the class of 1957 met for their 25-year reunion. These Personals are compiled from letters from the class members to the Alumni Association.

CHARLES H. ANDERSON went from Caltech to Harvard, where he earned his PhD in physics. In 1963 he joined RCA Laboratories in Princeton, New Jersey, and is now an RCA fellow and group head of applied mathematics and physical sciences. In 1972-78 he helped develop a new approach to flat panel television, and his current research interest is modeling lower levels of human vision. He and his wife, Patricia, have three children, Charles, Karen, and Steven.

STEVE ANDREAS (formerly John O. Stevens) is a publisher, operating Real People Press, and is also affiliated with Neuro-Linguistic Programming of Colorado, which does communication seminars and consulting. After graduation, Andreas worked at Shell Chemical in Torrance, California, obtained his MA in psychology at Brandeis in 1961, joined the U.S. Bureau of Mines in Berkeley, and worked for the Contra Costa Junior College District in Concord, California. He has also spent several years leading gestalt therapy groups. He has four children, Forrest, Summer, and Molly Stevens, and Mark Andreas. Steve and his wife, Connirae, live in Boulder, Colorado.

KIM CRANNEY followed his BS at Caltech with a BA in economics from Pomona College in 1960, then got his CPA certificate in 1964. He is an independent accountant and tax preparer, living in Berkeley with his wife, Kazumi. Their son, Dan, age 5, anticipates a sibling, due August 15. Cranney reports that he "made and distributed a series of ironic postcards depicting life in Berkeley, which were acclaimed by those who value such things."

ROBERT J. DEFFEYES is president and CEO of Graham Magnetics, Incorporated, in North Richland Hills, Texas. He previously worked for Memorex Corporation and for Dow Chemical, for which, he says, "I started up a phenol plant at the base of Mount St. Helens. That plant still stands today, which is more than can be said for the mountain." Deffeyes may or may not have written *How You Can Save $27,000 on Your Federal Income Tax and Other Peculiarities of the Extradition Treaty with El Salvador* (1972, Manana Books). He and his wife, Ethel, have two daughters, Joan, 22, and Suzanne, 16.

WILLIAM H. DIETRICH received his MS in industrial engineering from Ohio State, and after assignments with DeLeuw Cather & Co. and TRW Systems, in 1979 he became one of six founders of DKS Associates, a transportation planning consulting firm. He and his wife, Jean, live in San Rafael, California, where he has been appointed chairman of the Marin Country Transit Commission. The Dietrichs have three children, Dave, 21, Doug, 19, and Debbie, 15.

DUANE ERWAY, MS '58, is manager of engineering for Xerox Medical Systems, following several years developing document processor technology within the electronics division. He and his wife, Marjorie, who enjoy skiing, yoga, and tennis together, live in South Pasadena. They have one son, Donald. Another son, Miles, was killed in an accident.

C. GORDON FULLERTON, MS '58, lists under "travels" 130 around-the-world trips — and all between March 22 and March 30, 1982. This unusual itinerary was made on the third orbital test flight of the space shuttle *Columbia*. Col. Fullerton entered active duty with the Air Force in 1958, and became an astronaut in 1969. He and his wife, Marie, live in Houston, Texas, with their children, Molly, 8, and Andrew, 6.

WILLIAM H. HECHT lives in Everett, Washington, with his wife, Marilyn, where he is in private practice as a physician in diagnostic radiology, and where he is also president of the county cancer society. The Hechts have a daughter, 15, and two sons, 13 and 9.

RICHARD O. HUNDLEY, MS '59, PhD '63, spent ten years at the Rand Corporation and ten at R&D Associates in Marina del Rey, California, working on various aspects of military research. He has been a member of the Army Scientific Advisory Panel and of the Army Science Board. He and his wife, Janna, have three sons, Richard, 23, Michael, 20, and Christopher, 14.

ORVAL E. JONES, MS, PhD '61, is director of engineering sciences at Sandia National Laboratories in Albuquerque, New Mexico, where he has been since 1961. His current scientific interest is in volcanism; his current volunteer activities are in Boy Scouts and in curriculum planning for the Albuquerque public schools. His wife, Pauline, is also in the field of education. The Joneses have three children, Carol, 23, Sharon, 22, and Lawrence, 19. Carol has just completed her first year at Caltech as a graduate student in chemical engineering.

MARCEL LANDRIEAU, MS, went on from Caltech to earn a PhD in business economics. He is now an independent management consultant, specializing in assistance to foreign countries investing in France, where he lives with his wife, Collette. They have three children, Pierre, Laurence, and Nicole. Landrieau is also a member of the board of Marseilles University.

BERNARD B. LOPEZ, who, nine years after leaving Caltech, received his MA in English literature from Loyola, is director of the New Mexico Arts Commission in Santa Fé. He has also been appointed by the president to the National Council on the Arts. He and his wife, Kate, have four children.

DONALD S. LOPEZ, MS, is chairman of the aeronautics department of the Smithsonian Institution's National Air and Space Museum in Washington, D.C. In 1979 he edited a book for the Smithsonian Press, *The Jet Age*. He and his wife, Glindel, have two children, Donald Jr., 29, and Joy, 26.

MARK F. MEIER, PhD, and his wife, Barbara, live in Gig Harbor, Washington. He works for the U.S. Geological Survey and is currently working on predicting the drastic retreat of Columbia Glacier, near Valdez, Alaska, that will produce increased iceberg flux into navigation lanes. The Meiers have three children, Lauren, 24, Mark, 21, and Gretchen, 16.

REUBEN B. MOULTON, his wife, Beverly, and daughter, Vicki, 16, live in Foster City, California, where he is district staff manager of consumer product management for Pacific Telephone in San Francisco. He continues singing in several performing groups, and playing piano and organ.

DONALD P. NIERLICH, who received his PhD from Harvard, is professor of microbiology and a member of the Molecular Biology Institute at UCLA. He also edits the *Journal of Bacteriology*. He and his wife, Susana, have three children, Karen, Steven, and Marianne.

ED PARK, who has an MBA from UCLA and a PhD from Princeton, is a senior economist with the Rand Corporation in Santa Monica, California, and lives with Judy Ross in Los Angeles. Park keeps busy with flying (he has multi-engine, instrument, and helicopter ratings and has flown to the East Coast, Mexico, and Alaska), construction (building a large part of his house as a one-man project), backpacking, and running. He has two daughters, Annika, 20, and Mia, 18.

RICHARD (PETE) PETERSEN, MS, is deputy director of the NASA-Langley Research Center in Hampton, Virginia, and last year was named a Distinguished Engineering Alumnus at Purdue University. He and his wife, Jody, have two children, Eric, 21, and Kristin, 19.

LUIS B. SOUX, after earning an MS in electrical engineering at USC in 1959, moved to Venezuela, instead of to his home country, Bolivia, where he found more promising job opportunities. In 1970, with two associates, he founded an engineering consulting company, Inelectra S.A., which has become the second largest in Venezuela, and of which Soux is now president. He and his wife, Nelly, helped found a chamber music society and have traveled widely. He welcomes visits from classmates; his address is Apartado 65521, Caracas 1066A, and his phone number is 33 11 86.

WALTER A. SPECHT, MS '61, PhD '65, joined the Mitre Corporation in Boston as a member of the technical staff last year. Previously he was with GTE Sylvania.

ROY T. STAKE, MS '60, lives in Costa Mesa, California, with his wife, Jeannine; they have three children, Eric, 21, Monica, 19, and Kurt, 18. Stake is manager of market development and strategic planning for Airesearch Manufacturing. He has recently taught a marketing course at UCLA, but reports that his biggest project is restoring a 1958 Alfa Romeo Giulietta Spyder. His next project may be a fake Porsche Speedster. He admits to 25 cars and 17 jobs since he graduated.

JERRY SWEDLOW, PhD '65, is professor of mechanical engineering at Carnegie-Mellon University in Pittsburgh, where he was also associate dean of engineering, 1977-79. He and his wife, Pat, have three children, Jason, 20, Pam, 18, and Kathy, 16. He underwent the removal of a brain tumor in March 1981 and has been recuperating this last year.

MARTIN C. TANGORA is associate professor of mathematics at the University of Illinois at Chicago. He and his wife, Polly, have a son, Charles Martin, born New Year's Day 1982. Tangora continues to play piano (after two recitals in Paris in the late sixties) and has become known as a leading expert on, and defender of, the architecture of Chicago. He is working on one book in mathematics and two books on Chicago history and architecture.

DAVID E. YOUNT is professor of physics and chairman of the department of physics and astronomy at the University of Hawaii in Honolulu. He was previously at Princeton University and at SLAC. His other activities include swimming and creative writing, and in 1981 he ranked 53rd in men's open tennis for the state of Hawaii. He and his wife, Christel, have four children, Christine, 17, Gregory, 14, Steffen, 5 and Sonja, 1.

Caltech baseball

The 1982 season was a bright one in many ways for Caltech baseball. The season's most important aspect was the size of the squad. There were 25 on the roster at the start of the season, and 21 people involved at the season's end.

Another important achievement was the fact that this year's team played more innings than any Caltech team in more than 15 years. The more playing time, the better the team performed.

Individually, team members gave many solid performances. Senior Bob Buck was recognized by SCIAC for outstanding play by being named a second team outfielder, and was probably the best defensive outfielder in the conference. Another graduating senior, Doug MacKenzie, was named to the SCIAC honorable mention team. Playing with a brace because of knee surgery, MacKenzie pitched in three fourths of the Caltech games and was fourth leading hitter on the team.

In the future, three players should fill in for the graduating seniors: Howard Kong, a gifted infielder who solidified the infield with his play at shortstop, despite the fact that he played in only half the games. Doug Shors, at first base, led or placed second in nine offensive and defensive categories. Also coming back next year is this year's Alumni Trophy winner, Steve Havstad. Steve, also an honorable mention all league outfielder, was elected by his teammates as next year's captain. As leadoff hitter, he led the team in hits, walks, batting average, stolen bases, and on-base percentage (almost .500).

Occidental won the 1982 SCIAC conference by a one-game margin over Redlands. La Verne finished third in the league, followed by Whittier and Claremont, who tied for fourth. Pomona was sixth and Caltech seventh.

Obituaries

1925
RAYMOND E. ALDERMAN on May 6 following a long illness. He was retired from the Royal Globe Insurance Company in San Francisco, and had been living in that city.

STERLING W. BEED on May 1. He had retired in 1965 as senior designer at C F Braun & Company in Alhambra, California. He is survived by his wife, Christina, a son, Roger, a daughter, Joan, and five grandchildren.

CARYL KROUSER on March 16. Former owner of *The Desert Dispatch* in Barstow, California, he had owned the paper for more than 35 years. He was also instrumental in the incorporation of Barstow. Krouser is survived by his wife, Freda, two daughters, two sons, five stepchildren, 12 grandchildren, and 14 step-grandchildren.

1927
DONALD R. HINKSTON. Retired as owner and vice president of Hinkston Norcross, consulting engineers, he was living in Los Angeles.

RICHARD T. SCHECK, Ex, on February 1. He was retired from his position as assistant vice president of United California Bank in Van Nuys, California, and had been living in Ventura.

1931
CARTER H. GREGORY, PhD '35. After working for Shell Oil in New Orleans and New York, he had been a consulting geophysicist, residing in New York City.

1932
HOWARD W. FINNEY on March 29. He had retired to Bountiful, Utah, after working as controller for the J. M. Covington Corporation in Santa Fe Springs, California.

CHARLES M. HARSH on May 25 of cancer. He had been living in Huntington Beach, California, after retiring as psychologist for the Office of Naval Research in Boston.

WILLIAM C. ROCKEFELLER, MS '34, on May 23. He was president of Via Computer, Inc., in San Diego, California.

1935
TANEMI OBATAKE on January 19 of congestive heart failure. He was an engineer with the Dysland Company in Los Angeles.

1942
WILLIAM C. JOHNSTON, MS, on May 2 of cancer. He had been living in Palos Verdes Estates, California, and is survived by his wife.

GENE W. McDANIEL, MS. He had been a research physicist with Itek Corporation in Lexington, Massachusetts, and was living in Reno, Nevada, before his death.

1945
WESLEY F. BARNES on January 10 of cancer. He retired in December 1980 as project manager with J. T. Thorpe, Inc., in Los Angeles. Mrs. Barnes survives him.

1947
ARNOLD A. McCARLEY, MS, on December 29. He was a general contractor with the California Industrial Construction and Engineering Corporation in Los Angeles. His wife survives him.

1962
JAMES B. IFFT, PhD, on March 20 of a heart attack. He had been professor of chemistry at the University of Redlands in Redlands, California. Mrs. Ifft survives him.

Personals

1933
CHARLES D. PERRINE, JR., writes from Santa Rosa, California, "Finally retired — after 46 years with Hughes, Fairchild, Convair, General Dynamics, and Johns Hopkins University applied physics laboratory — in the Valley of the Moon at Oakmont — with a small electronics lab for more experiments."

1935
NORMAN B. DEWEES, MS '38, writes, "My wife, Sally, and I have been instrumental in forming and building Sherwood Oaks, a nonprofit, nonsectarian 260-unit life care community 21 miles north of Pittsburgh, Pennsylvania. I work nearly as hard (unpaid) at Sherwood Oaks as when going to Tech. After we move in, in June, life is supposed to be easier, but I have a few other projects in mind such as conversion to solar heat and greenhouse gardening."

1938
DONALD E. HUDSON, MS '39, PhD '42, professor and chairman of civil engineering at USC, has been named the university's first Fred Champion Professor of Engineering. He is also professor of mechanical engineering and applied mechanics, emeritus, at Caltech, where he joined the faculty in 1942.

1941
JOSEPH W. TRINDLE, MS '49, reports from Pryor, Oklahoma, "We moved to Pryor last June, Peggy having been invited to resume her medical practice here. She had not practiced since our tour of missionary duty in the Holy Land, at Baraka Hospital, halfway between Bethlehem and Hebron, which ended in 1971. Her pediatrics practice is growing well. As a pastor of very small churches I have been moonlighting with my technical skills, the last job being to teach Digital Logic in the St. Louis Community College at Meramec. Here in Pryor I could not get a job, being now I suppose overage. However, the church we have planted here is growing, and we are electing officers and incorporating next month. We already have a lovely little building which will seat 40 people. I serve as pianist as well as pastor."

1942
JOHN W. MILES, MS '43, Eng '44, PhD '44, professor of applied mechanics and geophysics and vice chancellor for academic affairs at UC San Diego, has been awarded the prestigious Timoshenko Medal for 1982 by The American Society of Mechanical Engineers. Miles was honored for "outstanding contributions to a wide range of areas of fluid dynamics, particularly to supersonic aerodynamics and panel flutter, oceanography and geophysical fluid dynamics, generation of water waves by wind, stability of heterogeneous shear flows and solitary wave interaction."

1945
JOHN D. CARDALL joined EG&G Almond Instruments in Covina, California, as vice president of marketing in February. The firm manufactures custom AC-to-DC low voltage switching power supplies for military and industrial applications.

RICHARD A. B. KNUDSEN reports from Glendale, California, "Still running my 'Mr. Fence' but now am lucky enough to have two of my sons in with me. Looking forward to phasing myself out of the daily operations."

1949
FRED H. NICOLAI reports that he has been appointed general manager of Texaco's exploration and producing services department in Houston, Texas.

1952
SHERMAN BUTLER, senior psychiatrist for the California Department of Corrections at the men's colony in San Luis Obispo, California, writes, "I received my private pilot license in December 1980 and am working toward my instrument rating. Flying is fun!"

1953
ROLF D. WIGLEIN, MS '54, writes that he is quite happy as a research engineer at Hughes Missile Systems Group in Canoga Park, California. He says, "The fun of being in exploratory research in a systems organization is that one can get involved at the outset of new programs where new ideas, concepts, and devices are needed." He is especially interested in acoustic microscopy, which he developed and applied at Hughes Research Laboratories. Wiglein just returned from two months at Oxford University, where he was senior visiting fellow in the department of metallurgy and science of materials. He reports also that his wife, Ruth, is teaching piano.

1957
L. ROBERT TALBOT is a senior engineer for Memorex Corporation and, with his wife, Diane, has bought a new house in Almaden Valley, California, not far from his home of 17 years in Santa Clara. The Talbots have four children, Pamela, Wendy, Andrew, and Gregory. He keeps busy coaching and assisting in his sons' sports activities and making a variety of stained-glass items, including Tiffany lamps.

1959
GORDON C. OATES, PhD, professor of aeronautics and astronautics at the University of Washington, has received a Distinguished Teaching Award from the school's Alumni Association, based on recommendations from students, alumni, and faculty. The award is given for "a concern for students that extends beyond the classroom."

1960
NOEL W. HINNERS, MS, director of the Smithsonian Institution's National Air and Space Museum, has been appointed director of NASA's Goddard Space Flight Center in Greenbelt, Maryland.

GARY A. ZIMMERMAN reports that he is executive vice president and chief operating officer of Seattle University.

1967
LOREN D. LUTES, PhD, writes from Houston, Texas, that he is simultaneously beginning a new marriage and a term as chairman of the department of civil engineering at Rice University.

1968
JON R. HAVILAND has been promoted to director of energy utilization for Ralphs Grocery Company in Los Angeles. He joined Ralphs in 1978 as manager of energy utilization.

CRAIG ZUMBRUNNEN, MS, and his wife, Carol, have adopted Annika Kim Zumbrunnen, who was born about Christmas Day 1980. She was adopted through the Travelers Aid Society of Washington State and the Social Welfare Society of Seoul, Korea; she has been with her new parents since June 1981. Zumbrunnen is a member of the geology faculty at the University of Washington.

1977
ELLIOT FISCHER, PhD, reports that he has taken a position as a member of the technical staff at Bell Laboratories in Whippany, New Jersey.

ROBERT B. KJELGAARD writes, "I am currently living in New York (upstate), where I am group leader for digital subassembly test engineering at IBM's federal systems division in Owego. I am fortunate in having a job where I can do (almost) everything from writing applications software in high-level languages . . . to designing and debugging the digital and analog circuits . . . as well as supervising/aiding in these activities. Off the job, I am currently the lead guitarist in a local soul/rock band, which is beginning to acquire a few fans."

1978
LEE AYDELOTTE, MS '78, writes, "My wife, Elizabeth, and I are pleased to announce the birth of our first child, Laura Elizabeth." Aydelotte is a computer programmer with ALS Electronics in Anaheim, California.

JOEL GUNTER announces that he began his residency in anesthesiology at Barnes Hospital in St. Louis, Missouri, in July. He graduated in June from the University of Oklahoma College of Medicine.

1979
PHILIP G. CORMIER writes, "I met and married Pamela S. Haugen at Purdue University. We both graduated from Purdue with our master's in math. I am now a lieutenant in the Air Force, stationed at Tinker AFB, Oklahoma City."

1981
ALAN KAMEI was married to Nancy Bates on May 22 in a ceremony at the Caltech Master's House followed by a reception at the Alumni House. Kamei is a junior manufacturing engineer at IBM in Tucson, Arizona. His father is HIROSHI KAMEI, BS '51, MS '52.

DUANE D. SMITH, PhD, research fellow at the University of Chicago, reports the birth of a baby girl, Stacey Miranda, on March 13.

JOSEPH SHEPHERD, PhD, writes, "My wife, Donna, and I had a son, Douglas Parker, on October 19, 1981. I've been a member of the technical staff at Sandia National Labs in Albuquerque, New Mexico, since September 1980."

This glowing, translucent creature is an advanced larva of the sea urchin, Strongylocentrotus purpuratus. *It was grown in the laboratory of Eric H. Davidson (the Norman Chandler Professor of Cell Biology at Caltech) and, when the photograph was taken, had been fed a diet of algae for about six weeks. It is about 0.8 mm across. The sea urchin is proving a valuable model for studying the first stages of development, in which a fertilized egg is transformed into a functioning animal. Basic discoveries from this line of research can be applied to all creatures in the animal kingdom, including man, because the process (embryogenesis) is essentially the same for all animals.*

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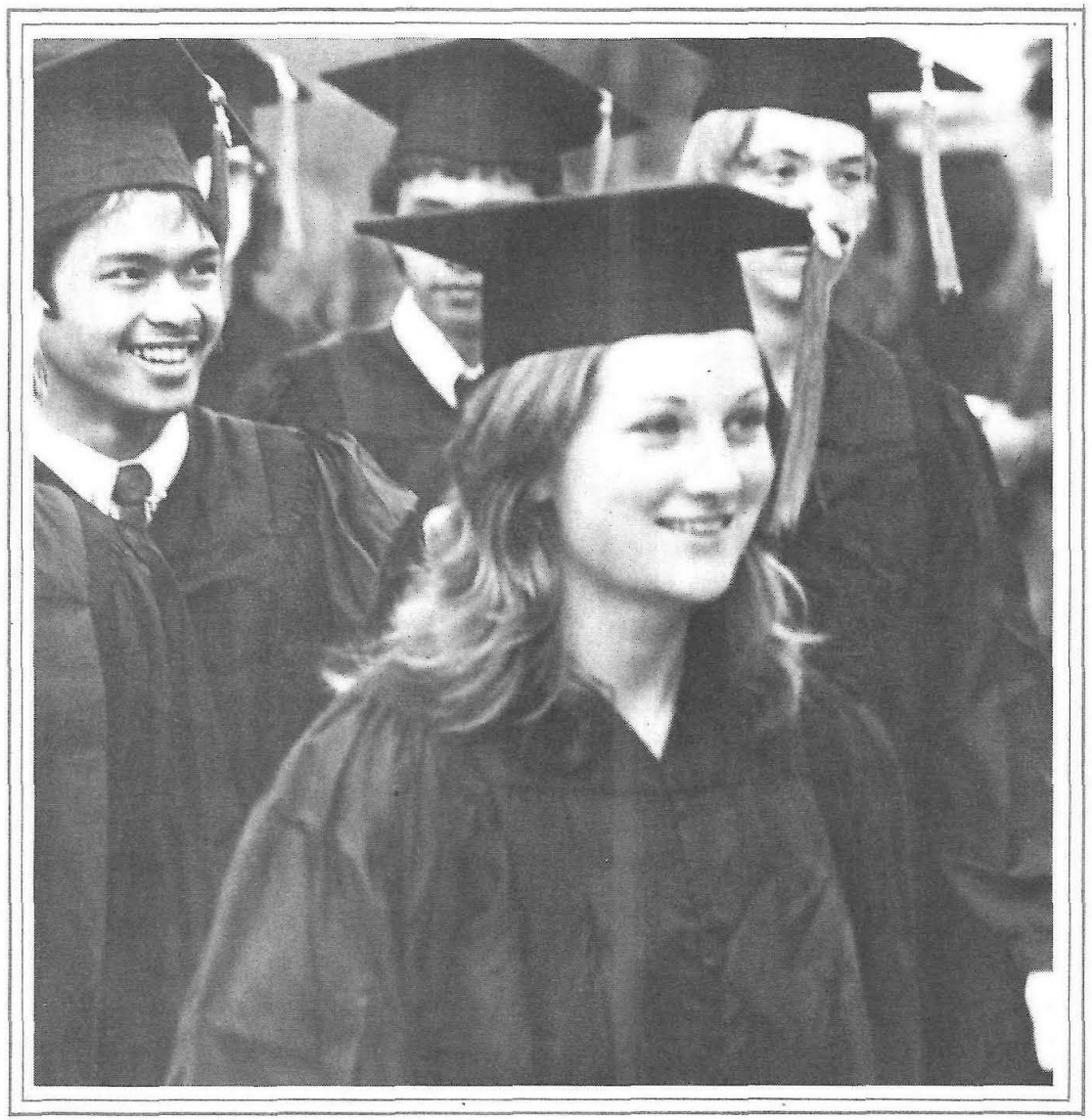

Sue VandeWoude is one of 361 new Caltech alumni. *See page 1.*

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