

CALTECH NEWS

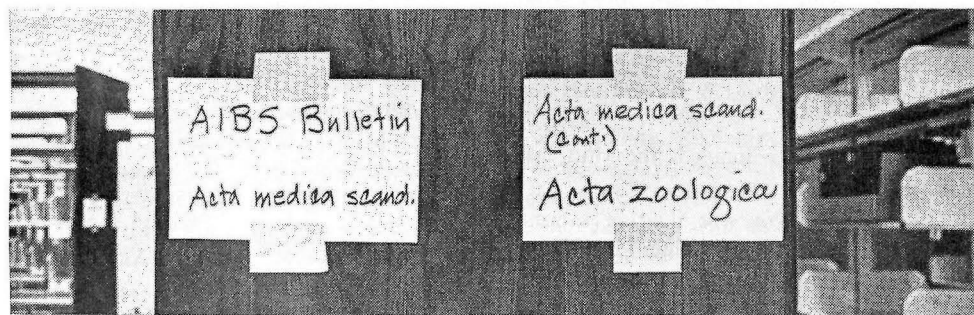


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MOVING DAY AT LAST. On July 17, movers (above) began a two-week job of transferring books from the general, humanities, biology, chemistry, and physics libraries to their new homes in Millikan Library. (Aeronautics, astrophysics, geology, and industrial relations will remain in their present locations.) Almost as soon as the first volumes were in place (below), users started tramping in, and the facility was in full operation before the beginning of the academic year. Alumni will be invited to tour the building at an open house later this year. For more about the library and the librarian—see page 4.



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Caltech News is now being sent to parents of 2,100 students and recent alumni.

Clarence Allen Is Acting Geology Chairman Until '69; Don Anderson Becomes Head of the Seismological Lab

Robert P. Sharp, '34, who has been chairman of Caltech's geology division for 15 years, has taken a leave of absence from formal administrative duties until the end of 1968 so that he may devote more time to teaching, research, and other Institute affairs. Clarence Allen, PhD '55, professor of geology and geophysics, who has been acting director of the seismological laboratory for the last two years, will assume the job of acting division chairman. He has been on the faculty since 1955.

Taking Allen's place and becoming permanent director of Caltech's seismological laboratory is Don L. Anderson, PhD '62, associate professor of geophysics. Anderson, who did his undergraduate work at Rensselaer Polytechnic Institute, has been on the Caltech faculty since 1962.

Students Ask For--And Are Given--A Chance To Say More About Institute Affairs. So Now What?

In the spring, young men's fancies may turn to all sorts of things, but even Caltech was a bit surprised by its young men this year. A large portion of the undergraduates, for the first time in many people's memories, managed to get together to present their "grievances" to the Institute.

ASCIT president Joe Rhodes, '69, rolling with the momentum that got him elected last February (the first sophomore ever elected), went to work with his board of directors right after the election to consider academic changes they thought would be desirable. On April 19 the board presented its conclusions, in the form of proposals to be voted on by the students, to about 350 cohorts in Beckman Auditorium.

The meeting, to which faculty were also invited, consisted of discussion of the measures; the student body voted on them by ballot a few days later. One of the items suggested by the ASCIT board—to reduce the number of units required for graduation—was killed at the general meeting. Of the proposals that remained on the ballot, only one failed (53 percent against it): to eliminate the requirement for choosing an option.

Those that the students approved were: (1) that the Institute reduce the required number of courses; (2) that student study groups be set up to investigate: how to improve teaching, an exchange program with other schools, a student-sponsored research conference at Caltech, more undergraduate research, modification of the advisor system to work in with other proposed changes, ways to help students learn how to teach, and general science or combination options; (3) that the students have one-third representation on those faculty committees concerned with student and academic life (students to have no voting privileges on the two admissions committees); and (4) that representatives of the faculty, graduate students, and undergraduate students sit as non-voting liaison members of the Institute board of trustees.

A non-academic measure that reflected growing disenchantment with the life offered in the Caltech student houses also passed. It called for the use of Institute general funds in addition to current sources of income for the purpose of supporting and refurbishing the student houses.

The faculty quickly responded to some of the students' suggestions. The undergraduate student relations committee met with student leaders on May 2 (less than two weeks after the student assembly) and found many areas of agreement. It recommended that relevant faculty committees take the initiative in getting students involved in their affairs. Those suggested were *academic policies*, *Institute assemblies and programs*, *ad hoc divisional curriculum*—and *undergraduate relations*. The faculty board on May 22 endorsed the report and added more possible faculty committees to the list: *graduate houses*, *under-*

graduate houses, *health*, *musical activities*, *physical education and athletics*, and *relations with secondary schools*.

Students probably would not have votes on committees, but, buoyed by the friendly faculty reaction to their requests, they don't seem to object to that condition.

Rhodes has definitely been the catalyst for the student activity. Nominally a physics student, the junior from Pittsburgh admits he is becoming increasingly interested in areas of social science. People seem to be his forte, rather than scientific intangibles.

It was he who spearheaded the successful drive for the coffee house which opened last April. Campus YMCA leaders feel that he has had a positive impact on the summer program at the Westside Study Center in mostly Negro northwest Pasadena.

On campus there are a few people who eye him with a combination of suspicion

Continued on page 4

More Pass-Fail Grading To Ease the Perils of Curiosity

At the suggestion of the undergraduates' educational policies committee, Caltech will allow sophomores, juniors, and seniors to take one subject per term, outside their discipline, on a pass-fail basis. The new plan goes into effect this month.

This comes on the heels of last year's decision to put the system of pass-fail grades for freshmen on a continuing basis. It was started as an experiment in 1964.

However, what a freshman pass-fail year does to or for a Caltech student is still a moot point. John Weir, Caltech associate professor of psychology, and Kenneth Eells, Institute psychologist, have been studying the effects of the new grading system but have not been able to draw any definitive conclusions yet.

They have found that some bright high school students, of the type inclined toward Caltech, are comparable to trained seals and look on grades as "rewards" for performance. In discussing the pass-fail system

Continued on page 6

Board Adds Six New Trustees

Six nationally known industrialists were elected to the Caltech board of trustees this summer. They are: Robert O. Anderson, board chairman of the Atlantic Richfield Company; Roy L. Ash, president of Litton Industries; Stephen D. Bechtel, Jr., president of Bechtel Corporation; Fred L. Hartley, president and chief executive officer of Union Oil Company of California; William A. Hewitt, chairman and chief executive officer of Deere & Company; and Rudolph A. Peterson, president and chief executive officer of the Bank of America.

The election of the six new men brings the board total to 39. There are, in addition, five honorary members.

ALUMNI FORUM

Editor:

Congratulations on the fine work you have done on the *Caltech News*. It certainly brings the campus more close to me.

I am most delighted to see the large increase in women enrollment at Caltech. When I started at Caltech in 1959, there were only five women. Thank you for giving the women students a chance so that their voices can be heard. I feel that I am so close to them, I feel their "laughters," "tears" (they'll have more after graduation), "kicks," and "problems" wholeheartedly.

At Caltech, everybody (both students and faculty) is serious about his profession. Therefore, nothing but your work counts. I had never experienced any discrimination against women. However, it is not true anymore outside of the Caltech community. As pointed out by Sue Kieffer, people think that it is a novelty to be a female student at Caltech. I feel that most people, consciously and/or unconsciously, distrust women's ability (my feeling is far more complex than that; unfortunately my English is not good enough to express it). I remembered clearly that people always seemed astonished when they found out I was a student at Caltech. The "almost universal" comments were "you don't look like . . ." or "I can't tell it by looking at you." I finally asked one of the people who commented that way, "What do you expect me to look like—a monster?"

I sympathize with Janet Jones and agree with her totally. I had the experience she is facing now about academic positions. If Siberia is the only place open to us, I suggest that we go there. With our determination (we must be very stubborn; otherwise we would never get this far), flowers can bloom even in Siberia (of course, they will not be as good as the ones in Pasadena).

One last comment on Nancy Rathjen. She said that she will refuse to recognize the fact about discrimination against women scientists. I would like to know what she is going to do about it. Whatever action she will take, please count me as a life-long supporter to raise the value of women scientists and engineers.

Ying-chu Lin (Susan) Wu, PhD '63
The University of Tennessee
Space Institute
Tullahoma, Tennessee

Editor:

I just got the April issue of *Caltech News* today [June 8]. Surface mail takes a little while—not only does it go slowly, but it has to be inspected or something. I would like to congratulate you on it. I think it's great.

The paper is lively and interesting, and covers issues that are still of interest to me. Keep up the good work. Way the hell out here in the middle of nowhere, someone appreciates it.

Richard Karp, '64
Peace Corps
Baguio City, Philippines

P.S. I'm sure glad we didn't have to debate about censorship when I was editor of the *California Tech*.

Editor:

Congratulations on the first two issues of the *Caltech News*. It is refreshingly alive and should prove a real bond between Tech and its ever-increasing alumni.

At the risk of being a voice of one crying in the wilderness, I feel impelled to comment on the campaign of the YMCA and its attempts to "round out" Caltech students by importing so-called theologs, and particular-

ly on the comments of at least one of the seminarians.

The report seems to indicate that many of the students were not too rapidly being "rounded out" and that there seemed to be doubts regarding the very liberal views of the seminarians as compared with the basic doctrines of their religions.

But the reported statement of one theolog that, "When you hear words and phrases like 'sin' and 'salvation' and 'Jesus saves' you turn off," effectively shows the depths of apostasy to which at least his seminary has fallen. It is a self-evident fact to any thinking being that sin—or call it by any name you wish—is deeply engrained in all human beings, bringing about the daily examples of 'man's inhumanity to man' which we do not find among the beasts of the jungle.

Which brings us to the second word and the phrase that turn off the theolog, but these are covered in one statement by God: "There is no other Name (Jesus) under heaven, given among men whereby we may be saved (salvation)." You see, God says "I am the Lord, I change not," yet modern man, wise in his own conceits, feels that we need a new ethic, that the faith of our fathers is outdated. Let us leave such ideas to the hippies and those on an LSD trip.

God, who created all things—he really did, you know—can be found in the Caltech labs daily; the periodic table of elements is a miracle of wisdom and design, and when we compute the path of a moon or Venus probe we are only using the mathematical laws He created. But all of this is not as important to Him as one soul; and He certainly would not have given His only Son as a sacrifice for that soul if there had been any other way.

Well! That's quite a little sermon for me! But I could not read such remarks regarding One I love so much and Who has done so much for me, without writing in a little rebuttal.

Truman F. McCrea, '21
San Bernardino, California

Editor:

I enjoyed reading your article on student drug use in the June issue of *Caltech News*. It appears to me that the present crop of undergraduates are more conservative than those of earlier days. A poll of the undergraduates at Caltech taken, say, in 1954 would probably have unearthed the fact that 99 percent of them were taking LSD, marijuana, and other hip drugs on a regular basis; some of the students in 1954 were probably obtaining their marijuana from the lush marijuana farm between Blacker House and Dabney House. It would be helpful if the Institute Psychologist could determine what effect admitting girls to the graduate school has had on the consumption of LSD by Caltech students.

G. Louis Fletcher, '56, MS '57
Redlands, California

Editor:

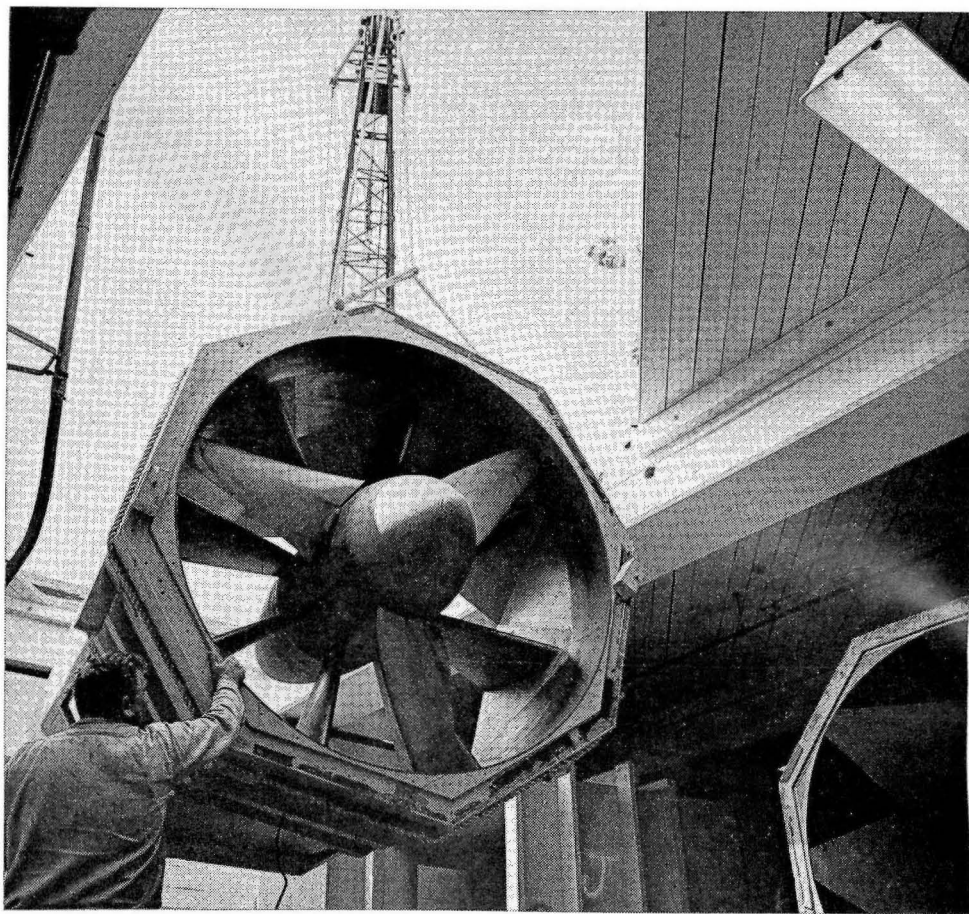
On this Independence Day I feel called upon to tell you the truth; someone has to. Your paper is sorry.

The heads are dull, the style leaden, the stories too long, the tone uninspired. Even the name has the personality of a sick clam too long in the sun.

The ratio of "news" to "feature" story approacheth zero, the essentials of a news story rarely appear—and then as if by accident—and your obsession with statistics having to do with Pot makes me wonder if you aren't in the wrong institution.

Some blatant oversights:

Page one, last issue: A story about im-



THE 17-YEAR-OLD Merrill wind tunnel, located above the arch between the synchrotron and old central shop, is moving to make way for a five-story high-energy physics building to rise on that site. For the time being the low-speed (160 mph) tunnel, dismantled into 24 sections, is nesting in an underground storage vault. It will be reassembled vertically (to save space) within a year in the basement of Guggenheim Aeronautical Laboratory.

ported seminarians. *Not one is named!* Ever heard of Who, What, When, Where etc?

Page one, last issue: "ever since the editor of the *California Tech* . . ." Who is he? What is his name? You know; I don't. You are supposed to be writing for me, no? Get the point, chowder head?

Page four, last issue; The worst one of all! ". . . The diversity of the prize winning proposals *once again* points up the Caltech undergraduate's versatility."

Well, la-dee-dah!

I saw it in the first issue, but I let it go. I saw it then in the piece about the editorial types carrying on at length about what is "news"; one of the participants dwelt upon how *intelligent* the Caltech student is.

Twice in two issues is three times too many.

That kind of marijuana is the kind that will really do you hurt, man.

That kind of Pot was floating around the campus 110 years ago when I was there. The hardest part of growing up was shaking the notion that I was a little smarter than the guy beside me, because I was a Caltech type. Forget about the kind of Pot that sends people on trips; focus on the kind that gives you a permanent big head. You guys *may* excel in one small way in one big world, but the gent beside you—the one who never went to Tech—and there are lots of guys who wouldn't consider it even if it were for free—can probably outsmart you in a line you just possibly never even heard of.

Right now, Mr. Editor, what you need is a standard high school course in Journalism. If I'd ever foisted on the associated students an issue of the *California Tech* half as bad as your faceless *Caltech News*, Professor George MacMinn, God rest his soul, would have flown my scalp from the highest point of Throop Hall at high noon.

Tom Terrill, '33
San Jose, California

Editor:

Damned good headline writing!

Harry Press
Editor, *The Stanford Observer*

Coming Caltech Events

- Oct. 1, 2 p.m., Beckman Auditorium.
Fiesta Mexicana—Mexican singers, dancers, and musicians.
- Oct. 7, 8:30 p.m., Beckman Auditorium.
Oedipus Rex—directed by Theo Marcuse.
- Oct. 8, 3:30 p.m., Beckman Auditorium.
Coleman Concert Series. *Amadeus* Quartet.
- Oct. 10, 8:30 p.m., Beckman Auditorium.
Film: Fontaine and Nureyev dancing "Swan Lake."
- Oct. 16, 8:30 p.m., Beckman Auditorium.
Monday Evening Lecture Series. "The Blue Boy Revisited: The Case for the Huntington Art Collection." Robert R. Wark, curator of the Huntington Library and Art Gallery. Free.
- Oct. 20, 8:30 p.m., Beckman Auditorium.
The Melrose Theater in two plays: "Squat Betty" and "The Sponge Room."
- Oct. 21, all day. Campus.
Parents Day. Free.
- Oct. 22, 8:30 p.m., Beckman Auditorium.
Coleman Concert Series.
New York Chamber Soloists.
- Oct. 23, 8:30 p.m., Beckman Auditorium.
Monday Evening Lecture Series.
"The Start of Development in Animals." Albert Tyler, Caltech professor of biology. Free.
- Oct. 24, 8:30 p.m., Beckman Auditorium.
Film: "A Winter's Tale" with Laurence Harvey.
- Oct. 30, 8:30 p.m., Beckman Auditorium.
Monday Evening Lecture Series.
"Molecular Irony: From Iron Rust to Hemoglobin." Harry B. Gray, Caltech professor of chemistry. Free.
- Nov. 4, 8:30 p.m., Beckman Auditorium.
Plays: "The Tiger" and "The Typists," by Murray Schisgal.
- Nov. 6, 8:30 p.m., Beckman Auditorium.
Monday Evening Lecture Series.
"Developments in Nuclear Power in the Next 20 Years." Milton Plesset, Caltech professor of engineering science. Free.
- Nov. 7, 8:30 p.m., Beckman Auditorium.
Film: "Turn On, Tune In, Drop Out," with Timothy Leary.
- Nov. 10, 8:30 p.m., Beckman Auditorium.
"Benjamin Franklin, Citizen," with Fredd Wayne.

When They Changed the Name to Humanities AND SOCIAL SCIENCES, They Really Meant It

When Hallett Smith came to Caltech as chairman of the division of humanities 18 years ago, the division was still serving as a kind of "finishing school" for the students—a place to get some culture. Today it offers three undergraduate options and is on the threshold of beginning work in some new and important fields of social sciences—as Dr. Smith indicates in this interview.

Q: What kinds of students have been majoring in the humanities at Caltech?

A: I don't know that any picture has emerged yet. We have three options: economics, history, and English. One might say that economics is congenial to the obviously mathematically inclined types and also to people who are interested in applied science.

Some students have a double major in a science field and history. As for English, sometimes they're just boys who find, as one of them told me, that he'd a lot rather write papers in English courses than write chem lab reports. Others are interested in the general field of information science and think they should have some training in literary and philosophical discourse.

The people majoring in humanities have been good students, generally. Some say that they are perfectly willing to do some more work in science, but they don't want to be scientists.

Q: Do you plan any additional fields for humanities majors?

A: As soon as we can staff it, we want to have an option in political science or government, with special emphasis on that part of the field that has to do with science and public policy. We're actively trying to recruit people in that area now.

Q: Will there be any graduate studies in the humanities?

A: This question has not been answered, although it is by no means being excluded from consideration. It will be a fundamental policy decision that the faculty and the trustees of the Institute will have to make. I would imagine—personally, NOT as division chairman—that as we build up strength in various fields we will introduce graduate work in those fields.

Q: How much interest do graduate students show in humanities?

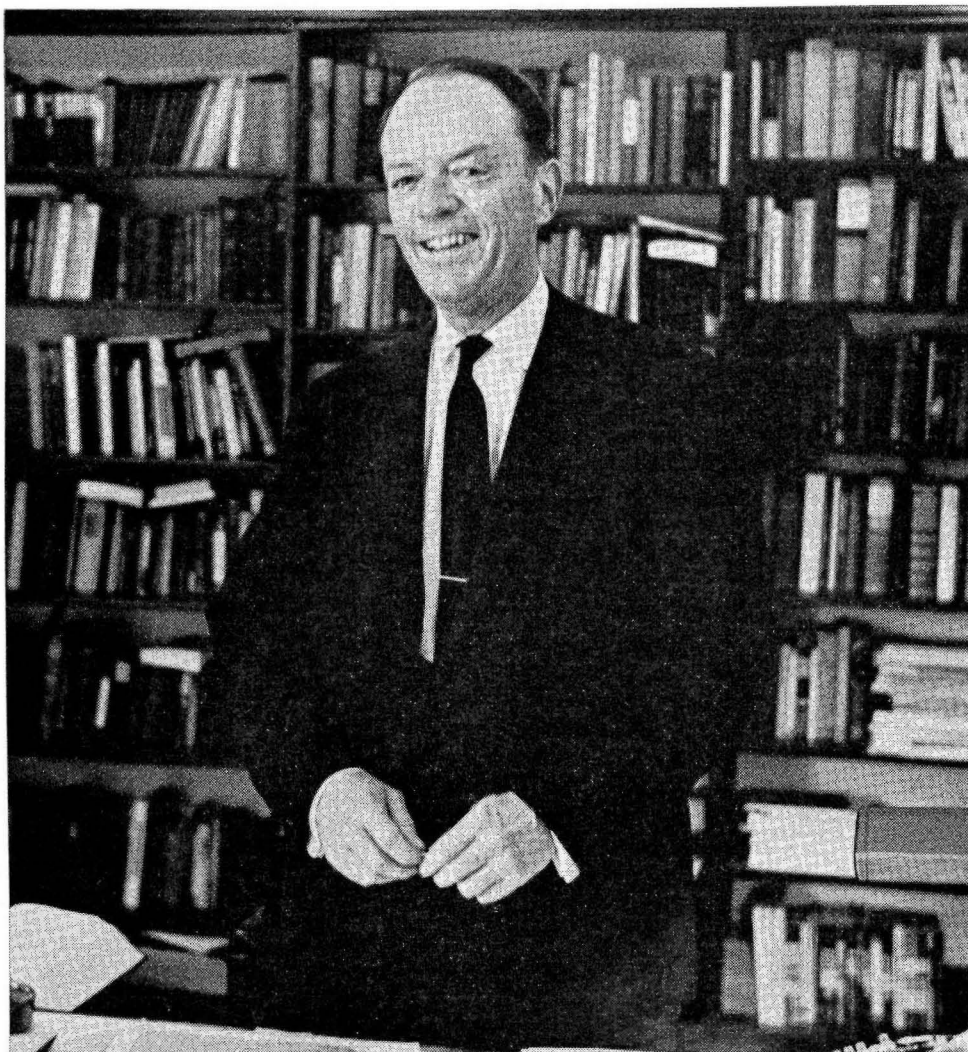
A: It used to be that all candidates for an MS had to take 27 units of humanities, but now that requirement is left up to the individual option. Three of them—aeronautical engineering, civil engineering, and astronomy—have retained the requirement.

A fair number of graduate students continue to take some humanities. They can, of course, count humanities credits toward a distributed minor, which is required for the PhD—they must take a certain number of units outside their own special field—or they can take one field of humanities as a specified minor.

Q: For years students have talked about how some humanities courses—particularly in English—are graded very easily. Is this a reflection of division policy or the attitude of some individual instructors?

A: There's no division policy about easy or hard grading. In general the grade distribution in the multi-section courses in this division is about the same as those in the big multi-section courses in physics, mathematics, and chemistry. Students sometimes say that grading in English is easy, but I think that reflects one or two individual instructors. I think the new provision for having pass-fail grading in some upper-class courses may make for a lesser concern on grades anyway.

Q: As of 1967-68 you have 39 full-time teaching personnel in the division—10 in



Hallett Smith

Photo by Leigh Wiener

history; 10 in English; 8 in economics; 8 in philosophy, languages, and psychology; 2 in some sort of "political science"; and 1 in anthropology. What changes in that balance do you expect in, say, the next five years?

A: In making plans for a new humanities building we visualized office space in the new building and refurbished Dabney for 70 people. This looks ahead for some years; we probably won't get to 70 even in the next five years. And although the building is in the planning stage now, we surely can't go very fast until we actually have it.

As for the balance, we certainly will have more in psychology, political science, anthropology, sociology, and economics. We have three new appointments in economics for 1967-68.

We have to wait to see how our new humanities elective system [See related article on page 5] works before we can predict our needs in English and history. But I think we'll find we will be able to do with our present staff in those areas.

Q: What concrete steps is the division taking to implement the talked-about interrelation of science and the humanities?

A: We are taking a good many steps—particularly in the interrelation of science and social sciences. Harrison Brown now has an appointment in this division as well as in geology. We have committees working on recruiting and planning in the field of science and government and in transfer of technology from one field to another. We also have a committee working with the biology division on how we are going to make a bridge from behavioral biology to individual and group psychology. We haven't made any appointments yet, but the committee has been working over the last year and has now made a report to the president.

Q: How adequate are the division's library resources?

A: Very inadequate. We have been, for the last year or so, systematically trying to fill in gaps, particularly in English, history, and economics. But we need, in the

next few years, to double or triple the holdings of the humanities library, and perhaps to go beyond that within a period of ten years.

Q: What kinds of non-Institute financial support does the division have?

A: We currently have two grants—one from the Rockefeller Foundation and one from the Sloan Foundation—to enable us to make a start in the area of science and social change, technical innovation and social change, transfer of technology, and economics of research and development. Those are for the startup period. We need

additional support for continuation and enlargement of it.

We have, aside from that, the McCollum Fund, which for a number of years has enabled us to buy books in the areas where we need them and to bring visiting lecturers to the campus. We've used that very effectively in the last two years.

We also have the Old Dominion Fund, which is a way of providing for year's leaves of absence for younger men—who have not yet acquired tenure—to go off and finish a book or do research. This, we think, is a very important feature in a university without a sabbatical system.

Q: Do you see an increasing concentration on the developing countries in the division's programs, or is the current interest only a reflection of certain faculty members' particular fields of specialization?

A: There certainly is going to be an increasing interest in the developing countries in our programs. One of the economists that we have just appointed is returning from a two-year tour of duty with an American AID program in Brazil. He brings fresh and direct experience of economics in developing countries. And, of course, Ned Munger [professor of geography] and Thayer Scudder [associate professor of anthropology] are very much interested in Africa. Harrison Brown's interest in this division is often with the problems of providing scientific knowledge and technical knowledge to underdeveloped countries. This is related to his work as foreign secretary of the National Academy of Sciences.

The interest in these parts of the world is general in the division. Certain faculty members do have special interests, and we're doing all we can to support them in their interests and to add personnel who will back them up and collaborate with them.

Problems of growth and development are, of course, not confined to underdeveloped countries. We are conscious of the need to study social tensions at all levels of development. Some important lessons can be learned in our own backyard.

New Research-Oriented Publication Available to Alumni

This description of work in bioengineering is reprinted from *Research*, a quarterly publication of the Institute. It is designed to acquaint directors of science and engineering projects in industry with research being conducted at Caltech. Alumni may receive the free publication from the Office of Alumni Relations.

In the first detailed study of problems of gas exchange with flowing blood, Edmund E. Spaeth, 1967 doctoral graduate in bioengineering, has devised not only a formula to aid in better design of heart-lung machines but also model techniques for others to follow in studying the transfer of contaminants to the bloodstream.

Under the direction of Sheldon K. Friedlander, professor of chemical and environmental health engineering, Spaeth studied a basic process of blood function, the rate of exchange of carbon dioxide and oxygen. Variations of the known equation for gas exchange with water were developed into forms applicable to blood. These were compared with results from well-defined laboratory experiments to evaluate predictions against actual data and to then validate the equation for blood. Diffusion of gases in and out of blood was found in general agreement with that for water, except fresh blood was found to carry 60 to 100 times as much oxygen.

The exchange of gases with blood through a membrane in heart-lung ma-

chines is inhibited by a layer of slow-moving blood next to the membrane. This blood-layer resistance was incorporated into Spaeth's formula, which can now be used to evaluate the efficiency of gas exchange in any current or future heart-lung machine.

Spaeth's equation brings design engineers closer to finding the most efficient way of getting oxygen into the blood. Some heart-lung machines use direct exposure of blood to oxygen without an intervening surface, but, after short periods, toxic reaction causes blood cells to clump. Other machines include a membrane between the air and the flowing blood. Since blood is very sensitive to surfaces other than those it encounters in the body, a smaller membrane area would further reduce damage to the blood and allow longer use of the machine. But smaller areas require greater efficiency of transfer than previous designs could offer. Now that efficiencies can be evaluated by Spaeth's formula, better designs with smaller areas can be achieved.

Dr. Friedlander also foresees application of Spaeth's work to new research in human response to various types and levels of air pollution. Such methodology may now lead to detailed knowledge of whether traces of contaminants in the air slow down transfer of oxygen into the blood and the manner in which different contaminants enter the bloodstream.



Rod Casper, chief reference librarian; Harald Ostvold; Kathryn Gosden, catalog clerk.

Ostvold Smooths Transition To New Library By Shelving Old Ideas While Circulating Books

"At a school like Caltech," says Harald Ostvold, "the librarian's lot is not a happy one." He should know. He is the librarian.

Since he wears the look of a man who likes what he's doing, his attitude lightens his words as he continues: "Here, the distinction between the librarian and the scientist is greater than in some other places. The scientists get farther and farther into the empyrian, and the librarians stay back in the mud."

However, Caltech's chief book keeper does not regret his decision to leave his spot as chief of reference at the New York Public Library to take on Caltech's many-splendored headaches. He has found Caltech "enormously attractive" and likes the idea of being in a broad spectrum of library work and on a campus again.

Ostvold is a man who admits to thriving on puzzling questions, and Caltech had a dilly ready for him when he arrived on campus in June of 1963.

The problem was to gather Caltech's departmental libraries under the new Millikan roof, while keeping everybody concerned reasonably happy in the process.

The situation wasn't exactly strange to him. He had integrated the science librar-

ies at Northwestern University in 1947. And after two years as chief reference librarian at Washington University in St. Louis, he headed the planning and execution of a new library on a campus not unlike Caltech's: the St. Paul campus of the University of Minnesota, which is a research center for agriculture and biochemistry.

Also, in 1956, he had the experience of working over the library system at Seoul National University in Korea. This entailed training librarians, planning buildings, setting up an agricultural library, and reorganizing the engineering and medical libraries.

Perhaps as important a consideration to the Caltech people who chose him was that campus people liked him—a critical quality for any man being hired to come in and turn a 50-year-old system topsyturvy.

Ostvold is the kind of man who elicits the "He doesn't act like a librarian" type of left-handed compliment. Caltech historian Rodman Paul, chairman of the library committee, probably sums up why this is when he says, "You know, you still run into librarians who seem to feel their li-

braries would get along just fine if people didn't come in and take out the books. Harald considers a library system a service that must be run for the satisfaction of the people using it, and he's sensitive to the way people think."

His basic concern is how he can give the best service to a scientific community.

"There are so many of our men working so far out that there isn't a great deal of literature that can help them," Ostvold says. "They know everything in their fields. It's different from most campuses where you are primarily in a learning situation."

"The scientists here get a great deal of their information from their colleagues—at conventions, by letter—that sort of thing."

"But you still have to try and find the best way of providing service for them when they need it. This is something that's never been solved—at the Caltech level, anyway."

Ostvold believes that the best service he can give them is good access to the literature by means of reproduction.

"If you can give it to them fast, you're giving them a major service. It's one of the proposals we've made that's met with the most enthusiasm."

As to automated library systems, he says that many campuses, including MIT, are working along lines involving computer consoles. "But," he adds, "there's a good deal of pessimism about this right now. The MIT research is still experimental and is being done with limited and known stores of information. This type of retrieval in 1967 isn't worth its cost. The input is largely of historical interest. We've talked about it here and even made some tentative moves, but for Caltech this year and with our particular problems, we're not bullish."

As he sees the function of Millikan Library, right now the best thing is to provide a convenient library with convenient hours (8 a.m. to 2 a.m., weekdays; 8 a.m. to midnight, weekends and holidays), convenient working conditions, good reproduction service, and as good a stock of the literature scientists need as is available.

Under the new system there are three categories of libraries at Caltech:

The centralized and relatively complete subject collections housed in Millikan. These include biology, chemistry, engineering, humanities and social sciences,

mathematics, and physics.

Large subject collections not housed in Millikan, such as aeronautics, astrophysics, geology, and industrial relations. In these cases it seemed to work out best for the departments to retain their own.

Smaller divisional collections consisting chiefly of publications duplicating those in Millikan. These also may include specialized material of interest only to the division.

With Caltech's growing attention to the social sciences, the possibility of a separate humanities and social science library dominates a portion of Ostvold's planning time. He sees this as part of a future humanities-social science building complex.

Meanwhile, an increasing number of the Caltech genus whose banners read "We Never Did It This Way Before" are quite contentedly riding the noiseless Millikan elevators to their destinations. The chairs are comfortable, the lighting is fine, and the air conditioning makes the atmosphere fresh as a Swiss mountain pasture.

And then there's always Harald Ostvold to see that they get what they want. Under these conditions, it's hard to remain loyal to the past.

Alumni Association membership brings:

- Engineering and Science magazine
- Triennial Alumni Directory
- Athenaeum membership privilege

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Editor: Bruce Abell, '62

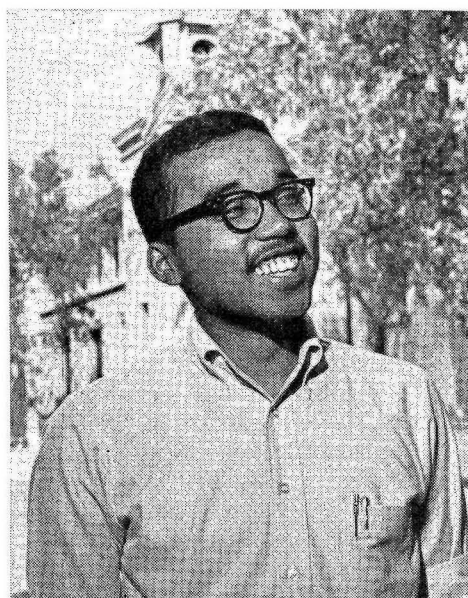
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"To Convince Students That They Should Take Responsibility For Making Changes"—More on Undergraduate Restlessness

Continued from page 1

and disfavor. This probably stems from an adverse reaction to his very vocal and consistent advocacy of doing some things differently and better at Caltech—and the fact that his conversation does tend to be grandiose at times. But he has the drive and the manner to engender enthusiasm and turn off apathy among his contemporaries.



Joe Rhodes, '69

A hundred and twenty-five signed up for the various study committees, many for more than one. Their subsequent enthusiasm has surprised even Rhodes, who expected to have to put a lot of effort into making them work. But groups met on their own, and kept meeting. By midsummer he had received preliminary reports from some of them.

The options group drew the conclusion that there should be some framework other than the departmental option, some way to hand-make options for special interests. Rhodes adds his own feeling that Caltech, with its favorable faculty-student ratio, should "do things on a more personal level."

The exchange group was still considering the possibility of a junior year abroad, but seemed to approach with much more enthusiasm a program whereby students could exchange with other American schools for a quarter, with students from other schools also coming to Caltech.

Fifty students signed up to work on the evaluation of teaching and courses at Caltech. One group is studying classroom teaching and the other lab instruction. Rhodes admits that the early discussions with lab instructors and committee members have revealed that the faculty are often disappointed with the minor suggestions being made by students. Apparently the

faculty would prefer to see the students think in terms of evaluating whole courses. "We're finding that the faculty are ahead of us in many ways," says Rhodes. "But that was expected. The main thrust of this business is to convince students that they should take responsibility for making changes, not just wait for the faculty to make them."

Many faculty members think that when the students have finally had their say, nothing much may have been accomplished. Robert Huttenback, professor of history and master of student houses, has presided over the houses for nine years and probably knows the undergraduate character as well as anyone. He points out that, above all, the Caltech students are conservative about changing Caltech. "I don't think they're terribly clear on what they want changed. I think what they want is to become more involved, which is something I personally welcome. But in the student body meeting last spring, when the ideas of changing courses or changing degrees came up, they didn't want to change things. It seems the thing they treasure above all is the value of their degrees."

Rhodes believes that five or six faculty committees will have students on them in 1967-68. Huttenback is convinced that, for the most part, the faculty will welcome student participation. But he is also convinced

that "neither the students nor the faculty are very serious about the kinds of shibboleths that have come out—closer student-faculty relations, better teaching, and all those that we hear again and again. The real prospect of much closer student-faculty relations is as horrifying to students as to faculty. It's just something nice to talk about. But I do hope that students are going to become more interested in how the Institute runs and will get more involved."

Huttenback adds that there can be as much closeness as the students want; the opportunity is there. "I think in most cases it's up to the student to make the first move."

Rhodes, no shrinking violet when it comes to initiating action, agrees, although he believes the faculty is responsible for whatever alienation does exist. "They have more freedom than any faculty I know of anywhere to effect changes in their school. They have created Caltech for the undergrads. I'm not saying the faculty isn't concerned, but problems of the Caltech undergrads stem from faculty actions."

All this has unfolded during the spring quarter and summer. Whether the students' ambitious reform program will seem as attractive in the fall, with another long academic year waiting to be lived through, remains to be seen.

While Students Are Scaling the Walls, Faculty Opens the Doors by Reducing Requirements

Four of Caltech's six divisions have taken steps of varying magnitude to reduce the number of required courses for their students and are offering considerably revised curricula for the 1967-68 academic year. Biology, chemical engineering, and geology have all consolidated several subjects into more comprehensive courses; humanities and social sciences has eliminated most of the specific requirements for science and engineering majors.

Biology will offer, instead of multi-term courses in individual or related topics, "supercourses" that will combine subjects. Thus, plant and animal biology, together with new material in mammalian anatomy, become *organismic biology*. Three quarters of *bio-chemistry* are compressed into one. Neurobiology and psychobiology are combined into one quarter of *neuroscience*. Three quarters of *genetics* are compressed into one.

Each of the four supercourses includes the basic core class and labs or colloquia designed to complement it. The full course carries 34 units. A student can elect only the core section, although biology majors will be advised to take at least two of the four for full credit.

Chemical engineering, faced with small numbers of students in many of the courses it offers, has also decided to consolidate some of its offerings. As a result, undergraduates will get more exposure to thermodynamics, and undergraduates and graduates will do more work in transport phenomena; two separate courses in industrial chemistry and stage operations are now combined as *optimal design of chemical systems*.

Geology, because it accepts students for graduate study who have little or no background in geology (about 50 percent of each incoming group), has had to schedule them for a variety of basic courses, which they take along with the undergraduate geologists.

To reduce the complexity of arranging special programs, the division has set up two new courses. One is *advanced general geology*, which incorporates mineralogy and igneous petrology; sedimentary rocks and structural geology; and tectonics, metamorphism, and earth history. The other is *field training and problems*. These two new courses cover the material that undergraduates have been learning in their sophomore and junior years, so they will take the courses in their junior year along with the graduate students. In addition to reducing

the number of courses being taught, the new geology plan will make it much easier for students to transfer into the geology option at the end of their sophomore year. It will also provide more time for undergraduate geology majors to take electives.

The humanities and social sciences division, which now includes options in English, history, and economics, found that the wide range of subjects being offered were not always available to students wanting to take them because of the time required to fulfill the basic requirements in English and history. As a result, humanities regulations now are that:

Every candidate for a BS must take 120 units of humanities and social sciences (the same number of units previously taken). However, elementary language courses, debating, journalism, two psychology courses, and elementary music cannot be counted toward that total.

Freshmen must take three quarters of English I (literature of the modern world—9 units per quarter), OR History 1 (introduction to modern Europe—9 units), OR History 2 (major themes in United States history—9 units).

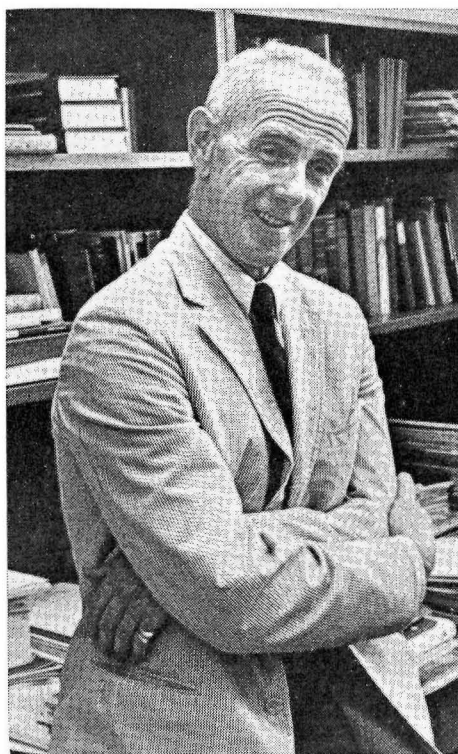
Every student must take at least 27 units of English. If he takes English I as a freshman, he must take an additional 9 units of English in a later year. If he does not take English I, he must take English 7 (advanced literature—9 units); he cannot receive credit for English I and English 7.

The humanities revisions also finally laid to rest History 5, public affairs (known years ago as current topics), the venerable two-unit course that has been required of Caltech seniors for more than 40 years. Its material will be covered in other courses.

Free Publication Now \$2.00

"*The Next Ninety Years* should be required reading for high school, college, university and adult education classes. Only if we are aware of the problems facing us in 1967, may we be able to do something about the world of 1977." So wrote Dr. Irving Bengelsdorf, science editor of the *Los Angeles Times*, on August 3, in reviewing the book made from the Industrial Associates Conference held at Caltech last March. The 200 copies offered free to Alumni in the June *Caltech News* have been used up, but copies may still be ordered through the Caltech Bookstore, Dept. 90, for \$2.00 each postpaid.

Question for Admissions Office: Will Future Caltech Graduates Have Leadership Qualities?



Peter Miller

One of the by-products last year of the Alumni Study Group (in addition to *Caltech News*) was a collection of questions about the Institute that seemed of particular interest to the 25 alumni in that group. Various officers of the Institute have volunteered answers to them, and *Caltech News* will present one or more in each issue from now on. Alumni are, of course, invited to submit additional questions.

Is the Institute selecting freshmen who have the potential of becoming tomorrow's national leaders?

The answer is a clear Yes. Whether our freshmen are as likely to develop into national leaders as the freshmen of other colleges, I believe no one can say. Science has not yet discovered how to look into the young man of 17 and see with any clarity the national leader of 50. But if brains and creative ability provide a potential for leadership, we can certainly say that our freshmen have that potential.

There is no point here in launching on a comparison between our freshmen and freshmen from other colleges. We do not have accurate information in the first place, and such a comparison only leads to the fruitless questions of: "Are our freshmen better than MIT's? Are they better than

Harvard's?" The answer is probably both Yes and No, depending on what criteria are being used for comparison. I think the best answer would be that we, in company with many other good colleges throughout the country, have excellent freshmen with real potential.

Our freshmen are most likely to develop into leaders in the fields of science and engineering. We screen them carefully for what they have done in high school and take only those students whose records have been excellent. We screen them on what their potential seems to be, as expressed by scores on the College Board tests. And our College Board averages remain very high. We screen them on the strength of their interest in science or engineering and base our screening largely on concrete evidence of what a student has done of his own volition in the way of extra work in these fields.

We thus have an academically excellent group with what we hope is strong motivation for learning in our particular fields. Once these students interact with our faculty, there are bound to be a number of them who will develop into really creative scientists or engineers, who will undoubtedly be among the leaders in these fields as their work progresses.

There are many opportunities for the exercise of leadership once the students become undergraduates here. Student affairs are self-run, and many men develop considerable talent in guiding undergraduate activities. Some of these men seem to develop the ability to guide without at the same time doing much that is creative in academic fields; others seem to manage both the extra curricular and the academic side of the Institute with real ability.

I would conclude, therefore, that the alumni could feel reassured on the question raised. Our student body certainly has the potential of developing national leaders; and probably more important, the student body will provide the creative scientists and engineers who will work increasingly closely with national leaders who are not scientists or engineers.

—Dr. Peter Miller, associate director of admissions.

PLACEMENT ASSISTANCE TO CALTECH ALUMNI

The Caltech Placement Service may be of assistance to you in one of the following ways:

- (1) Help you when you become unemployed or need to change employment.
- (2) Inform you of possible opportunities from time to time.

This service is provided to alumni by the Institute. A fee or charge is not involved.

If you wish to avail yourself of this service, fill in and mail the following form:

To: Caltech Placement Service
California Institute of Technology
Pasadena, California 91109

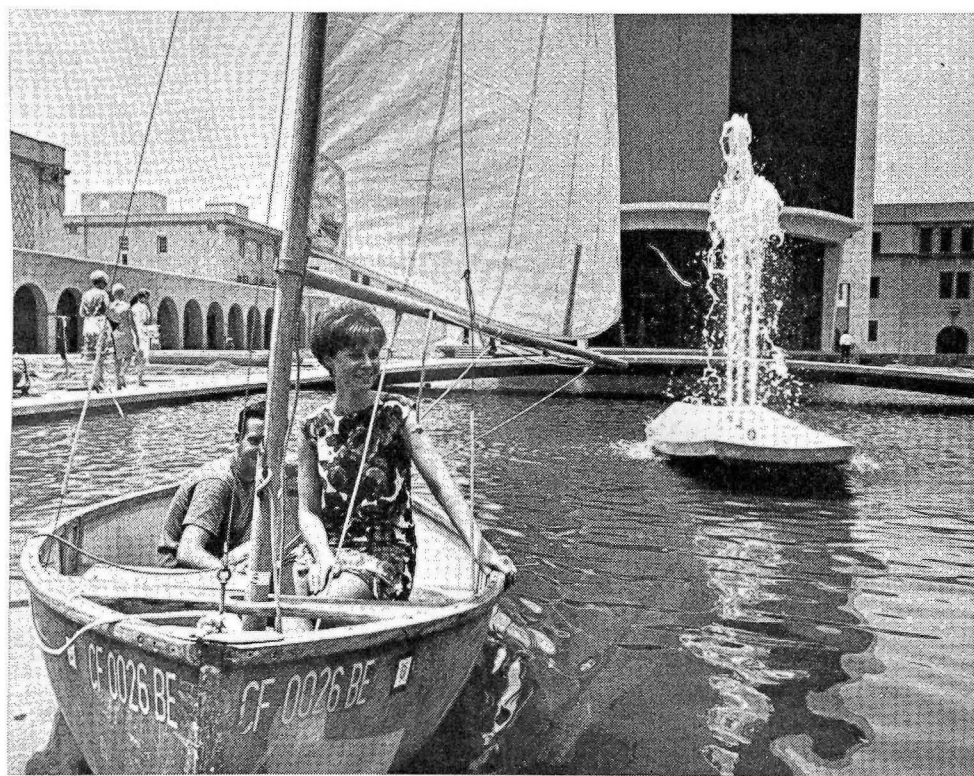
Please send me: (Check one)

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

Name

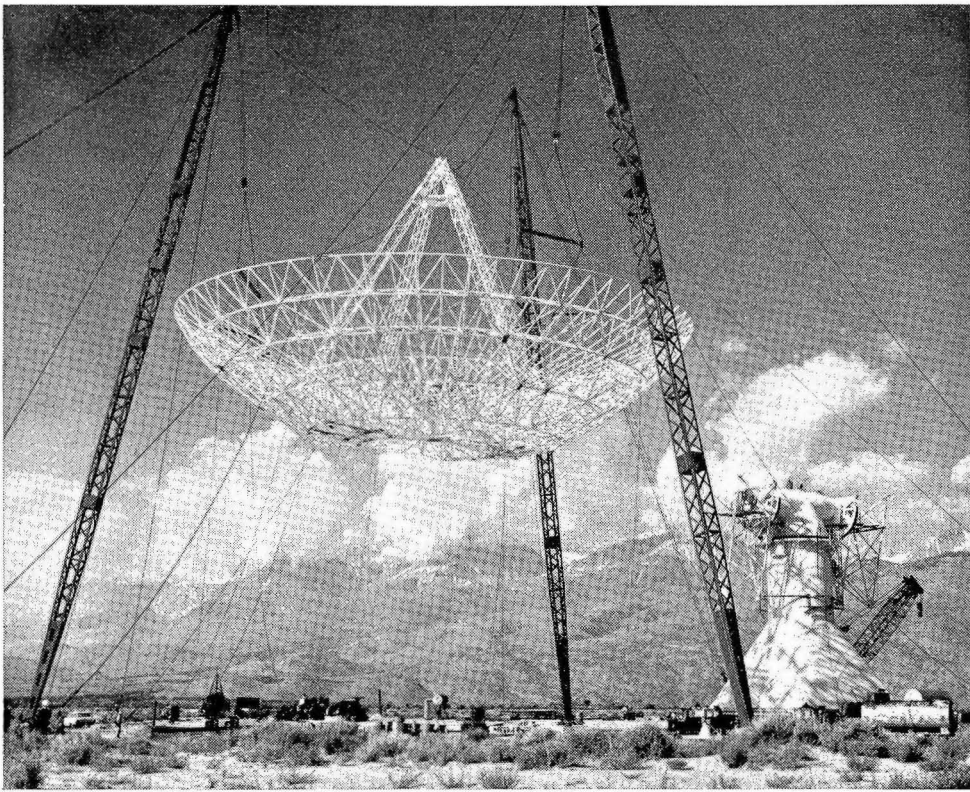
Degree (s) Year (s)

Address



NOBODY SPECIFICALLY said it wasn't, so Caltech sailing club commodore Randy Cook, '68, and campus secretary Carol Ince assumed the library reflecting pool was a navigable waterway (left). After all, the ocean is a long way off, and it was a beautiful day to be out on the water. But the harbor patrol, in the form of Caltech Lieutenant of Guards A. G. Newton, scuttled the regatta (below), suggesting that bluer waters might be more appropriate.





CALTECH'S RADIO OBSERVATORY in Owens Valley is well on its way to having a 130-foot, fully steerable dish antenna to complement its two 90-foot antennas. The dish framework was hoisted (above) and its 65-foot pedestal was wheeled under it (below) on July 17. A month later a National Science Foundation advisory panel for large radio astronomy facilities recommended that seven additional 130-foot antennas be built as soon as possible at the Caltech observatory. These eight could be linked electronically in a phased array, becoming, through interferometry, the equivalent of a much larger dish—with very sharp resolving abilities—than would be possible to build. Cost of this first 130-foot radio telescope is \$1,650,000; it is being funded by the National Science Foundation.



Industry Group Supporting Earthquake Research Meets

Earthquake Research Affiliates, founded in 1967 by Caltech to help support the Institute's earthquake studies in geology and engineering, held its first conference on May 18. About 90 guests of Caltech and representatives of member corporations—there are now 14, each contributing a minimum of \$2,500 a year—heard Caltech faculty summarize current work in: seismic hazards as related to geology, micro-earthquakes and earthquake mechanisms,

earthquake prediction, measurement of destructive ground motion, dynamic tests of structures, and earthquake behavior of soils and foundations.

ERA evolved from a small group of corporations that had been providing support on an informal basis for earthquake studies over the past 14 years. Membership privileges are also extended to the 48 member companies of Caltech's Industrial Associates.

Pass-Fail Gets Mixed Reactions, But Hurray for That Ski-Jump-Shaped Letter Grading Curve!

Continued from page 1

tem with Dr. Eells, a few freshmen have admitted to being badly shaken at the thought of having to go through their first college year without the supporting structure of grades. However, some of these particular students also concluded that the pass-fail situation brought their weaknesses into focus for them, and that they learned to develop more self-discipline and to realize that the work itself could be as motivating as the "reward" of high grades.

Jürg Waser, who has been running the freshman chemistry course since 1958, feels grades do provide a valuable stimulus and is not sure that the freshman pass-fail system is a complete success. "Ideally," he says, "a person should work for the love of it, but these are very young people, and I don't know if we're doing right by them by not having a set of grades. I would like to see some sort of freshman grading—possibly pass-fail the first term, grades the second and third."

William Wood, assistant professor of biology, conducted his own experiment in a class of 15 juniors last year. He set up the first term traditionally, with periodic examinations and a stiff final. He conducted the second term as a seminar. He told the students there would be no tests—only a few problem sets and a paper.

He found that some of the students who got poor grades under the first system did much better under the less rigid second-term system. On the contrary, some of his best first-term students fretted under the loose structure of the second term and voiced the wish that it could have been like the first.

But, in spite of the problems associated with giving letter grades, most undergraduates are able to keep up the level of achievement that brought them to Caltech originally. Of the grades given to sophomores, juniors, and seniors in the second quarter of 1966-67, about 32 percent were A's, 39 percent were B's, and only 18 percent were C's. Failures, conditionals, and incompletes accounted for only about 2 percent. However, a whopping 8 percent of the freshman grades were failures.

Robert Langmuir, professor of electrical

engineering, does not consider grades too important among the seniors he teaches. "By then they've made their decisions about getting good grades or not, and those who are going on to graduate school are in the right working patterns. The only time I think about grades *per se* is when I occasionally have a class that goes into a slump. Then some D's liberally sprinkled in the right places act as a good prod."

Robert Woodbury, assistant professor of history, thinks the freshman pass-fail system is good for the faculty. "One of the worries of faculty members is that if there are no grades to use as leverage, there's no pressure to exert on the student. I think pass-fail forces a faculty member to make his course justifiable to the student."

Tom Apostol, professor of mathematics, is not satisfied with either the letter grade system with its plus and minus designations and resulting grade point average OR pass-fail used for freshmen.

"The first gives more information than is needed, and tends to place too much emphasis on grade point accumulation. The second does not convey enough information and tends to encourage mediocrity among the students," he declares.

He would like to see both the letter-grade and pass-fail systems replaced in most courses by a three-valued system: *Honors*, *Pass*, and *Fail*, with no accompanying GPA. Under this method Institute requirements for graduation would fall into two broad categories: (1) passing a certain specified minimum number of courses and (2) satisfying special requirements assigned by an option to majors in that field. Hopefully, he says, the second requirement would emphasize independent work by a student, rather than grade points.

There is no question that many students at Caltech and elsewhere attach importance to grades as a means of barter for getting into a chosen graduate school or the better job. However, this is one element that the students hoped to remedy when they suggested the extension of pass-fail grading. They feel that the opportunity to investigate a course that one finds interesting and that may well broaden one's education should not bring grade point penalties if it doesn't happen to work out.

Class of '71 Reaches for Destiny's Elusive Hand

Another school year is about to begin, and 196 young men—the Caltech class of '71—are eagerly awaiting reel one of *The College Education*. Each will react to his new surroundings in a way he will think is unique, but for every one there are alumni ready to retort: "That's exactly how I felt."

As usual, the freshmen come in all sizes and from all parts of the country. The shortest is 5'6, the tallest is 6'5. There is a sprinkling of sixteen-year-olds. Two are fifteen. One looks ten. One is named Carl Anderson. There's a Mark Hopkins in the crowd, and a Barry and a Terry Fitzgerald (who aren't related.)

As usual, too, National Merit finalists and semi-finalists are in the majority. There may be an exceptionally large number of proficient musicians and chess players.

Admissions committee members agree that the incomers' high school science projects grow more sophisticated every year. Rocketry and electronics are the most popular. One young man might have invented the first truly soft landing; he devised a rocket that could come back

to earth without cracking its cargo of fresh eggs. Another trained "mousetro-nauts" who came through their miniature space trips with no apparent ill effects.

Telescopes, built single-handedly, turned up frequently, and their owners proudly submitted snapshots showing proof of near-professional work. Some designed computers. Those who were financially able to went ahead and built them. One of the Caltech interviewers reported that he didn't understand the computer built by a certain boy, but he was impressed. The boy was also building a magnetic core memory.

One student—obviously pointing for Caltech—had repeated the famous Millikan oil drop experiment, which determined the charge on the electron. Many have built radio transmitters and received amateur radio licenses at early ages.

One incoming freshman states flatly that he expects to become the world's greatest physicist. Another said he could hardly wait to go out for football at Caltech "because up to now, I was never good enough to get on a team."

Manton Barnes, '21, Composer of Alma Mater, Dies

A Caltech alumnus whose campus innovations grew into traditions died at his home in Palo Alto on August 9 at the age of 73.

Manton M. Barnes, '21, composed the official Caltech alma mater, "Hail to C.I.T." He was also the manager of the first *Big T*, the undergraduates' yearbook, and he founded *The Hot Rivet*, originally a once-a-year campus humor magazine. The name is still given to the last yearly edition of the student newspaper.

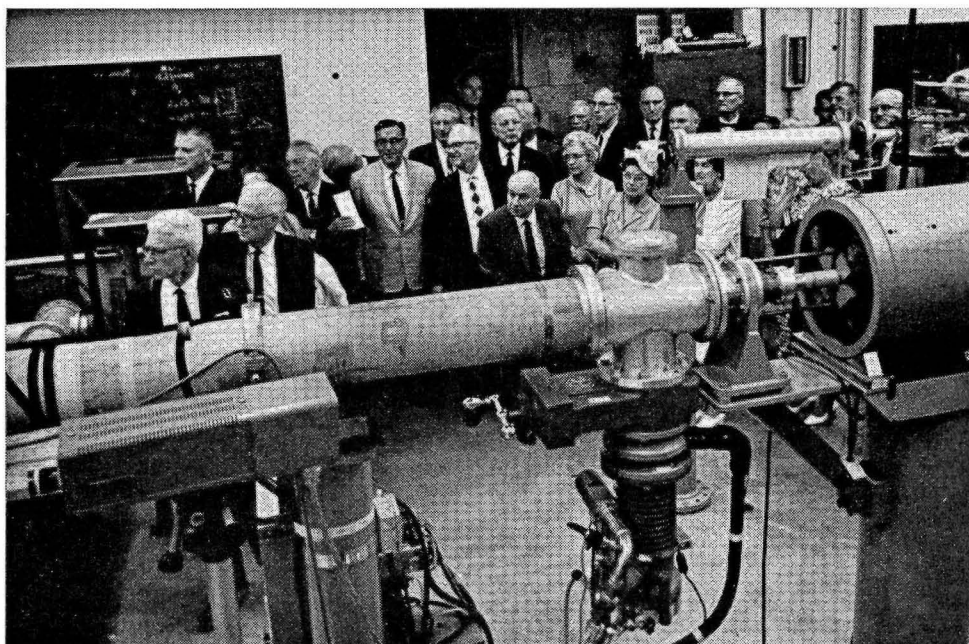
Barnes wrote the alma mater in the fall of 1919 when Caltech was still Throop College of Technology. He was a professional musician at the time, playing with Paul Whiteman and other well-known

band leaders to pay college expenses.

After receiving an engineering degree he went to work for the Pacific Telephone and Telegraph Company in Southern California. He moved to San Francisco when he was appointed to the California Public Utilities Commission. When he retired from PT & T in 1959 he was head of the depreciation department.

Barnes was well known in Palo Alto as the founder and leader of "The Haywire Orchestra," a string instrumental group much in demand which celebrated its 30th birthday last year.

He is survived by two sons, William B. Barnes of San Rafael, and Stanley M. Barnes, '49, of Corcoran, who was a Caltech student body president.



REUNION CLASSES back on campus on June 6 get a grand tour that includes a stop at the tandem accelerator (above). One of the most interested alumni was Kirk Dyer (below), who came all the way from Cromwell, Conn., for a reunion of the class of '02. He and classmate James Gaylord (who is in a convalescent home in Pasadena) are Caltech's oldest graduates—and both got advanced degrees in engineering from MIT in 1907. The third member of '02, Maude Nicholson, died several years ago.

Class of '32--Affluent, Republican 'Old Goats'--Reunite

Although one classmate wrote from Ohio that he would rather remember "all you old goats the way you were," 29 of his friends in the class of '32 showed up in Pasadena for their 35th reunion on June 6. Howard Finney, class secretary, who conducted a mail poll (48 replies) for the further edification of the class, sent the results on to *Caltech News*. Included among the queries:

How many different companies worked for since graduation?	5.1
How closely does present employment match undergraduate major?	
Same field	30%
Closely related field	40%
Remotely related field	17%
Unrelated field	13%
What was your approximate gross income during the first year after leaving school?	\$1,400
What is your present gross income?	\$29,620
What was your political conviction on graduation?	
Republican	71%
Democrat	13%
Other	8%
None	8%

What is political conviction now?

Republican	88%
Democrat	8%
None	4%

Astronomer Gets His Wish: A Closer Look at the Heavens

Robert A. Parker, PhD '63, an astronomer at the University of Wisconsin, has become Caltech astronaut number five. He was selected in August as one of eleven new NASA scientist-astronauts, joining space veteran Frank Borman, MS '57, and three other scientists picked in 1965: engineer Edward G. Gibson, PhD '64; physicist F. Curtis Michael, PhD '62; and geologist Harrison Schmitt, '57. The total number of NASA astronauts is now 56; of those, 16 are scientist-astronauts.

Caltech will also be represented in the Air Force's Manned Orbiting Laboratory (MOL) by Charles Gordon Fullerton, '57, MS '58, who was chosen in 1966 as an aerospace research pilot. There are now 16 men in that program.

New Alumni Books

Intermediate Algebra for College Students, Thurman S. Peterson, '27. Harper & Row, N.Y., ed. 3, 1967. \$7.50.

Waves & Messages, John R. Pierce, '33, PhD '36. Doubleday & Co., Inc., N. Y., 1967. \$1.25.

Principles of Underwater Sound for Engineers, Robert J. Urick, MS '39, McGraw-Hill, N. Y., September 1967. \$15.00.

Design and Construction of Concrete Shell Roofs, G. S. Ramaswamy, MS '47, CE '48. McGraw-Hill, N. Y., 1968. \$25.00.

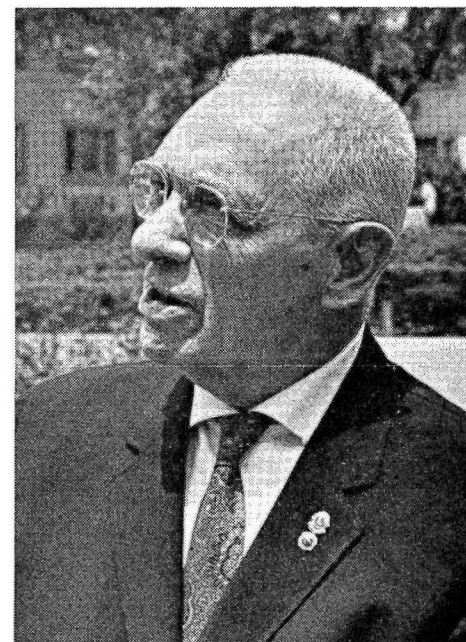
Fundamentals of Vibrations, Roger A. Anderson, '48, PhD '53. Macmillan, N. Y., 1967. \$11.95. Macmillan series on mechanical engineering.

Radiation Dosimetry, vol. 2, Instrumentation, Frank H. Attix and William C. Roesch, PhD '49, eds. Academic Press, N. Y., ed. 2, 1966. \$20.

Direct Energy Conversion, George W. Sutton, MS '53, PhD '55, ed. McGraw-Hill, N. Y., 1967, \$14.50. Volume III in McGraw-Hill's Inter-University Electronics Series.

Advances in Magnetic Resonance, Vol 2, John S. Waugh, PhD '53. Academic Press, N. Y., 1966. \$12.00.

Machining of Plastics, Akira Kobayashi, MS '59. McGraw-Hill, N. Y., 1967. \$16.00.



PERSONALS

1922

ALBERT D. HALL and his wife have moved to Salt Lake City, Utah, with their three adopted grandchildren. Hall retired from Pacific Telephone in Los Angeles in 1962 and writes he now plans to spend full time on his hobby, alchemical research.

HOWARD G. VESPER has retired as director and vice president of Standard Oil Company of California in San Francisco, after 45 years with the company. He will continue his activities as a trustee of Caltech and also as a presidential appointee to the General Advisory Committee to the Atomic Energy Commission in Washington, D.C.

1923

WILLARD E. BAIER retired in August as director of the research and development division of Sun-kist Growers, a citrus marketing cooperative in Los Angeles. He had been with them 44 years.

1924

WILLIAM L. HOLLADAY, chair-

man of the board of Holladay, Eggett and Horn of Los Angeles, is president-elect of the American Society of Heating, Refrigerating and Air Conditioning Engineers.

DAVID WOLOCHOW retired in April as secretary of the Canadian Government Specifications Board and as director of the specifications and standards branch of the Department of Defense Production. He is now a consultant to the Department of Defense Production.

1927

R. CARTER BLANKENBURG, director of underground research and development for the Southern California Edison Company, has been appointed general chairman for the 1969 IEEE Conference on Underground Distribution to be held in Anaheim, Calif.

EDWARD M. BROWDER JR. is a project engineer with Parsons, Brinckerhoff, Quade & Douglas, working on a segment of the San Francisco Rapid Transit System. Prior to this he spent 34 years in the Canal Zone as a structural engineer and assistant director of engineering

and construction for The Panama Canal Company.

G. C. COFFEE is president of Cycle Imports, Inc., a business he formed in 1958 to import motorcycles from Czechoslovakia to sell to dealers in the western states.

CHARLES LEWIS GAZIN, MS '28, PhD '30, is the curator of vertebrate paleontology and acting chairman of the department of paleontology at the Smithsonian Institution in Washington, D. C.

MASON A. LOGAN is a supervisor at the Bell Telephone Laboratories in New Jersey, where, for the last eight years, he has been responsible for the design and development of four-phase data sets, instruments that transmit digital data over telephone lines. Logan and his wife are building a home in Sun City Center, Fla., where they plan to retire this winter.

GEORGE E. MOORE is professor of physics at the State University of New York in Binghamton, a position he accepted after retiring as research physicist from the Bell Telephone Laboratories in New Jersey in 1966.

1928

MARTIN E. NORDBERG, PhD, is the recipient of the first Eugene C. Sullivan Award, given by the Corning Section of the American Chemical Society. The award recognizes

outstanding achievement in research, industry, teaching, or service to this section of the society.

1929

GIFFORD E. McCASLAND, PhD, research professor of chemistry at the University of San Francisco Institute of Chemical Biology, has been awarded a research grant by the United States Public Health Service for studies of sulfur-containing sugars.

EDWARD C. SANDBERG, MS, has retired, after nearly 23 years of service, from the Atlantic Richfield Company. He was senior estimator for the company's northern California district, headquartered in Bakersfield, Calif.

WILLIAM G. YOUNG, PhD, vice-chancellor of UCLA, has been named winner of the American Chemical Society's 1967 Priestly Medal, one of the highest honors for an American chemist.

1930

MICHAEL M. SILVERMAN died in April in Los Angeles after a long illness. He is survived by his wife and a daughter.

1931

PERRY M. BOOTHE, MS '32, a captain in the U.S. Navy, has been awarded the Legion of Merit medal

for outstanding service in Vietnam, where he served on General William Westmoreland's staff. Boothe is now serving as assistant commander for contracts for the Naval Facilities Engineering Command in Washington, D.C.

1932

ROLAND C. ROSS, MS, retired as professor emeritus from California State College at Los Angeles in June. Ross, who has been professor of nature study at Cal State since 1950, was formerly supervisor of nature study for the Los Angeles elementary schools and was co-founder of the U.S. National Park Naturalist Service at Yosemite, Calif.

MERIT P. WHITE, MS, PhD '35, commonwealth head of civil engineering at the University of Massachusetts in Amherst, has been elected a fellow of the American Society of Mechanical Engineers. This honor is conferred upon engineers who have 25 years of active practice and at least 13 years as a member of the society.

1933

RAYMOND C. BINDER, MS, PhD '36, professor of mechanical engineering at the University of Southern California in Los Angeles, has been elected a fellow of the American Society of Mechanical Engineers.

PERSONALS

1935

WILLIAM B. McLEAN, MS '37, PhD '39, has been named commander of the Naval Undersea Warfare Center in Pasadena, Calif. Prior to this he was technical director of the naval facility at China Lake, Calif.

JACK M. ROEHM, MS, director of building and construction market planning for the Reynolds Metals Company in Richmond, Va., has been named chairman of the Aluminum Association's Building Industry Committee.

1937

HOLLAWAY H. FROST, senior technologist for the Mobil Oil Field Research Laboratories, died in January in Dallas, Texas. He is survived by his wife and two sons; one—Martin—has just finished his second year at Caltech.

1939

EDGAR A. AIME, MS, died in September, 1966, in Winchester, Va.

JOHN W. BLACK, vice president of Hughes Aircraft Company in Culver City, Calif., has returned with his wife and two sons from a one-year cruise in the South Pacific aboard his ketch, the Alegria.

1940

ERNEST W. SILVERTOOTH has been appointed head of the electrical and optical department, sensing and information systems subdivision, in the electronics division of Aerospace Corporation in El Segundo, Calif.

GEORGE J. TODD, MS '41, has been appointed assistant to the operations general manager of Aerospace Corporation's technical operations in El Segundo, Calif. Todd came to Aerospace from TRW Systems in 1961 and served as staff engineer in the systems planning division until he accepted this new position.

1941

RICHARD W. BELL, AE, PhD '58, chairman of the department of aeronautics at the Naval Postgraduate School in Monterey, Calif., is on a one-year leave of absence at the scientific branch of the Office of Naval Research in London, England.

JOSEPH WEISS has been appointed district sales manager for ITT Cannon Electric, a division of the International Telephone and Telegraph Corporation. He will direct and coordinate sales and marketing operations for the company's district sales office in Los Angeles.

1942

WOLFGANG PANOFSKY, PhD, director of the Stanford Linear Accelerator Center at Stanford University, is the recipient of the 1967 California Scientist of the Year Award. The award, presented for "profound accomplishment" in science during the year, is sponsored by the California Museum of Science and Industry in Los Angeles.

CHARLES M. SEIBEL, MS '43, is working in the engineering department of the Bell Helicopter Company in Fort Worth, Texas, developing new prototype aircraft.

1943

SAMUEL L. ABBOT JR., MS, president of the S. L. Abbot Co., died in June in San Francisco.

REDGNAID D. BUSHELL, MS, has been appointed eastern regional manager of the petroleum chemicals division of the Ethyl Corporation of New York. He was previously sales manager for the eastern region and has been with the company since 1938.

SAMUEL P. MORGAN, MS '44, PhD '47, has been promoted to director of the Computing Science Research Center at the Bell Telephone Laboratories in Murray Hill, N. J. Morgan joined the Bell Laboratories in 1947 and has been head of the mathematical physics department since 1959.

1945

OTIS E. LANCASTER, AE, George Washington professor of engineering education at The Pennsylvania State University in University Park, has been named associate dean for instruction in the college of engineering.

1946

SAMUEL T. MARTNER, MS, PhD '49, division geophysicist for the Pan American Petroleum Corporation's Denver, Colo., division, has been appointed assistant chief geophysicist in Tulsa, Okla. He will coordinate technical aspects of the company's geophysical programs.

GEORGE M. PALMER, MS, AE '47, professor of aeronautics at Purdue University in Indiana, is the recipient of the School of Aeronautics' 1967 Outstanding Professor Award. Palmer has been on the Purdue faculty since 1947.

1947

PRABHAT K. BHATTACHARYA, MS, PhD '50, died in May in Kharagpur, India. He was professor of geology and geophysics at the Indian Institute of Technology at Kharagpur.

ELMER E. HALL JR., MS, senior civil engineer for the Pacific Gas and Electric Company in San Francisco, has been appointed manager of PG&E's Land Department, where he will manage property owned by PG&E in northern and central California and will oversee the company's public recreation program and plant site and rights-of-way acquisitions.

ADRIAN PAUW, MS, PhD '52, professor of civil engineering at the University of Missouri in Columbia, has been appointed acting dean of the college of engineering.

RICHARD D. YOUNG, MS, PhD '52, recently joined the staff of TRACOR, Inc. as assistant director of the information systems programs department in Sherman Oaks, Calif. He was formerly senior staff engineer of systems engineering at Informatics, Inc., in Sherman Oaks.

1948

HARVEY H. LATSON JR., MS, a colonel in the U.S. Air Force, has received the U.S. Air Force Commendation Medal for meritorious service while assigned to Wright-Patterson AFB, Ohio. He is now assigned to Headquarters, Seventh Air Force, Tan Son Nhut, Vietnam, as deputy for civil engineering.

1949

ROBERT SCHWARZ JR., ID, has been appointed to the new post of corporate vice president of product research and development of Bec-

ton, Dickenson and Company in Rutherford, N. J. Formerly vice president of the special products division, he has been with the company since 1959.

1950

HENRY A. CORRIHER JR., MS, has been appointed principal research engineer for the Engineering Experiment Station at the Georgia Institute of Technology in Atlanta. He was formerly senior research engineer at the station.

ROBERT L. NELSON, MS, PhD '52, assistant chief geophysicist for the Pan American Petroleum Corporation in Tulsa, Okla., has been appointed to the newly created position of exploration systems manager. He will be responsible for manned and electronic information systems in the exploration department.

1951

PETER L. AUER, PhD, has been appointed professor of aerospace engineering at Cornell University in Ithaca, N. Y. He was formerly deputy director for ballistic defense, Advanced Research Project Agency of the Department of Defense in Washington, D. C.

1952

EDWIN B. KURTZ JR., PhD, is now professor of biological sciences at the University of Arizona at Tucson. For the past two years he has been assistant director in charge of teacher education for the elementary school science project of the American Association for the Advancement of Science in Washington, D.C.

GILBERT E. STEGALL, MS, has received a Department of Commerce Bronze Medal for "exceptional leadership and technical direction in the administration of climatological programs at the National Weather Records Center" (Ashville, N. C.), where he is head of the climatic operations branch. The medal is the highest award given an employee by the agency.

1953

LEVI A. BROWN, MS, a lieutenant colonel in the U.S. Army, graduated from the Army War College in Carlisle Barracks, Pa., in June. He was one of 205 civilian and military men selected to attend the ten-month course, designed to prepare men for top-level armed service or government positions.

JAMES T. LaTOURRETTE has accepted a position in the electrophysics department of the Polytechnic Institute of Brooklyn's Long Island Graduate Center in Farmingdale.

WILLIAM M. SMITH JR., MS, has recently opened an architectural engineering firm, Nichols, Ostrander and Smith, in Covina, Calif.

1954

ROGER M. GOLDEN, MS '55 PhD '59, has left the Bell Telephone Laboratories in New Jersey to return with his wife and two daughters to California, where he has joined the communication sciences research department of Autonetics in Anaheim.

ROBERT M. RUFVOLD, MS, a lieutenant colonel in the U. S. Army, after completing a ten-month course at the Air War College, Maxwell AFB, Ala., has been reassigned to the office of the Army Engineer, U. S. Army, Vietnam.

DAVID H. SMITH, MS, a colonel in the U. S. Army, completed his ten-month course at the Army War College in Carlisle Barracks, Pa., in June.

1956

DAVID B. BROOKS, MS, has been appointed chief of the division of economic analysis in the Bureau of Mines of the U. S. Department of the Interior. He has been associated with Resources for the Future, a non-profit research foundation in Washington, D. C., for the past five years, except for a year's leave of absence (1966-67) which he spent as assistant professor of economics at Berea College, Berea, Ky.

EASTMAN N. HATCH, PhD, has been appointed assistant dean of the graduate college at Iowa State University in Ames. A member of the faculty since 1961, he will continue to serve as professor of physics and as senior physicist in the Ames Atomic Energy Commission Laboratory at Iowa State.

1957

DONALD T. MEYER has completed a year's postdoctorate study at Duke University in Durham, N. C., and has accepted a position as assistant professor at Haile Selassie I University in Addis Ababa, Ethiopia.

1958

ROBERT L. BLAKELEY and his wife are living in Brisbane, Australia, where he is continuing his research in biochemistry at Queensland University. Blakeley, who went to Australia in 1965 as a postdoctoral fellow from the National Institutes of Health in Washington, D. C., is being supported by a research fellowship from the Wellcome Trust of London.

NORMAN T. ELLETT has been elected a consulting principal in the Los Angeles office of Fry Consultants Incorporated, a management consulting firm. Before joining Fry in 1964, Ellett served as assistant to the president of Hoffman Electronics Corporation in El Monte, Calif.

JOSEPH M. KIERNAN JR., MS, a lieutenant colonel in the U.S. Army, was killed in Vietnam in June. He is survived by his wife, Marianne.

EDWIN M. PERRIN, MS, has been appointed an economic evaluator for the Dow Chemical Company in Midland, Mich. He will be working on research and development projects.

1959

PHILIP D. HARRIMAN, with the help of an American Cancer Society postdoctoral fellowship, is working at the Cold Spring Harbor Laboratory of Quantitative Biology in Long Island, N. Y.

HOMER L. SMITH, AE, a commander in the U. S. Navy, has been reported captured in Vietnam.

JON A. WRIGHT has been appointed assistant professor of physics at the University of Illinois in Urbana. He has been a lecturer and research physicist at the University of California at San Diego for the last two years.

1960

MEREDITH B. MITCHELL received his PhD in psychology in June from the Claremont Graduate School and the University Center in Claremont, Calif.

JOHN W. PORTER, MS, PhD '63, has joined TRACOR, Inc. in Austin, Texas, as a consultant in aerospace engineering. He was formerly assistant professor of aerospace engineering at the University of Texas in Austin.

PETER R. RONY and his wife write to announce the birth of a son, Glenn David, in June. They are living in St. Louis, Mo., where Rony is with the Catalysis Research Center at the Monsanto Co.

1961

SIDNEY LEIBOVICH is now assistant professor of mechanical engineering at Cornell University in Ithaca, N. Y. He has just returned from University College in London, where he was doing research as a NATO postdoctoral fellow.

KENNETH W. WOOD, MS, an engineer at the Shell Development Company's Emeryville, Calif., research center, has been appointed an engineering supervisor in the process engineering department.

1962

GARY SCOTT FRALEY, PhD '67, has joined the staff of the Los Alamos Scientific Laboratory in New Mexico in the theoretical division.

ROGER E. MESSICK, PhD, has been appointed associate professor of mathematics at the University of Cincinnati in Ohio. He has been assistant professor of mathematics at the Case Institute of Technology in Cleveland since 1963.

CHARLES F. STEBBINS, MS, AE '63, a captain in the U. S. Air Force, received his PhD in aerospace engineering sciences in June from the University of Colorado at Boulder. Captain Stebbins is on active duty and is currently assistant professor of aeronautics and special assistant to the dean of the U. S. Air Force Academy in Colorado Springs.

FREDERICK W. WEINGARTEN is working as assistant program director for the National Science Foundation in Washington, D. C., dealing with NSF grants for the development of university computer facilities. He was formerly with the Lawrence Radiation Laboratory in Berkeley, Calif.

1963

DAVID W. HALL, PhD, is working as a postdoctoral research fellow in chemistry at the University of British Columbia in Vancouver. He was formerly an advanced research chemist with the Marathon Oil Company in Denver, Colo.

RICHARD E. PARKS, AE, a lieutenant commander in the U. S. Navy, was killed in April when a Navy jet bomber in which he was flying crashed near Alturas, Calif., during a snowstorm. He is survived by his wife and three children.

ROBERT W. SCHMIEDER, who is working on his PhD at Columbia University in New York, writes to announce the birth of his second child, a boy, in April.

1964

RAUL HUSID, MS, PhD '67, professor of engineering at the University of Chile in Santiago, married Tamar Wise in June in North Hollywood, Calif.

1965

RAJESHWAR MALHOTRA, PhD, writes that he married Neena Trehan in New Delhi, India, in December, 1965, and that he has recently accepted a position as technical director for American Universal Electric, Ltd., in New Delhi.

1966

STEVEN P. ELLIOTT married Lydia Robb in June and is now a graduate student at the University of Chicago.