CALTECH DE STALL MARE TO NEWS

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National Academy of Sciences' President Seitz addresses Caltech's 1968 graduates.

Seitz: Scientists Must Sing for Their Suppers

Scientists who see the current cutbacks in public support of scientific research as a temporary byproduct of spending prioritigs for the Vietnam War may be deluding themselves, warned Frederick Seitz, president of the National Academy of Sciences, at Caltech's 74th annual commencement on June 7. While admitting that some of the rollback may be attributable to the war, he said, "I am inclined to believe that the greater part originates in widespread concern that our Iscience's1 interest in the welfare of society is much too subordinate to our special professional interests."

Seitz, who is president-elect of Rockefeller University, called on his fellow scientists to "strive as actively and eloquently as we can to reemphasize to our fellow citizens that our work actually is in the public interest in the short as well as the long range."

Seitz said he agreed with most scientists in placing "the conceptual revolution made possible by science above its contribution to technology. We can never afford to forget, however, that society as a whole

Hornig: Scientists Better Recognize Society's Woes

The combination of scientists' self-importance and society's short-sightedness has created a crisis for science that may spell hard times for Caltech and its sister institutions, according to Donald Hornig, President Johnson's Science Advisor.

Speaking at a dinner celebrating the dedication of the A. A. Noyes Laboratory of Chemical Physics on May 7, chemist Hornig said, "After two decades of adventurous progress, the Congress and the public ask whether we can afford it after all. We find ourselves pulling back from the exploration of space, slowing down on *Continued on page 14* has its own good reasons for inverting this order of priorities.

"In the main, the academic scientific community has been supported at a relatively high level in the postwar years, both to provide it with a reward in recognition of its unusual services in World War II and to encourage the quite explicit expectation that university scientists would join in helping with the more immediate needs of society."

Until the early part of the last century, Seitz said, the idea that science had practical value was "a concept of faith held by only a few inspired individuals over the centuries. The fact that these individuals proved to be right is a miraculous and wonderful thing, comparable in its way to the achievements of those individuals of earlier human history who had the faith to believe that mankind could gain by learning to control fire or by domesticating animals or plants. We who are gathered today know that the technological fruits of science have only begun to be gathered, if indeed we have the courage to persevere in advancing the dream."



Presidential Science Advisor Donald Hornig

There Is a Santa Claus; Students Funded for Summer Smog Study

The ASCIT Research Project has received an air pollution survey grant of \$68,250 from the U.S. Department of Health, Education, and Welfare. The grant, from HEW's National Center for Air Pollution Control, will finance work by some 60 students at Caltech this summer.

According to Charles D. Yaffe, chief of the center's Control Agency Development Program, the grant is to catalog sources, effects, and reactions of air pollutants; to measure the costs of air pollution damage; and to determine the costs of controlling air pollution.

In commenting on the grant, Yaffe said: "We are pleased to see students addressing their energies and imaginations constructively to such public issues as air pollution control.

"In the process of conducting this project, they may not only demonstrate some fresh approaches to certain aspects of the air pollution problem, but they will be better prepared in the future to understand and deal with some of the important problems of modern society."

The grant was awarded on the basis of an 87-page proposal submitted by project executive director Mike Garet, '69; student body president Joe Rhodes, '69; and student body secretary Larry Shirley, '69. The proposal came out of six months of pilot studies conducted by the Caltech students [*Caltech News*, April 1968].

The proposal states that "no mathemati-

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Institute, After Studying Problems of Drugs on Campus, Adopts Regulations to Minimize Them

To prevent misunderstanding and to spell out Caltech policies regarding illegal drugs, the Institute has issued a book, *Drugs and the Caltech Student*, to all students and faculty. It is based on a report made to President DuBridge by a facultyadministration-student committee, whose chairman was Kenneth Eells, Institute psychologist.

The book was commissioned by Dr. DuBridge after the Caltech Board of Trustees decided on March 4, 1968, that:

"The Institute cannot and does not condone the illegal use, manufacture, or selling of drugs by students and expects Caltech students to have the intelligence and sense of responsibility to refrain from actions which may be damaging to themselves, or to others, or to the Institute, or which are contrary to the law whether or not the student agrees with the law.

"The Board of Trustees recognizes that the problems of disciplinary action are an administrative responsibility, and charges the administration with the responsibility of cooperating with faculty and students in developing and enforcing proper codes and regulations, and in specifying penalties for violation. The administration will also continue to carry out appropriate educational and health-counseling services to assist students in understanding the problem."

^oPrepared by Dr. Eells; Paul Eaton, dean of students and associate professor of English; Robert Huttenback, master of student houses, professor of history, and chairman of the faculty committee on student health; James Knowles, professor of applied mechanics and chairman of the faculty committee on graduate student relations; Robert Woodbury, assistant professor of history and chairman of the faculty committee on undergraduate student relations; Chris Dede, '69; Len Erickson, '68; and Les Fishbone, '68. In addition to enumerating Institute policies and the consequences of violations of them, the drug book discusses medical, psychological, and legal aspects of drug use and describes services available through the Institute Health Center should drug-use problems arise.

The following statements, from the section on "Rules and Procedures Relating to Drug Use," summarize the Institute rules now officially in force.

"The problem of substantial use of illegal and potentially dangerous drugs by more than an insignificant minority of college students is a relatively recent phenomenon, and college and student attitudes toward the problem are not always clearly

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Business and Caltech Are Discussing Their Inevitable Interaction

Higher education has a vitally important message for the business world, and Caltech has found that business leaders are more than happy to have a chance to hear and discuss it. Colleges and universities face growing financial hardship which, if not eased, will have a direct impact on the quality of the nation's educational resources. The business community, which relies on those institutions for both technological innovations and new talent, needs accurate, current information on the state of higher education to help determine what its own role should be.

To open up some hitherto infrequently travelled avenues of discussion, Caltech has organized a President's Council, currently composed of 45 business and industry executives from throughout the nation, devoted to exploring areas of mutual interest. The Council provides a format in which members are able to meet with Institute faculty and officers and with their corporate peers to discuss the interaction of higher education and business. Council meetings will be held twice a year in the principal cities of the nation, with a two-day meeting in alternate years on the Caltech campus. Initial meetings were held in New York on May 16; Los Angeles on May 20; San Antonio on June 11; San Francisco on June 24; and Chicago on June 26.

Council members have welcomed the opportunity to talk with experts about education. One reason is that they are being called upon more and more frequently to make financial commitments to educational institutions for their companies. Caltech, in turn, welcomes their participation as the opportunity to broaden the geographical constituency of "opinion leaders" who know about and are interested in Caltech.

In announcing faition of the President's Council, \mathfrak{D}^{*} . DuBridge explained, "We are attempting more energetically to extend the base of scientific knowledge, to bring science into more direct contact with local and world problems, and to educate students with a broad scientific base as well as a greater awareness of the nature of the society which they will be serving. We realize that we cannot effectively pursue these ends in isolation, so we wish to establish a more intimate and continuous discourse with the nation's leaders in technology, industry, and business."

Current members of the Council are: Lloyd M. Bentsen, Jr. Lincoln Liberty Life Insurance Company

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formulated. Because of these uncertainties, it seems desirable to try to state as explicitly as possible the present attitudes and policies of the Institute in this area.

"The Institute recognizes that there is conflicting evidence with respect to the seriousness of the medical and health hazards involved in the use of certain drugs . . . The Institute recognizes also that the use of marijuana, LSD, and all drugs listed as dangerous drugs in state and federal laws is illegal.

"As a matter of policy, the California Institute of Technology cannot condone the use by students of drugs which are illegal and which may involve substantial medical or psychological hazards to themselves or lead to interference with the rights and privileges of others . . .

"The Institute, however, is an educational institution and believes that it can help students grow in wisdom, maturity, and responsibility more through educational means than through punitive or disciplinary ones.

"It is not the Institute's responsibility to protect students from all possible actions which may be hazardous to them . . . it is assumed that most Caltech students are mature enough to assume a very considerable degree of responsibility for their own actions. It is the Institute's responsibility to make available to students accurate and reliable information on the basis of which each student can exercise his responsibility intelligently.

"Use of . . . drugs will not of itself be regarded as an act calling for Institute disciplinary action, provided Institute property is not used for illegal purposes. However, any student who, as a result of using such drugs, acts in ways which are seriously objectionable or harmful to fellow students or other individuals, or who creates serious social-problem situations as a result of such usag, will be subjected to disciplinary action on the basis of these actions.

"Any student administering LSD or an

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LSD-like drug to anyone else without the latter's knowledge, or knowingly permitting others to do so, will be subject to severe penalty, up to and including dismissal from the Institute. This is an Institute rule . . . entirely apart from any legal penalty which a student might incur . . .

Drugs and the Caltech Student: Do's, Don't's, Where and Why Not's

"There is to be *no* use of Institute property or premises for the manufacture or processing of marijuana, LSD, or any other drug whose manufacture or processing is restricted by law. Violators will be subject to severe penalties, up to and including dismissal from the Institute, and may also be reported by the Institute to appropriate law-enforcement authorities.

"By request of the Board of Control, disciplinary actions arising from drug-use actions will usually be handled through administrative disciplinary channels and not as a responsibility of the Honor System.

"Illegal drugs are not to be used on Caltech campus property, and no supplies of illegal drugs are to be taken on the Caltech campus for any purpose.

"If violations of this policy occur in the student houses and come to the attention of Institute authorities, the student involved will be required to move out of the student houses. Serious or repeated violations by any student . . . on campus property may lead to disciplinary action.

"Evidence of impairment of critical judgment from any cause may provide grounds for suspension of privileges to work in the laboratories.

"The Institute cannot interfere with legitimate law-enforcement activities even to protect its own students On the other hand, the Institute is not itself a law-enforcement agency. Legal counsel has advised that Institute authorities are not legally required to report known or suspected law violations, although they could do so if they wished.

"As a matter of policy, Institute authorities will not ordinarily take the initiative in reporting suspected drug-use or drugdistribution violations unless the circum-

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stances should make it legally incumbent upon them to do so . . . Institute authorities *will* take the initiative in notifying the police of any available information as to sale-and-distribution activities which because of their nature appear to pose major threats to the welfare of other students or of the Institute itself.

"The Institute will not knowingly cooperate in the placement of informers in the student houses. Students should be aware, however, that informers may be sent by police officials (without Institute knowledge) to student gatherings, both on and off the campus.

"Cases might arise in which legal penalties are assessed against a student for actions which do not also involve a violation of Institute rules—because, for example, they occurred outside the Institute's jurisdiction. If such a student cannot then carry out his educational activities, he may later petition the Committee on Academic Standards and Honors for readmission, and the Committee will take account of the special circumstances of each case in reaching a decision with respect to such a petition.

The book also pointed out that the Institute will undertake a broad educational program with regard to drugs on the level of genuine education, recognizing the complexities of the issues and avoiding an oversimplified, propagandistic approach.

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Physics, Astronomy, Math: Pulling the **Universe's Extremes Closer Together**

Caltech's division of physics, mathematics and astronomy is perhaps the most complex of the six academic branches. While, admittedly, theoretical physicists and mathematicians operate with a minimum of equipment, experimental physicists use accelerators at remote locations, and others must send their work aloft on space probes; astronomers, although blessed with preferred access to Mt. Wilson, Palomar, and Owens Valley Observatories, nonetheless must go long distances to do a night's work and even then may lose unrecoverable observing time if the weather is poor.

Presiding over this far-flung operation since 1962 is Carl Anderson, a member of the faculty since he took his PhD at Caltech in 1930. Dr. Anderson, who was the first Caltech alumnus to win the Nobel Prize (1936), answers some questions here about his division. This is the last in a series of six Caltech News interviews with division chairmen.

O: About half of all the undergraduates now major in your division. What problems does that large number of students create for you?

A: Well, first of all it means that our teaching load is very heavy, particularly in physics and mathematics, and many of our classes are much larger than we like them to be. In addition, many students who are majoring in other divisions take our courses and add to our teaching load; in several of our core courses over half of the students are majors from other divisions. Of course, we're glad that so many students like to study physics and mathematics, as we feel these subjects are of basic importance to all areas of science and engineering.

We're trying to be as efficient as we can in dealing with this problem. The professorial staff, though their first love is research, are also very much interested in teaching, recognize its importance, and cooperate in sharing this responsibility.

Q: Have you made any substantial changes in the curriculum or manner of instruction in the last five years?

A: About five years ago we made very substantial revisions in our undergraduate physics and mathematics curricula, having two principal ideas in mind. The first was to liberalize the program in order to give the students greater freedom in their choice of courses; the second was to introduce modern ideas at the beginning of the first year and thus provide a thorough training in both classical and modern ideas throughout the entire undergraduate course of study. For example, the freshman physics course now includes relativistic particle mechanics, scattering of radiation, kinetic theory, and black body radiation in addition to more conventional topics. One half of the sophomore year is devoted to a study of quantum mechanics. We are now engaged in a substantial revision of both our undergraduate and graduate instructional programs to take effect the next academic year.

Q: What are the major areas of research in the division today?

A: They can be classified as follows. We have a strong program in experimental and theoretical work in high-energy or



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A large activity is under way in experimental and theoretical work in astrophysics, covering a very broad base, in which there is a strong collaboration between the astronomy and physics staffs. This activity is carried out in conjunction with the Palomar and Mount Wilson Observatories, the Owens Valley Radio Observatory, the nuclear physics facilities in the Kellogg Laboratory, and other facilities for solar and infrared and gamma-ray astronomy. The program ranges from work on the very far away objects such as other galaxies and quasi-stellar objects to pulsars, and studies of our own planets and the sun. We also have a strong activity in studies of the interplanetary medium, particles, fields, plasmas, and cosmic rays.

In addition, we have major programs in nuclear spectroscopy, nuclear interactions, Mössbauer experiments, and experimental and theoretical work on those nuclear reactions active in stars in their various stages of evolution.

There is very live and active work in cosmology and the application of general relativity to cosmological problems.

We also are active in solid-state and low-temperature physics, a program which we hope to strengthen in the near future. It isn't possible to list everything we do, but these are the major programs in physics and astronomy.

In mathematics, research projects are under way in algebra, analysis in various forms, combinatorial analysis, probability, and topology. The mathematics staff is working with a strong staff in applied mathematics, a program which bridges this division and the engineering and applied science division.

Q: With the completion of the new physics labs, what will happen to Sloan, Bridge, and Kellogg Laboratories?

A: When the new building is completed, the first floor of Sloan will be vacated by the physicists who now occupy it and turned over to the mathematicians to provide them with much needed additional space.

The Bridge Laboratory will experience a large decrease in population and will undergo a major rehabilitation to bring this 45-year-old structure up to modern standards and to provide facilities for future research in physics.

Photo by J. R. Eyerman

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The Kellogg Laboratory activities, which are now extremely overcrowded, will occupy some space in Bridge. Our future plans also call for a new building to provide additional space for the Kellogg research program, but this will have to await the availability of new funds to make this possible. A new astronomy building is now in its early planning stage.

Q: What are your plans for the future? In what areas do you want to strengthen your activities?

A: Historically Caltech has been a small institution, and I believe most of us here now would like to see it remain small. Even if it is to remain small, it must, of course, change. Historically, Caltech has chosen a limited number of objectives, but has tried, and quite successfully, to be outstanding in the way it has carried out these objectives. This is still our philosophy. We propose to do all we can to strengthen those programs in which we are now engaged and to expand our effort in a limited number of fields in which we do not now have sufficient strength.

Solid-state physics is such an area which we plan to strengthen in the very near future. We do not look forward to a large activity, but to an excellent and active program in a limited area of solid-state physics. Much work in solid-state physics is presently under way in some other divisions of Caltech, and we hope to coordinate our activity with theirs and to strengthen the whole effort of the Institute in this very important field.

Of course we're continually considering, through both formal and informal discussion, possible new fields of activity, evaluating their intrinsic importance and their relevance to Caltech's over-all program.

Q: Do you see a tying-up of the looser ends in particle physics, or are we heading into a jungle of more and more subatomic particles?

A: The problem of understanding the laws that govern the properties and interactions of the subatomic particles of physics is probably the most fundamental and difficult problem in the whole field of physical science today. The particle problem is intimately related to the problem of understanding the forces between neutrons and protons in the nucleus of an atom. The existence of the nuclear-force problem was well recognized over 30 years ago, and it has been intensively studied, both experimentally and theoretically, ever since, but so far has not been satisfactorily solved. One cannot predict how or when the nuclear force/particle problem will be solved. It almost certainly will require the development of new mathematical techniques as well as new formulations in terms of the physical aspects of the problems. It will probably come as a series of steps, but perhaps a single very fundamental breakthrough may serve to clarify the whole problem. This field of physics can truly be called the high road of physics research today.

Q: Do you think it's becoming more difficult to relate work in physics to laymen?

A: Yes, if for no other reason than the increasing complexities of modern-day research. To popularize science in the sense of providing for the laymen an understanding and appreciation of the true essence of science-the elucidation of nature's laws -and of the motivations behind scientific work-to discover and understand nature's laws-would be extremely valuable to our society. Too many laymen believe that the main goal of scientific research is only to provide better TV sets, faster airplanes, and other technological advances. Technological advances often follow scientific discovery but are not the main aim of scientific research, only incidental to it.

All scientists should make a greater effort to help the layman understand the true spirit of science. This is all the more necessary today when the support of scientific research, much of it very expensive indeed, comes in large measure from public funds.

Historian Will Peruse a

12th Century Conscience

An unusual 12th century man with a modern tendency toward introversion and guilt is the subject of an extensive study being made by John Benton, Caltech associate professor of history.

The American Philosophical Society has awarded him a grant to study in France this summer the works of an obscure monk named Guibert of Nogent-the first medieval European to write fully of his own childhood.

What makes Guibert significant, Dr. Benton says, is that in early medieval Europe, life's emphasis was on honor rather than conscience. But Guibert's autobiography reveals an unusual childhood for those times, in which his neurotic mother nourished his conscience into hyperactivity. The candor of Guibert's revelations, Dr. Benton believes, can show a 20th century historian exactly how and why the child is father to the man.

Dr. Benton says that medievalists are just beginning to reevaluate medieval personalities in the light of modern insights from psychology and anthropology.

"Until recently," he declares, "medievalists have paid little attention to childhood experiences and training, which contribute so greatly to the formation of personality. Even now, many rarely discuss how or why their subjects developed into typical or unusual people, even when the materials for such investigations are readily available."

Dr. Benton maintains that, as more scholars become interested in this littletreated area, much more material on childhood in the Middle Ages will be analyzed, and new concepts of medieval personalities will emerge. П

Carl Anderson

Undergrads, Critical of Campus Environment, Suggest Changes in Policies and Facilities

When Master of Student Houses Robert Huttenback sent seven undergraduates off to survey campus housing at eight other universities in the spring of 1967, he expected some constructive suggestions for improvement in housing at Caltech. Those he got, as reported in *Caltech News* in November 1967. All seven suggested that somehow the accommodations in the student houses should be made more homey, less institutional.

But in an equally fascinating part of those reports-which have just been printed and distributed on campus by Dr. Huttenback's office-the students, to a man, took the occasion to enumerate their pet criticisms of undergraduate life at Caltech. Inevitably, the reports contain some biased-and even purposely exaggeratedobservations, as well as incendiary accusations. They provide plenty of room for argument, if not outright indignation. Nonetheless, the viewpoints expressed are valuable as a reflection of student attitudes, because, accurate or not, they are the honest impressions of seven representative students. Following are edited excerpts of particular interest; count to ten and dig in.

Terry Bruns, '68 Ruddock House

Increase the total number of students to about 1,000, of which the added 300 will all be humanities majors They would provide an infusion of new ideas, of enthusiasm, of interest among the students. A group of humanities students would increase personal communication. The student houses should help break down the barriers between students and promote personal contact; I think the presence of the humanities majors within the house would do just that.

Make Caltech coed. It would promote a much healthier attitude toward the opposite sex among the Caltech males. The prevailing attitude now is rather unhealthy and unreal.

Make the houses more of a place for living than studying. The student should have the house as a place where he can relax and let off steam, or at least have some area in the house where it is easy to do so.

Require students to live on campus; then they would put far more effort into making the house system work than the students living on campus now do. Further, the student who is now living off campus is precisely the student who would make the houses worth living in—that is, the most dynamic and well-rounded students and the leaders are far too often those who move off campus because they find the atmosphere too sterile to satisfy them or broaden their experience.

Make the houses seem more like apartments than square cement-block boxes.

If any new houses are ever built, they should definitely be on some sort of suite system . . . The addition of carpeting and

One of the things which most significantly makes Caltech life "unreal" is the absence of women. soundproofing to the present houses would be very helpful.

I would like to see a three-day grace period just before finals in which there would be no classes.

Chris Dede, '69 Ricketts House

Although the science professors are generally well satisfied with the performance of the students academically, the professors in all non-science fields are generally disgusted, and with some reason. In the average English class, attendance is below 50 percent of enrollment, most of the reading is either ignored or done with Cliff Notes, and the term paper is either ground out in one night or a leftover theme from high school.

The student houses manage to combine all the disadvantages of a dormitory and a fraternity. Over 70 percent of all student leaders live off campus, and with good reason. The initiation and rotation system had to be dropped last fall due to abuse, the noise violations have caused concern even up to the Provost's Office, and most professors regard eating lunch in the houses as equivalent to spending one hour in hell.

Despite the pronouncements of belief in a well-rounded education by the administration and the well-publicized efforts made to give the undergraduate knowledge in fields other than science, the fact is that it is extremely difficult for many students to take *any* elective courses outside of science above the 120-unit humanities requirement.

To be blunt, the administration has done and is doing damn little. To illustrate how far it is out of touch, let me refer you to the July 1967 edition of *Caltech News*. There President DuBridge in speaking of "Caltech's Future" quoted Professor Kaplan Ia YMCA Leader of Americal on Caltech students: ". . . the most intellectually mature undergraduates I've ever known . . . they have a fanatic desire to develop their human side, are less interested in discussions of the nature of science than in talking about God, morals, art, or beauty."

This is, of course, in diametric opposition to my conception of the typical undergraduate. I will not disagree with Professor Kaplan about the undergraduates he met; quite probably those who were motivated to come to see him were as he described them-but they were only 70 or so "enlightened" students out of the 700 undergraduates. I respect them very much, but one out ten is a rather poor average . . . Twenty or so of those 70 will transfer out, and most of the rest live off campus. Then where is your enlightened student body? If you still don't believe me, come around to the student houses any time, any day, and see if you can find a mess of discussion on morals, art, or beauty."

The deplorable condition of the student houses is caused to a great extent by the attitude of the Business Office, which has the brilliant conception that the student houses should be self-supporting.

We should admit more humanitiesoriented people. We have admitted people talented in humanities, but not necessarily interested in humanities. Let us admit some students who are the counterparts of Caltech students: strong in science, but primarily interested in humanities.

The student houses-problems beneath the red tile roofs.

All faculty should be required as part of their duties to eat lunch once a week in the student houses. This would promote student-faculty relations such as we boast of having. I do not feel that it would be cruel and unusual punishment.

I have seen only three things affect the "typical" Tech student enough to help him. One is falling in love; one is helping someone in desperate trouble; and the third is sensitivity training. Falling in love is a difficult activity to support-the best policy is to attend as many house social events as possible. Helping someone in desperate trouble is easily arranged through the Caltech YMCA, which sponsors many programs funneling students to help in the Pasadena ghetto at Westside Study Center. Sensitivity training conferences are periodically held by the Caltech Y. All three have empirically affected Caltech for the better.

William Hocker, '70 Blacker House

Major house improvements should be made at Caltech, but these changes do not stand in place of basic consideration of Caltech life and improvements of a more vital nature. The best course of action would be to actually make Caltech more like that glowing, paradisical place in *Facts About Caltech* to which students thought they were coming.

I recommend that first an attitude of openness be taken by all, so that students do not feel that they are considered intruders in a scientific Institute.

I favor admission of people in the humanities who have also a definite interest in science.

One of the things which most significantly makes Caltech life "unreal" is the absence of women on campus. From the limited presence of women and from the nature of the social contacts, many Caltech students develop a distorted view of women which fails to regard them as real human beings.

Create an alley system that allows groups of people to form around common interests and to live together in an alley physically designed to promote personal interaction. Socially, an alley would approach a suite. The most noticeable change Scientists are largely incompetent at deciding what they themselves enjoy or consider beautiful.

in physical improvements would be the inclusion of a living area in each alley.

Form a coalition of the "old houses" and the "new houses," with each coalition having its own large lounge. The lounge must really offer something, like interesting reading, exhibits, walk-in seminars, and popular faculty, in order to attract students so that it does not go unused like the common rooms of Harvard and Yale.

Greg Lutz, Ex '69 Dabney House

In my opinion, scientists lack esthetic sensibility in a very broad sense. By this I mean ability to appreciate anything other than truth, scientific inquiry, rigor, and logical structures. They are largely incompetent at deciding what they themselves enjoy or consider beautiful.

The general method of scientific education at Caltech is this: Expose the students very early to every important concept they will need, not expecting them to understand much at first. Then, in later courses, give them second and third chances to understand the same ideas. Eventually they will have a pretty thorough understanding of everything they have studied.

The trouble with this system is that it leaves underclassmen in a state of severe frustration and with doubts that most of science is within their ability to understand at all. It is clear to me that this system spawns a tremendous amount of escapist activity. Consider the student who is faced in several of his courses with subject matter he cannot grasp. Studying becomes an unbearable effort for him. But since his academic education is his most important concern, he cannot justify mak

A significant easing of option requirements could do a lot to improve school attitude.

ing commitments to productive extracurricular activities while leaving his course work unfinished. He must instead find refuge in activities which require essentially no commitment.

At Caltech, off-campus living is preferable to on-campus. I suggest that Caltech stop worrying about the deterioration of the houses and start converting them (leaving some for freshmen and dependent sophomores) into offices, laboratories, or student centers. The Institute could then help us find off-campus quarters, or even go so far as to build a few complexes of Harvard-like suites. If Pasadena landlords can make money off us while charging less than the houses, why couldn't the Institute at least come near breaking even in a similar endeavor?

Pursuant to my observations at Yale, Swarthmore, and in general, I believe this college suffers from its shortage of humanities majors and absence of girls.

Dennis Schneringer, Ex '69 Page House

A complaint often registered by students moving off campus is the noise in the houses. Rugs in the hallways tend to muffle noise, decrease rowdiness, and, as a bonus, add a little beauty to the houses. Much more important, at least in the new houses, is insulation of the wall between the rooms. It is a little disturbing to have only a "paper" barrier between you and your neighbor.

Do away with all the red tape involved in eating in another house. There's no reason why a student should have to plan ahead to eat in another house.

Just in case new undergrad houses are built some day, I would like to offer a suggestion as to their general layout. A suite system offers more luxury at no extra cost and provides the student with something besides a bedroom for entertaining.

Many quotes from Yale . . . reinforce my opinion that the opportunity to meet girls as human beings is a vital part of every male's life. The only opportunity a Techer has to meet a girl is as a date, a conquest, someone with whom to play the sophistication game.

James Woodhead, '68

Lloyd House

My first inclination after visiting Harvard, Yale, Bowdoin, and Rice was to suggest that the Institute tear down the undergraduate houses and start all over again.

A phenomenon we could call the-grassis-greener syndrome made it hard at times to distinguish between what was better at the other schools and what was merely different. It also made life at Caltech seem unbearable in comparison with that at the other schools. Only time and a little retrospection made it clear to me that life at Caltech is not so intolerable at all.

The suite system of room arrangement puts the more reticent (along with the more gregarious) students into living groups of generally four to six people. A student is not allowed to withdraw from all social contact so easily—whether through shyness or lack of social grace—as he is if he lives alone in a single. Yet when someone has to study or really wants to be alone, he can leave the group and go into his small bedroom. There is a strong anti-intellectual atmosphere in the student houses which tends to suppress any free flow of ideas. Those who bring up philosophical ideas outside of humanities class are often ridiculed by others.

A number of non-resident associates could be chosen by each house. The presence of a few faculty members or graduate students at lunches or dinners in each house may help break down the anti-intellectualism barrier.

Over half the people in the world are female, and the *de facto* denial of their existence by Caltech does nothing to help the Tech student cope with that ubiquitous female animal after he leaves here.

Maybe too much forced exposure to science can make it seem like drudgery even to the student who loves it. Maybe the regimentation of tightly structured option requirements makes science appear to be a narrow field to the freshman or sophomore who is transferring out. A significant easing of option requirements, not just an easing of freshmen requirements, could do a lot to improve school attitude.

Richard Wright, Ex '69 Fleming House

The financial situation of the Caltech houses suggests that something is wrong with their financial setup. After all, it is strange to find that four student houses built in 1930, housing a total of 230 students and receiving an annual income from the students alone of more than a quarter of a million dollars, are purportedly *losing* money every year; it is strange especially when one considers that apartments which provide much better facilities and furniture can be lived in much more economically and yet still provide enough profit to their owners to induce investors to build block after block of them in Pasadena.

There's a morale problem at Caltech. It seems to students that the administration does not really care about the students' lives. It often seems that the students are merely tolerated because great schools are supposed to have the smartest young men in the country as their undergraduates.

Caltech should be a university, not a multimillion dollar laboratory.

Some argue that the houses are bad places to live because the best students move out and desert the houses. I'm afraid cause and effect are getting a little mixed up. The students move off because the houses are bad places to live in to begin with. The argument goes further: "If the students have to live in the houses, they'll try to improve things." That's just the point. Many of the students who move off were officers in their houses for at least a year. They became officers with every hope of finally improving the atmosphere of the houses. But the harder they tried and the deeper they dug into the causes, the clearer they saw that it is virtually impossible to effect any significant changes.

Caltech should be a university, not a multimillion dollar laboratory.

Nothing short of having girls on campus would help. And that is, in essence, the conclusion that I have reached after many stages of thought . . . It'll cost money, but not as much as some believe. And you can't expect to kill dragons with pins.

But Graduate Students Are Less Inclined to Grouse, More Anxious to Get on With the Job

Based on the frequency of verbal sniping that takes place between undergraduates and graduate students (The phrase "grad student" is sure to draw a dour look and sour comment from the undergrad, and grad students are inclined to look on undergrads as a bunch of kids.), there appears to be a significant difference in life styles of the two groups. The major differences are probably that the graduate student's academic interests tend to be better defined and more serious, his social life is less institutionalized and more mature, and his background is more varied.

After reading the rather aggressive undergraduate opinions on the left, the reader may find that the following three sketches of graduate students reflect lives somewhat more in equilibrium with the Caltech environment.

It is doubtful if many grad students are as pleasured by Caltech as Wayne Pfeiffer is. But then he has his own reasons.

For one who started kindergarten at four, graduated from high school at fifteen, and entered college too young to drive a car or get a summer job other than mowing lawns, graduate school has been an era of personal emancipation.

According to Dr. Jerome Shapiro, his advisor in nuclear engineering, Wayne might have been fielding his PhD about now, at the age of 21, if he weren't able to do many things well.

When Wayne applied to Caltech, he had not made up his mind what direction of study to take. "All I know," he told the Graduate Office, "is that I want to work in some area where a lot of imagination is required—one with vast regions of unexplored territory."

He wanted to try astronomy, but the astronomy faculty felt his physics background was not strong enough. He turned to mathematics and switched to applied math before deciding math wasn't his piece of pi.

He believes his final decision on his area, and with whom he wanted to work, has been successful because of his exploratory first year. That year was exciting for several reasons. Because of his age, he had lived at home during his college years at Wichita University from which he graduated *magna cum laude* in three years. A Pfeiffer parental belief is that all things worth having involve work, and that it is not too much to expect their five children to perform reasonable chores to learn this.

Although Wayne concurs, he also admits to the excitement of bouncing onto a campus such as Caltech at 19 with nothing to do but explore the academic riches.

Personable and gregarious, he poked around and met all kinds of faculty and fellow grad students. His settling on nuclear engineering in the group headed by Drs. Harold Lurie, Noel Corngold, and Shapiro was a felicitous combination of interest in the work and rapport with the individuals involved.

They are working on neutron transport how neutrons penetrate matter. They hope the problems they attack will eventually feed back to the area of nuclear reactors and contribute to creating better ones.

For diversion Wayne likes to work out numbers and game theories and to analyze, by computer, complex games like chess and bridge.

Because he is athletic and likes outdoor sports, he was an instant convert to California weather, smog and all. He'd like to become a permanent Southern Californian.

The first graduate year at Caltech is "atypical and awful," declares third-year biology student Jack Griffith, who did his undergraduate work at Occidental College.

"It's generally miscrable," he says, "because the student comes from a school not quite so tough as Caltech; he's often thinking of changing fields; he's deficient in some areas; and he's trying to adjust to about 15 things at once."

Jack describes Caltech and the surrounding community as giant pigeon lofts "with each student like a pigeon flying from his hole in Pasadena to the hole he occupies on the campus—without ever contacting any of the other pigeons doing the same thing."

"The key to being reasonably contented is to get out and make off-campus friends, which also takes a bit of doing and a bit of luck."

The married students, he says, at least have each other and tend to socialize with *Continued on page 12*



Graduate students Jack Griffith, Jeanette Asay, and Wayne Pfeiffer.

NEW ALUMNI BOOKS

Life Science Research and Lunar Medicine. Proceedings of the Second Lunar International Laboratory Symposium, Madrid, October 1966, Frank J. Malina, PhD '40, Ed, Pergammon, N. Y., 1967, \$10.00.

Teleoperators and Human Augmentation, Edwin G. Johnsen, '43, and William R. Corliss. U. S. Government Printing Office, Washington, D.C., 1967. \$1.00.

The Year 2000. A Framework for Speculation on the Next Thirty-three Years, Herman Kahn, MS '47, and Anthony J. Wiener. Macmillan, N. Y., 1967. \$9.95. Engineering Fluid Mechanics, John E.

Plapp, PhD '57. Prentice-Hall, Inc., N. J., 1968. \$11.95.

Principles of Stellar Evolution and Nucleosynthesis, Donald D. Clayton, PhD '62, McGraw-Hill, N. J., 1968. \$18.50.

tiveness of British pressure, (3) the economic support of Rhodesia by South Africa, (4) the relative lack of guerrilla activity between Zambia and Rhodesia, and (5) the development of larger-scale paramilitary operations in northern Mozambique.

But, according to Caltech professor of geography Edwin Munger, who has been instrumental in the success of the four PMEs, prediction is not a primary goal of the game. It is possible though, he says, for the game to suggest a potential line of action that had not occurred to students of the real world situation.

Perhaps even more important is the chance that the players have of seeing the effect on the outcome of their own personalities as they operate under pressure of time and with incomplete information. \Box



Caltech's political-military exercise is verging on becoming an institution. After four consecutive years of role-playing in national and world affairs, the campus participants have honed it to the point where a weekend of synthetic crises turns out to be a pretty accurate microcosm of the way things work in this world.

The 1968 game, sponsored again by the Caltech YMCA, was played on April 12 and 13 in Dabney Hall of the Humanities. Sequestered in offices and classrooms throughout the building were the governments of countries, insurgent military groups, international commissions, pressure groups, and, to keep things running smoothly and realistically, the omnipotent and omniscient control boards (one international and one United States domestic) through which all actions were channeled.

The PME is simple in concept and tremendously complicated in execution. An organizing committee (headed this year by Barry Lieberman, '68) chooses a "crisis area" in which the game action is expected to be concentrated. Participants in the game are assigned appropriate roles in advance, such as president or prime minister, military leader, labor official, and anyone else who wields influence in important affairs. They are also given a reading list to prepare them for their specific tasks.

While the players are boning up for their jobs over spring vacation, the organizing committee writes a scenario of fictitious—but plausible—events that move the time of the game from the present to about a year hence. That scenario, revealed at the start of the game, at least minimizes the possibility of a team planning in advance a series of adroit maneuvers based on the current world situation, and gets the game off to a semblance of an orderly start.

The impressive volume of information generated in the game (12,000 messages this year, including deliberate and incidental rumors, some of which had robust lives lasting through much of the action) would provide a rich and true-to-life trove for a historian to try to sort out. Recapitulation of all the events in the game is nearly impossible. However, it did appear that, with the beneficent aid of the major powers, the Middle East ended the game somewhat closer to a stable peace than there was initially.

Tom Carroll, '71, writing in the California Tech on April 18, reported that: "Everyone got into the action: Israel, Syria, the UAR, Jordan, Iraq, the USA, Communist China, and myriad other forces . . . the USSR and the United States became increasingly friendly and mutually cooperative as the 'year' wore on, and this helped make finding a solution in the Middle East a lot easier. The United Kingdom offered a wise peace plan, while the United Nations, although active, had little really constructive effect. The Arab forces most likely would have defeated a spirited Israel if they had united instead of bickering among themselves . . . The Palestine Liberation Army and the Kurdish forces also played major roles in stirring uprising. All ended in relative peace, however, as Hussein regained his position as King of Jordan.

"Other topics were equally stirring. Students in Poland revolted and, as a result, liberal Poles took over the country and set up a well-received new government. The United States agreed on peace talks with Hanoi held in Geneva to the consternation of President Thieu and the South Vietnamese government. The CIA remained generally obnoxious throughout the day, probably because the control boards kept it that way. Rumania lost a ship in the Mediterranean, which raised a minor stir, while the Soviets were gleefully celebrating Kosygin's birthday with the launching of a 300-ton 'mystery' satellite purported to have been capable of detecting US. Polaris submarines while they were under water."

Role-playing of this nature is widespread and becoming big business these days; organizations like the State Department have been using the technique to give insight to its personnel for quite a while. Nonetheless, the Caltech version, more the product of evolution than design, has been exciting and valuable enough to attract special attention in the last few years. The 1967 game, which dealt primarily with a crisis in southern Africa, became the model for a manual prepared by Caltech for the U.S. Office of Education under a \$5,000 grant. The manual will help other organizations to set up PMEs to meet their own needs, which can range from as large a scale framework as Caltech's to an exercise in urban problems or even a specific group's workings. 1A limited number of the manuals are available to interested alumni; send requests to Caltech News.]

It is tempting to consider the PME as a way of "predicting" what course future events might take. Indeed, Caltech's first PME in 1965 anticipated: (1) Rhodesian unilateral independence, (2) the ineffec-



ASCIT president Joe Rhodes, '69, assumes the role of President of the United States. More than 100 people took part in the 1968 PME.



Dave Lewin, '70, as editor Harrison Salisbury, broadcasts the news.



One of many messengers (high school student Kathy Sinsheimer, daughter of biologist Robert Sinsheimer) delivers a communique.

The government of France (Neil Wright, '68; Mark Noble, '71; and Lou Felder, '68) confers during one of the five two-hour game periods.





Harrison Brown, as Premier Kosygin, is the counterpart of Joe Rhodes

Visiting Mid-East expert Ned Bayne on control board duty.



A Caltech News supplement on

Sensitivity Training At Caltech

O wad some Pow'r the giftie gie us To see oursels as ithers see us!

Caltech's John Weir, associate professor of psychology, estimates that before graduation six out of ten Caltech students will have had sensitivity training experience. "I'm sure," he says, "that's a much higher proportion than in any other college or university in the country."

In spite of this impressive proportion, the number of faculty and students actually committed is small. Those who have become involved in it have created an impact on the campus much larger than their number.

The phrase *sensitivity training* is bandied about loosely by laymen to refer to a training technique also called a human relations laboratory, b a s i c encounter group, or T- (for training) group.

The whole movement evolved out of conferences held in New England in the mid-forties by some educational groups and social behaviorists. They were looking for a common framework that would help certain personnel in industry, government, and education to improve their relationships with one another. It was felt that this would require certain basic human relationship skills that could be identified, analyzed, and practiced.

Since that time, the practice of groups participating in what has come to be known as sensitivity training has steadily permeated various segments of our national existence: government agencies (including the Los Angeles Police Department), industry, religion, and education.

Whatever you may choose to call it, it is still a surprisingly misunderstood subject among many who have not experienced it—and among a few who have. It is not psychotherapy, or a new type of fun-and-games with sexual overtones, or a gussied-up version of the old confessiontype revival meeting.

Reduced to its simplest terms, it has become a process designed to help a person gain insight into himself and into the way he functions with and appears to others. It attempts to, and often does, increase his openness to other people, ideas, and points of view.

John Weir has been the prime mover in the T-group principle at Caltech. He used the method as the basis for his first Pl 7 class (Human relations: an introduction to the principles and practices of interpersonal relationships) back in 1955, and for his Pl 6 class (*The psychology of behavioral processes and personality development*), which he started in 1958.

In the last two years, he added Pl 8 (*The principles and practices of personal growth*), a three-term course of lectures, laboratory, and readings which contribute toward a self-analysis of the student's experience within an unstructured group.

The class meets weekly for two-hour sessions, or several sessions may be combined into an all-day meeting or a 15- to 20-hour marathon session. The group may be "all talk" or it may include, as many T-groups do these days, body expression exercises, behavioral improvisation, graphic expression such as finger painting or work with clay, and other nonverbal means of expression. Each student keeps a diary of his own personal growth experiences and insights and writes a term paper based on it.

The frequent presence on campus of psychologist Carl Rogers, starting in 1964 and lasting for almost three years, also was responsible for much of the T-group activity at Caltech today.

Rogers is widely known as the psychologist who pioneered the concept of client-centered therapy, which is concerned with man's behavior in human relationships and in which client and counselor share in bringing about the client's personal growth.

In 1963, when Rogers moved from the Middle West to the staff of the Western Behavioral Sciences Institute in La Jolla, Robert Bacher, Caltech provost, began thinking about the advantages of inviting him to Caltech to discuss some of the Institute's forehead wrinklers.

Both Bacher and Weir knew him well and held him in high regard. Rogers was already well known at Caltech, having been one of the YMCA's Leaders of America in 1960, and he was a friend of several members of the faculty and administration.

"Now that he was in La Jolla," Bacher says, "I thought we had a rare opportunity to get him to come here and discuss with us what we might possibly do in many

The frequent presence on campus of psychologist Carl Rogers, starting in 1964, also was responsible for much of the T-group activity at Caltech. areas at the Institute. We could pose some real questions to him."

One of Caltech's basic problems at the time, as Bacher saw it, was how the Institute should approach the whole matter of behavioral studies and the social sciences, as well as the more clinical aspects of psychology.

This particular matter had already been a well-tossed-around bean bag. Going back about ten years, several faculty committees had been appointed to study the area, but nothing bore fruit.

Charles Newton, assistant to Dr. Du-Bridge and lecturer in English, joined the board of WBSI shortly after Carl Rogers first came there.

"I believe," says Newton, "that Dr. Bacher viewed Carl's coming here as a definite aid in helping us understand one another. And I'm sure Carl hoped to establish the T-group approach. He had always wanted to use this technique as a way of introducing change in education."

Early in 1964 Rogers started coming to Caltech two days a month, meeting with a wide range of faculty members in what came to be known as the "Honker Group." Besides the question of behavioral studies, "there were many other things I wanted Carl to explore with us," Bacher says. "I wanted his reactions on the range of faculty views pertaining to education, and the attitudes and frame of mind of the undergraduate. People around here have such widely different views on this!"

But the Caltech faculty as a whole evidently did not provide the elements for what Rogers may have had in mind. Although the meetings of the Honker group went on for two years and were succeeded by two other groups—Rogers' Rangers and the Far Out Group—eventually, Newton reminisces, "the whole thing petered out."

He says that occasionally the group members would dip into a little basic communication with each other, "but there was very little feedback and there was always backing off."

The drop-off was considerable. Some, including Weir and Newton, strongly felt that too many looked upon any hint of sensitivity training techniques as something to back away from personally.

"I don't think they did it for personal reasons," contends Richard Dean, professor of mathematics, who was a group

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Caltech psychologist John Weir teaches in a modified "experimental classroom" designed to reduce the formality inherent in the traditional teacher-student relationship.

Sensitivity Continued

member. "Many, including me, felt it just wasn't going to do anything for us in that particular framework."

Bacher agrees that the range of feelings about the venture was diverse but is inclined to feel that the positives outweighed the negatives.

"I think it provided a very interesting background for the discussion of problems. Carl is a stimulating person. Of course, some people only wanted to talk about *their* interests. Others were quite upset by the types of rambling discussions that went on."

He also cites the fact that it was in the Honker group that discussions first started which culminated in the later adoption of the freshman pass-fail system.

"At the end of the meetings," Newton says, "Wes Hershey lexecutive secretary of the Caltech YMCA1 and I agreed that any kind of sensitivity training activity such as Carl had probably h o p e d for would never get off the ground among the faculty. We felt that if it was ever going to, it would have to be among the students."

The start of sensitivity training in an extracurricular vein among the students came at the Y's annual Scripps-Caltech conference in the spring of 1965. There had been some feeling among Weir, Hershey, and most of the Y student leaders that the traditional format of the conferences had just about run its course.

"At the old conferences," Weir says, "the students would all sit around on bunk beds where half couldn't see the other half—and argue far into the night.

"I felt that after they had experienced some T-groups they'd come away a lot more excited than they would over just the plain old discussion groups."

He told the Y student leaders that he would plan a weekend for them if he could do it exactly the way he wanted. The students would come just as participants. They agreed.

The theme of the ensuing Caltech-Scripps conference (April 1965) was Creativity. It was led by Weir, Carl Rogers, and Sheperd Insul, a psychologist from San Francisco State College, and combined sensitivity training with sessions of graphics—finger painting, collage-making, and chalk drawing—and body expression. The latter was conducted by John's wife, Joyce, an early exponent of this type of nonverbal expression.

Joyce Weir has long been involved in the dynamics of dance. However, it was only when she started attending T-group conferences with her husband that she was constantly struck by one thing: Most people, while talking, were unaware of the feelings they were communicating bodily. Also, the two often did not tally.

She started experimenting with ways by which people in T-groups could become aware of their bodies, and of the fact that body expression is closely allied with a person's mental and emotional state.

At the old conferences the students would sit around on bunk beds where half couldn't see the other half and argue far into the night. Those at the Caltech-Scripps conference discovered that Joyce Weir's sessions which use experiences in what could be called, loosely, free-form dance, exercises, and conversations about reactions engendered by the activity—were releasing and relaxing. So have a variety of other people, because since that time she has developed an almost full-time schedule of conducting such sessions for professional people, students, nurses, educators, etc., in all parts of the United States and some of Canada.

Weir put on that conference with money from a grant from the Hill Family Foundation of Minneapolis. He had received it "to explore the scientific method and creativity" at Caltech.

The Creativity conference made the impact he had hoped for. The predominant student reaction was one of excitement in discovering that one could safely

Many had experiences in successfully encountering a fellow human for the first time, and this tended to put them up on Cloud 9.

risk personal openness in an atmosphere of mutual support and trust, and that there were ways of expressing oneself besides verbally.

The Firestone Boy Scout Training Center, a large and attractive conference site in the hills south of Pomona, was the scene of this conference and has been the site of several others since. Out of these conferences the YMCA promoted a continuing round of campus T-groups, with girls winnowed from Pasadena City College, Scripps, Pacific Oaks, Pitzer, and anywhere else an interested Caltech student might find a likely female participant.

Loneliness is part of the human predicament in varying degree. Kenneth Eells, Institute psychologist, is in a position to know just how strong it is in many Caltech students. He believes deeply in the benefits of campus encounter groups.

He started his first one in the summer of 1966. It was composed mainly of students who had been at the Firestone conference that Easter weekend.

By the end of 1967 he had three groups going. In the summer of 1967 the groups included a married couples group made up of Caltech graduate students and their wives.

"The rewarding thing about all this is," he says, "that there isn't a campus group now that doesn't have a waiting list."

At this point in the development of sensitivity training at Caltech, things were a bit raggedy. It seemed to be a hard thing for most students to take a reasonable attitude about. Many had experiences in successfully encountering a fellow human for the first time, and this tended to put them up on Cloud 9. The euphoria was so heady that they frantically tried to organize more weekends as soon as possible so that they could keep up on the cloud. There was little application of the new experiences to the grubby day-to-day existence. They waited for the emotional "kicks" of the next encounter. A few were turned off completely or were frightened by the emotions the experience gave rise to.

Wherever sensitivity training courses are found, leaders encounter a person here and there who mistakenly looks upon a T-



John Weir's ebullience gives a lift to the YMCA's 1966 Caltech-Scripps Conference.

group as a therapy session for his personal problems. Caltech was no exception. These students were subtly sifted out and steered to actual therapy by the campus professionals.

John Weir brings up the fact that until recently very few student body officers have ever been involved in campus sensitivity training.

"The students who tend to go to these things—they're the kind that have the same concerns for humanity that the Y has are involved in the Y activities. And you also get the fellows that are concerned with their personal relationships. Some ASCIT officers have tended to be more rational, logical, dedicated to their studies. It's a question of different sets of values, rather than personality or needs."

Quite a few faculty used to go to the old Caltech-Scripps conferences. As these have swung over to more of the T-group format, fewer of the faculty have involved themselves.

However, the effects of sensitivity training and the values it represents have strongly affected some faculty members. These are the men who would like to teach with a more group-centered approach and feel, with Carl Rogers, that there is merit in moving away from the classic authoritarian teacher vs. student approach. They feel a need for experiencing their students as individuals, for developing the students capable of doing creative work.

Richard Dean was the first to take the plunge.

"The summer after being in one of the Rogers groups, we had a reevaluation meeting," he said. "I was pretty negative about the whole thing, and I decided I'd read some of Rogers' books so I'd know what he was really saying, and then I'd really be able to make a case.

"When I read what he had written, especially as it applied to education, I thought there were some very good ideas there. I began to see a lot in the meetings I hadn't seen at the time."

What especially impressed Dean were Rogers' accounts of the amount of stimulation students got from student-centered

The effects of sensitivity training and the values it represents have strongly affected some faculty members. Dean threw the whole responsibility of the course onto the students. It's a toss-up who was the more panicky at first.

classes and the degree of spontaneity that occurred—the fact that they would talk about the class outside.

"I'd just come back from a year at the Institute for Defense Analyses at Princeton where I'd been working with other mathematicians, and it had been an exciting time, because we had been examining interesting conjectures in an informal way, and arguing, and after a session we'd all be limp. On the basis of my own experience and what I read in Rogers' books, I wanted to capture some of that kind of excitement in my own classes."

In his Ma 5 (Introduction to abstract algebra) class in 1966-67, Dean threw the whole responsibility of the course onto the students. It's a toss-up who was the more panicky at first.

"I said I wasn't going to dictate what they should study, and we'd talk about whatever they wanted to talk about. Of course the first question they raised was how they'd be graded. They decided to take a midterm and a final."

On exam questions asked of all Ma 5 sections, Dean's class had slightly lower scores. The experience of this first class prompted him to to make a few changes. "This year they had to read and report on a math article, do some creative math, and the take the final."

Dean describes the two schools of thought at Caltech, as he sees them.

"Most people feel there is a hard core of central knowledge everybody's got to have and that this takes up every minute of every class. If you don't structure things, you're not going to teach everything they should know. I guess I tend to disagree."

He doesn't think the classic system nurtures a student's potential for independent work, and there is less chance for him to find out if he is really as interested in the subject as he may think.

"It seems to me that when a student goes to a lecture, no matter how good or popular the lecturer, he goes to it as a sort of entertainment. If the student isn't entertained, he feels cheated, and he feels it's the teacher's responsibility to bring him the knowledge. I found that the things I would never have thought to lecture on were major stumbling blocks. As a lecturer I would have guessed wrong about what they could understand.

"What the admissions committee tries to do, in getting freshmen, is to screen them for imagination and creativity. I claim that once they get here we do precious little to encourage it, at least through the first couple of years."

Dean has liked many features of this new way of teaching in spite of the admitted drawbacks.

"I found out that the things I never would have thought to lecture on were major stumbling blocks, and in the free-wheeling class discussions the kids were willing to fight about these things and bring them out in the open. As a lecturer I would have guessed wrong about what they could and couldn't understand."

He has despaired to Weir because his Math 5 sections have been slightly below the others in grades.

"Weir says, 'Is this really the only criterion you want?' I can't answer this. But I do want self-startedness, and to increase the opportunity to do creative math, and I think I have. Several have done creative work on their own I wouldn't have dared assign."

Dean thinks things would work much better for him if he had more skills as a facilitator in dealing with individual students. He declares that in order to run this kind of student-oriented non-authoritarian classroom you have to have these skills, because you're going to see the students as people.

"Last year John Weir worked closely with me in what we did, even to attending the classes—so he was always there to hold my hand and deal with any personality problems that cropped up.

"Personalities evolve, and I feel my greatest drawback this year was being unable to cope with some of the 'personalities' I had." He has tried the T-group method in graduate student classes and found it a delight. "The best class I ever had was a small

The best class I ever had was a small graduate course in ring theory. The discussion topics were selected by the students, who also volunteered to present the relevant material as they saw the need for it. This seminar was a great improvement over traditional styles where students make reports according to a carefully structured schedule. Having chosen their topics, my students had a vested interest in seeing them prosper. Everybody was completely involved."

Chemistry division chairman George Hammond, and Robert Edgar, professor of biology, are two whose ideas of new teaching methods seem to have grown out of their personal experiences in sensitivity training groups.

With John Weir's help, Edgar marshalled all of his Biology 1 teaching assistants early last fall, and in a series of T-group-type meetings they threshed out their ideas of how Bi 1 should be taught. The result was a variety of teaching methods and a variety of reactions on the part of the students.

Some students disliked the lack of structure and felt they got little out of their course. On the other hand, a few were motivated to an enviable pitch of self-startership, and they reported at the end of the course that having to investigate on their own had brought them rewards they had not expected.

In addition, says Edgar, "a lot developed out of the meetings of the TA group —among the TA's themselves. There's a lot of talk about continuing to meet together and do other things.

"The whole business," he says, "was very exciting, and I'm looking forward to doing it again next year—except that what I want to do is to have being a TA a voluntary thing and have it clear before they volunteer that part of it is going to include a weekend encounter. Now we

Some students disliked the lack of structure and felt they got little out of their course. Edgar feels deeply that the unstructured, sensitivity training type of approach is the right way to go in teaching methodology.

realize that we should have included it this year. In the middle of the course, we did have one session when we were sort of floundering. It was at my house and it went from three until midnight. The first half was about the relationships that had developed between people, and the last was talking about the course.

"Everybody felt he would have been more involved, excited, and creative if we could have opened the channels of communications much earlier."

Edgar feels deeply that the unstructured, sensitivity training type of approach is the right way to go in teaching methodology. "But," he adds, "it gets to be a very personal thing, and it can be very disturbing, so a lot of people aren't going to want to try it."

He finds, at this point, that he gets extremely discouraged with his "seeming inability to relate to my students in a meaningful way."

Edgar sees this as a tremendous gap and stresses the point that of course he wouldn't see the gap if he were conducting a regular kind of course where he and his students didn't confront each other. "I'd just get up and lecture, give exams, get 'em back, grade 'em. Everything looks all right that way, but when you really talk to the students and find out how they think about things, and how fuzzy they are and timid and fearful-really lacking in the ability to grapple with thingsthen it gets very discouraging. You tend to say 'The hell with it!' and go back to making it formal and artificial and lacking in human reatlionships. If you go the other way, you open up a Pandora's box."

George Hammond says he has felt for a long time that good communication with students is an important part of teaching. But since he has had some sensitivity training experience himself, he says he is doing more thinking about the possible methods of establishing good communication. He feels it is time for the university and college system in general to move away from its paternalistic pattern, but he realizes this will be easier said than done. "Both sides—students and faculty have a strong emotional desire to maintain it. For my own part, I'm fed up to here with it."

He would like to see student-faculty mixed sensitivity groups, "but only if the students are willing to make an effort. I'm not going to go to a sensitivity group with the notion that I'm there to serve the students. What I'm there for is to interact with everybody else, and to serve myself as well as the others. But I think students resent this. There's considerable feeling on their part that the faculty, just as their own parents, are put there to serve them. A regard for the faculty as people with their own needs and desires is pretty much absent."

There's considerable feeling on students' part that the faculty, just as their own parents, are put there to serve them.

He thinks a large number of the faculty are unaware of this relationship and, to the extent they are aware of it, don't necessarily want to change it.

"They visualize themselves in this paternalistic role and are going to play along with the game. That's not a constructive way to go about establishing different kinds of human relations. Their fault is in being too psyched out in wanting to always be of service to the students. That's not the way people get along with each other!"

There has been enough campus enthusiasm about improving interpersonal relations that it looks now as if sensitivity training is here to stay.

One Caltech alumnus has played an important part in it, both in his business and on the campus. Mike Boughton, '55, is an associate director in the Mission Analysis Laboratory at TRW Systems in Redondo Beach. TRW Systems has been up to its eyebrows in what it calls human relations laboratory techniques for several years.

At the beginning of last summer Dick Schuster, '46, head of Caltech's Industrial Associates and on the board of the Caltech Y, sounded out TRW about donating funds for trainers for future Caltech Y sensitivity training laboratories. Instead of funds they offered some of their people who had had leadership training.

In this way Boughton entered the picture. He was a co-leader with Wes Hershey for an August 1967 weekend of Caltech students and some coeds. Boughton and other TRW facilitators have also aided the YMCA with several other conferences.

Continued on page 10

There has been enough campus enthusiasm about improving interpersonal relations that it looks now as if sensitivity training is here to stay.

Photos by Lou Jacobs Jr.

One of the prime reasons for these events is still a chance for boys and girls to meet, whether by new means of communication (above) or the more conventional way (right).



Sensitivity

Continued

"We wanted to develop sensitivity training on the campus, now, as a continuing process rather than to stage conferences now and then as events," he says.

Coincident with early fall 1967 discussions, the president of Dabney House, Len Erickson, went to the Y and said Dabney wanted to have a sensitivity training weekend. They were also interested in something with continuity.

The first Dabney weekend laboratory

was in February of this year. The participants included about half of the Dabney men, and girls from Immaculate Heart ther

"Annette and I thought, 'We're another generation. What can we find to say to them?' But it didn't work out that way."

Smith felt that he fell into a familial sort of pattern, and that his presence seemed to elicit some frank student discussion of problems with their parents.

"I thought most of them would have problems with the opposite sex, but it turned out that their major concerns were their relationships to their own families."

Smith found the experience helpful in his teaching. He says there are things he is willing to say in class, now, that he wouldn't have said before. He has been seeking ways to induce more student participation in his classes and is sure that the students' interest in the class has risen as a result.

But what IS sensitivity training? A Caltech student explains.

College. The students also invited David

Smith, associate professor of English, and

his wife, Annette, who teaches French at

going with WBSI," explains Boughton,

"and this worked out well for all con-

cerned-because the guys really wanted

to have girls. As a matter of fact, if you

check into it, that's an important com-

ponent of how conferences got started

here, anyhow-even before the human re-

The first Dabney lab was a good one.

David Smith, who had never experienced

one, went to it with some skepticism.

"Immaculate Heart had quite a program

the Claremont Colleges.

lations lab days."

Thursday evening: We get there late, but so does everyone else. General meeting finally starts—leaders introduced, purpose of conference stated: To let down barriers which hide you from others and yourself.

"I sit alone, feeling bad, wanting to say something, but cannot."

Real nitty-gritty starts. We adjourn to meet in groups of about a dozen people. Sit on the floor, look at each other for several minutes. Someone sneezes, another says *gesundheit*, then more silence. Eventually some conversation starts, wanders. I sit alone, feeling bad, wanting to say something, but cannot. I retreat into myself. Some of the others do the same. Others talk, but are safe: typical small talk, showing nothing of what is underneath the person.

Still, not everyone is as vegetative as I. A few feel enough trust in a few others that they say to them exactly what they feel. These people are taking a chance. The person they address could turn down the offer of friendship or could take offense at criticism and cause the meeting to degenerate into namecalling.

One could sense that some of the people were trying to be honest and were succeeding, saying what they felt, not afraid to disagree or agree with another. *They cared*. This honesty spread and grew; the members in the group began to trust each other more; this trust mushroomed—*slowly*.

"My first reaction was then to hide my face, to hide my feelings from the others."

I didn't talk much yet, but some of the group had noticed that I expressed my feelings through the expression on my face. My first reaction was then to hide my face, to hide my feelings from the others. But by now I trusted the people more—what did I have to hide? Are my feelings so horrible that other humans mustn't see them? If I want the others to trust me, don't I have to at least let them see something of what they are trusting? *Obviously*, *yes*—I was no longer afraid to let people see me. Still, this did not extend to my talking; I was still a listener. But a listener cannot be part of what he is listening to unless he also talks and lets others listen to him. He is a machine with input, but no output, and is of no value except to himself. I realized this, but felt powerless to do anything about it. So I just sat there feeling sorry for myself.

"The idea of physical contact with another person has been a hangup with me."

Necessarily, the time we spent together in our group was interrupted by time for meals and for an afternoon "rest" break. Some of the free time I spent trying to play the old piano in the main meeting hall; some of our group heard a little, and things developed to the extent that I was there at the piano, and the group was there ready to listen. But to what? I can't play well, especially the type of music I felt like playing. But I gave it a try, playing one of the most violent and emotional pieces I know—playing it badly, missing notes, but keeping it going, driving forward, trying to express myself, putting all I had into it. I couldn't finish the piece; in fact I only know part of it, but I think I got across in those few minutes part of the way I felt. The others in the group seemed to understand my feelings and to feel part of what I felt in the music. Thus I became aware of another type of communication I was capable of-but I still couldn't communicate by talking.

Another type of communication came Saturday afternoon. The idea of physical contact with another person has been a hangup with me, and I suspect similarly with other people. One can react to such a hangup by going through the usually accepted social means of contact, shaking hands, holding hands with a girl on a date, but without meaning anything by it just going through the motions; or one can react against all such contact, as I had, and avoid any contact at all. Either case is an unhealthy situation.

"I remember someone touching me on the back, patting me. My reaction was to shrink away."

At any rate, *real* nonverbal communication developed in our group; how it happened is difficult to describe. In fact, while the people were first beginning to reach out to each other, I was very frightened at the idea, and was hiding in myself, not even daring to look at people expressing their feelings so openly. I remember someone touching me on the back, patting me. My reaction was to shrink away, to reject the person reaching out, trying to help me. I was scared. But I was also lonely, and this feeling of aloneness became more and more intense, until I felt that I couldn't take much more.

"I wanted to pull away, but I wanted not to stronger."

Someone reached out and held my hand. Again my first reaction was to pull away, but the hand was insistent. It just held tighter. I wanted to pull away, but I wanted not to stronger. I gripped the hand tightly, even fiercely, so it couldn't get away, so I wouldn't lose contact with another world which I had just discovered. I hung on for several minutes, afraid to move, afraid to do anything. I finally looked at the person who had reached out to me, and even smiled-I felt wonderful, but scared. I reached out to some of the other people, to touch their hands, to hang on to them, too. It must have been a weird sight, all the people close together with their hands intertwined, all tense, and no one saying a word. But it was wonderful, and about the most intense emotional experience I have ever had. I felt it could have gone on forever. But dinner intervened. We got up to go to it, but we were sidetracked for a quarter of an hour by a spontaneous outburst of group dancing and singing. Like a bunch of drunks we were in a circle, arms around one another, singing and dancing. We finally broke up and went to eat. But we had achieved, by then, almost complete trust.

"I felt free to talk to the groupsomething I had been terribly afraid of before."

Now we could go forward, feeling free to express what we felt to each other. I even could talk to the other people now, and after dinner I felt free to talk to the group-something I had been terribly afraid of before. I trusted them. Hiding my feelings no longer served any purpose, so I tried to express them. And the amazing thing was that the others seemed to care—they seemed to want to hear me, and to share my feelings. This discovering that others can really care was one of two great discoveries I made at the conference. The other was the discovery that communicating feelings to others is as important to them as their expressing their feelings is to you; they really want you to talk to them, to tell them what you feel about them, to make them feel less alone. They're people like you. I thought most of them would have problems with the opposite sex, but it turned out that their major concerns were their relationships with their families.

Smith was also a member of a faculty weekend with Carl Rogers in March 1968. The majority of those who attended it found it a block-busting personal experience, and indicated an interest in going on.

Dabney House had its second weekend lab in May, when the whole house got involved.

"It was a lot less successful," Boughton admits, "and right now I don't know what the real reasons were. Nobody may know for a year or so! If ever."

But Dabney is still deeply committed, and Boughton is committed to spending time with the Dabney men developing a successful program.

"The hardest problem is trying to relate what happens in T-group experience to the outside world. The main thing we're doing in Dabney is to try to make life in the house more livable. There's a tendency for people in the houses to ignore each other—both their rights and their existence. In the labs we've found that two guys will have lived two doors away from each other for two years—and then in a weekend get to know each other for the first time."

There is a process going on, in Dabney, of developing some interdependency between the occupants, of recognizing each other as relative resources for other things than working a pulley problem.

"In fact," says Boughton, "they were so distant they weren't even helping each other with the technical confluences of life at Caltech!"

Now, he points out, even after so short a time, life in Dabney is demonstrably different. There will be five seniors living in the house next year. There was only one this year. There will be three times as many juniors, and virtually all of this year's freshmen have elected to stay.

They are having T-group sessions among themselves every Wednesday night, and Boughton says the students feel good about the way the sessions are going.

Boughton sees a "we" pattern taking the place of old "I" pattern, and the loneliness theme he sensed at the outset, he says, "is way down now."

With the success of the Dabney experiment, interest is coming from other houses. However, those involved—including Robert Huttenback, master of student houses are all moving carefully. The consensus is that it will be better to concentrate on Dabney for the present. The temptation to spread thin is something all are aware of.

Boughton feels that there are certain faculty members who would be excellent future lab leaders. If this works out, Caltech will not have to be dependent on outside facilitators.

Student body president Joe Rhodes says that ASCIT will probably tab a healthy share of their advance programs money toward sensitivity training.

Mike Boughton wants to continue contributing to the program indefinitely.

"People say What are you doing at Caltech, and what's there in it for you?". As I've looked into myself about why I'm here, I know a substantial part of it is a vicarious enjoyment of the students having what I wish I'd had."

A Telescope is Really Just a Big Camera, and Bill Miller is the Man Who Worries About the Film

On the back lot of the offices of the Mt. Wilson and Palomar Observatories stands an old two-story red brick building that looks like a turn-of-the-century buttonhook factory.

This is where Bill Miller runs the Observatories' astronomical photographic research facilities. And in the words of astronomer Allan Sandage, "His dedication is one of the reasons for the success of this place."

All of the technical advancements in astronomical photography that have come out of Miller's tenure, Sandage adds, "might be expected from any extremely competent person. But Bill has more than that—a feeling for new ideas."

This feeling has resulted in his devising improvements in materials and techniques that make it possible for the astronomers to squeeze the ultimate out of a photographic plate and thus discover things which otherwise might not be observed.

One of the most significant of those discoveries was the faint blue filaments in the exploding galaxies M 82. This came about through Miller's adaptation of an old trick of stacking the images from a number of negatives into a single image to form a composite that showed far more than any of the original negatives alone.

Miller is also the pioneer of successful color photography in astronomy, which is not like taking photographs in Kodachrome with an ordinary camera. Light levels are so exceedingly low that special techniques of color balance had to be developed. It was equivalent to devising ways to take accurate color pictures of things you can't see.

In order to make true interpretations, the reproduction of the colors the eye sees on these faint objects has to be exact. The work took up several years of Miller's time doing experimentation with Ansco and Eastman film. It has produced spectacular results.

Miller and Caltech have been traveling on the same wavelength for a lot of years. They first came together one summer during his college years at UCLA when he was given a job by John A. Anderson, an astronomer on the Mt. Wilson staff. Dr. Anderson was executive officer for the committee of astronomers planning the 200-inch telescope. He assigned Miller to an investigation group testing possible Arizona sites.

This was in the early thirties, and it wasn't long before Miller, like many other depression youths, had to drop out of college and go to work. Anderson gave him a full-time job in Caltech's astronomy machine shop. He helped build the big machines used to grind the 120-inch mirror, and was on the actual job of grinding that disk before it was given to the Lick Observatory. He also made the one that is now in the 18-inch Schmidt telescope at Palomar.

It wasn't long before he had such a reputation for his optical engineering that he was lured away from Caltech into industry.

But he spent his summer vacations as close to the Mt. Wilson telescope as he could get. As he says, he had "fallen head over heels in love with astronomy in high school."

Because there was no paying job for him at the Observatory, he would take jobs nearby at the old Mt. Wilson Hotel; gradually he made himself known to the observatory staff.

He also made himself useful.

"I got to know the old 6-inch and 10inch telescopes pretty well," he says, "and then I got to do a project for Dr. Paul Merrill. He needed photographic observations made over a long period of time on the old 10-inch. I did this for 15 years."

Merrill liked his work so much that he made it possible for this young astronomy buff to work with the 60-inch and eventually the 100-inch. Miller was the only layman who had ever been permitted to get within touching distance of the latter.

"All this time," Miller says, "I was especially interested in the spectrally sensitized plates used by the astronomers. They used to complain that they never knew how fast the plates in any new shipment were going to work."

His immediate reaction of "This should not be!" resulted in his building a spectrograph and a darkroom up on the Mountain so that he could test the speed of the plates as they were received from the manufacturer.

It was when Miller was doing optical engineering for a rapidly growing young South Pasadena firm called Beckman Instruments that Ira Bowen, then director of the Mt. Wilson and Palomar Observa-

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tories, called him up and said: "How would you like to do for beans what you've been doing all this time for fun?"

He offered him the job of taking over the Observatories' photographic laboratory and turning it into a research facility.

"There was so much I didn't know!" Miller says. "I had to read volumes and experiment widely before I could even begin to know what their problems really were and how to attack them."

The basic one was how to improve the emulsions, as supplied by the manufacturer, for use under the very unusual circumstances under which astronomers work: those long, long exposures.

The tendency is for emulsions to become very inefficient during long exposures. Bowen had made a discovery years before that had helped things along greatly: If you bake a photographic plate in an oven, it becomes more efficient for long exposures.

Another part of Miller's research was to improve the astronomers' techniques and the darkroom equipment.

"Because of Dr. Bowen's wisdom and foresight," he says, "we had a tremendous head start on any other observatory. He felt that if you have the biggest and best telescopes, you jolly well better know all there is to know about your auxiliary equipment and supplies."

Miller has had a constant and longstanding rapport with the companies who supply the materials.

"With their millions of dollars worth of

research facilities and their well-guarded professional secrets, they have helped us solve many problems. We pool our knowhow and discoveries with them, and the results have been helpful to both of us."

Miller's becoming an actual member of the Caltech family left his weekends and vacations free. Free, for instance, for such things as archeological trips into Navajo country. His interest in archeology had sprung from that original Arizona trip for Caltech. Arizona archeologists have come to know him as a reputable, knowledgeable practitioner of the potsherd.

He also built a large three-manual concert-type organ from the ground up.

Last year he turned his appreciation of the out-of-doors to community service. He joined the Altadena Mountain Rescue Team.

In his late fifties, he has found to his extreme pleasure—as wouldn't you—that he is physically able to master the technique of jumping out of and into a hovering helicopter, rappel off a sheer cliff into a canyon below, and track lost humans successfully night or day, summer or snow storm. The supreme compliment came when his doctor exclaimed after his last physical: "What's happened to you, Bill? You're in twice as good shape as last year!"

In a life so filled with activity that even a sneeze has to stand in line for a priority, Bill Miller also found time, in the middle of everything else, to go back to college after World War II and get his bachelor's degree in astronomy.



THE MAHARISHI Mahesh Yogi, one-time guru to the Beatles, came to Caltech on May 16 to enlist scientists and engineers in his crusade to reform the world through transcendental meditation—and also to film a documentary of his self-promoted visits to college campuses. He met first in a private session in Dabney Garden with about a dozen students and faculty (above), then spoke to several hundred people (below) on the Winnett plaza. The enlistment rate appeared to be rather low.



Alumni Near 75 Percent Of Their Campaign Goal

Ruben F. Mettler, '44, chairman of the Alumni Committee for the "Science for Mankind" development program, has reported that by Commencement on June 7 alumni campaign subscriptions totalled \$1,421,486 from approximately 20 percent of the Institute's alumni.

According to Mettler, it is hoped that eventual alumni dollar participation in the program will exceed the \$2.0 million goal by a generous margin and that at least 60 percent of the alumni will have a share in making this possible.

Some 750 alumni in 84 areas of the country are actively involved in soliciting alumni support. Additionally, numerous other alumni have accepted key corporate and special gift solicitation assignments on behalf of the "Science for Mankind" program.



In Beckman Auditorium the cast of "The Castle" is led by Terry Bruns, '68, who played a "low-income world traveler," in calling for authors Mike Garet and Dan Nemzer.

Dance numbers, like this dream sequence, were choreographed by sophomore Dick Neu.

More On Grad Student Life

Continued from page 5

others in the same category, generally in the same division. "But the single students who know only other Caltech students can lead a terribly limited life."

Having grown up around Anchorage, Alaska, Jack still pursues interests in skiing, hunting, fishing, and sailing. Because he likes to be around people, he took care of campus limitations by applying for and being appointed resident associate of a student house (Lloyd).

He doesn't hold out much hope for the prospects of boy grad students meeting girl ditto here at Caltech.

"After all, there are only about 30, some of them are married, and the others are either unavailable or unattractive," he says categorically.

He thinks a prevailing feeling among his peers is that you can't have your cake and eat it too. "They're here because they realize they're being trained by a top school to become professional scientists or engineers. They're here because the person they're working under is one of the best they could find. They miss very much the fact that they're not at a college with all the social sorts of things but realize there are very few places where they could have both."

He declares that many of the graduates here, with the whole thing to do over again, might possibly select a school like Berkeley, Stanford, or Harvard–all of which are prestigious, *and* large and social.

He bravely offered some personal impressions of the foreign student community:

"The French are cliquish—because they're better than everyone else, they tell

"The Chinese are cliquish too, because of the language thing. Most of them live in the graduate houses together and eat together, so a clique is formed more by necessity than choice.

"Indian students arrive very outgoing and friendly. They're thrilled to be in the United States. Then, little by little, they start feeling hemmed in. It's difficult to meet people at Caltech. Those they've gotten to know easily they come to know too well. They generally become dissatisfied with the social side of their life."

He makes a differentiation between undergraduates and graduate students:



"They're different animals. The grad student is intellectually interested in science. Our undergraduates often don't have an intellectual interest at all."

Jeanette Asay, a third-year chemistry student from Utah, has resolved any problems arising from being a new member of the Caltech graduate school. But she agrees with Jack Griffith that the first year is no picnic.

"The way grad school is set up, you have a tendency to be isolated, even in your own division. My first year was rough, but I tried hard and did the best I could to attach myself to something, because it was too frustrating doing nothing."

She joined in certain activities coming out of the Caltech Y and continued the long, slow process of getting to know people.

Now her friends are numerous, most of them in chemistry, although they are not people she does research with. Out of her circle of friendship has come marriage (June 11) to another chemistry grad student, Tim Betts, from Eureka, California.

Jeanette admires students who come into graduate work with their goals well defined. She feels that not being strongly oriented toward a certain thing has been somewhat of a handicap in her own case and that it started back on the high school level. She suspects she is part of a sizable group that suffers because of inadequate early counseling. In her undergraduate years she did so well in chemistry that the department offered various inducements to keep her, in spite of an equal aptitude in math. In fact, she even now wonders if she shouldn't have gone down the math path.

"But I kept getting all kinds of neat summer jobs, and certain chemistry teachers kept encouraging me. I feel as if I was almost bribed into chemistry. I really wish they hadn't done it. I feel I was put under a kind of pressure."

She adds that at a younger age many students don't yet realize what values will be important to them.

"Now I know what kinds of interactions with people are really important, and they don't involve people liking you because you do something well. Of course people like praise, and it's important, but there should be more perceptive observations by our elders more often to find out what students *really* like."

She hazards the guess that too many students get into fields they really don't enjoy to the hilt. "Then things become sterile. Interest has everything to do with creativity."

- Alumni Association membership brings:
- ► Engineering and Science magazine
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Curtain Up: Students Write, Produce, and Perform A Musical

On May 17 and 18 Beckman Auditorium resounded with singing, dancing, and drama as the Associated Students presented the world premiere of the Third Annual ASCIT Musical, *The Castle*. The consensus of the audience was that this year's musical was by far the best. The months of preparation put in by the many people who worked on the production evidently paid off.

The Castle was born less than a week after the presentation of last year's ASCIT musical, A Game of Chance Played in the Rain. It was at that time that Mike Garet, '69, and Dan Nemzer, '69, initiated plans for this year's production. Mike had written both the book and lyrics for Game of Chance, as well as having directed it; Dan had produced it. By the end of the summer Dan had almost completed the book for The Castle, and Mike had fimished most of the lyrics and music.

With the beginning of the school year more than 60 Caltech students, joined by about two dozen girls from nearby high schools and colleges, began to bring the play to life.

The castle of the title was built on the Atlantic coast of Spain in the 8th century by Pelayo, the Spanish hero who led the resistance against the Moorish invasion of 711, to commemorate his successful last-ditch stand. In the play, the ancient castle broods over a 1968 fishing village and eventually catalyzes the residents' philosophy when they realize what values they have lost by selling out to a domineering industrial group. As their ancestors used the castle to fend off invading Moors, so must they use it as a symbol of maintaining the simple way of life they really believe in.

Throughout the production the songs were very good, and the dance numbers were excellent. Music was provided by a 14-piece orchestra. All in all it can be said that Caltech students once again proved that scientists are by no means untalented artistically. Rodgers and Hammerstein look out! Here come Garet and Nemzer.

> –Jim Cooper, '71 Co-editor, California Tech

July 1968

75 Immunologists Fete A Favorite Colleague

Seventy-five of Dan H. Campbell's colleagues and former students surprised him in April with a party in Atlantic City following the 52nd annual meeting of the Federation of American Societies for Experimental Biology.

Dr. Campbell, professor of immunochemistry who has been on the Caltech faculty since 1942, was also presented with a four-inch-thick bound volume of personal greetings and published scientific papers titled Selected Writings in Immunology in Honor of Dan Hampton Campbell by His Students, Colleagues, Friends.

The inside covers are composed of various caricatures of Dr. Campbell, and the book begins with a preface letter by George Feigen, PhD '48, associate professor of physiology, Stanford, and Richard S. Farr, head of the division of allergy, immunology, and rheumatology, Scripps Clinic, La Jolla. Both Drs. Feigen and Farr are long-time personal friends of Dr. Campbell.

The letter reads in part, "This volume is a collection of papers . . . that spans over a quarter century of time. It is a record not only of your own consummate skill and farsightedness in science but also your faith in those whom you taught, for they, in their own way, have hammered on the anvil of intellectual toughness . . .

"You have generated a great deal of immunology in many fields during the past 28 years and this collection is a testament to the profound influence you have had on the course of immunochemistry in the world."



Dan H. Campbell

Favorite quotations and sayings of Dr. Campbell's and events remembered by his students were written by the contributors on pages preceding their scientific articles.

The letter from Linus Pauling was representative of the affection felt for Dr. Campbell and the personal memories of working on scientific projects with him.

Dear Dan,

I am glad to join many others of your friends in congratulating you on 60 years of a full and vigorous life that you have seen so far.

I often feel nostalgia for those wonderful days a quarter century ago when you and I were striving to dispel the fog of mystery enshrouding serological reactions.

I send my best wishes to you. Sincerely,

Linus.



Historian Daniel Kevles and archivist Judy Goodstein look through a Robert A. Millikan family photo album, part of the Millikan papers housed in the Institute's Archives.

Archives Are Growing; Hale's Papers Published

A personal letter to George Ellery Hale from President Woodrow Wilson, a scribbled memo from Albert Einstein, the diaries of Robert Millikan and Hale—all essential threads in the tapestry of 20th century science—are being collected, cataloged, and filed with the personal papers of other famous Caltech scientists in Millikan Library as part of an archives program.

Caltech has appointed Mrs. Judy Goodstein, a PhD in the history of science, to organize and administer the personal records and manuscripts donated to the Institute to be preserved for present and future scholars. The Archives now consist of the papers of Millikan and Theodore von Kármán; the Hale papers are being held in trusteeship until the Mount Wilson and Palomar Observatories establish their new offices on the Caltech campus.

Daniel J. Kevles, assistant professor of history, who started work on the Hale papers two years ago, said the Hale and Millikan documents are now available for

Clough Off For the Rough

British archeology will get some extra digs this summer from a physics major who won Caltech's 1968 Junior Travel Prize. Gene Clough of Long Beach will take an expense-paid trip to the British Isles to visit archeological sites and to do some excavating.

According to Clough, Great Britain is the home of the amateur archeologist, and a lot of outstanding work is being done there by nonprofessional people. "Many of the excavations," he says, "are literally school digs, with student volunteers guided by experienced archeologists." Clough also intends to visit Oxford University to study methods of modern physics that are being applied to archeological problems.

With the proposal that won him the travel prize, Clough enclosed a letter from the Council for British Archeology which warned that "all volunteers are expected to provide their own trowel . . . and you may also find a kneeling pad of use."

The opportunity to try out for the Travel Prize is offered every fall to the 30 Caltech juniors who stand highest in sophomore scholastic ranking. Past winners have pursued a wide range of activities from sailing in European waters to studying Japan's martial arts.

use by qualified scholars. The Von Kármán papers are still being organized and cataloged.

Some 109,000 of the Hale documents have been published in microfilm under a \$6,900 grant from the National Historical Publications Commission. The 100 rolls of microfilm range from personal correspondence to reports on solar observations.

The Millikan papers include photographs, letters from famous statesmen and scientists, plus personal mementos.

The Archives will help historians of 20th century science to unravel the genesis of a particular idea or research project and will give an insight into how science influences and is influenced by industry and government. Many of the papers, especially those of Hale, tell of the political troubles that have beset science in this century. Hale created the National Research Council during Warld War I and faced political difficulties in expanding it to the international level when Allied scientists were determined to exclude the Central Powers scientists from membership.

Dr. Kevles sees the difficulties surrounding formation of the International Research Council, the parent of today's International Council of Scientific Unions, as the first catastrophic breakdown of the international scientific community after the Napoleonic era. He explains that Hale "was in the center of it all, caught among the vengefulness of the Allied scientists and the political commitments of President Wilson."

Included in the Hale papers are several letters from President Wilson, who made it a point to differentiate between the German people and their leaders, exempting the people from responsibility for the crimes of the Kaiser. Hale was seeking President Wilson's support for the International Research Council, but the President refused to commit himself for fear it would jeopardize his own efforts for peace and the League of Nations.

There are also letters in the files from Albert Einstein, who was a visiting faculty member here in the early 1930s. According to Dr. Kevles, Einstein was one of the few German scientists who opposed the war. Even so, when he visited the United States in 1921, many American scientists considered him to be an agent of German propaganda and asked that he not be given official recognition by such agencies as the National Academy of Sciences.

Sports Year Ends With Four Swimmers Picking Up All-America Awards

All-America honors in National Association of Intercollegiate Athletics competition went to four Caltech swim team members this spring, with one swimmer—Henry DeWitt, '68—also taking All-America honors in the National Collegiate Athletic Association's college division.

DeWitt, who successfully defended his championships in the 50- and 100-yard freestyle events at the NAIA national championships in St. Cloud, Minnesota, last March, is also working out with the Los Angeles Athletic Club's swimming coach, Peter Doland, in preparation for the men's Olympic trials that begin late in August.

The other NAIA All-America winners from Caltech were Maarten Kalisvaart, '69, Mabry Tyson, '70, and Gregg Wright, '69.

Caltech's swim team, sparked by the performance of these four, finished the season with a 10-5 win-loss record. The squad placed third in the all-conference meet, finishing fourth in Southern California Intercollegiate Athletic Conference ranking.

The swim team's coveted Campbell trophy was awarded to DeWitt, while Steven Johnson, '70, took the Outstanding Diver trophy. The trophy for the most improved swimmer went to Jeff Rude, '71.

Caltech's Beaver track squad also finished the season with a winning record, winning seven, losing five. The squad finished the season tied in fifth place with Claremont-Harvey Mudd.

The Goldsworthy Track Trophy was won by Jim Stanley, '68, and Bob Tarjan, '69, while the trophy for the most improved squad member was shared by Hal Petrie, '68, and Bob Antuki, '71. Two men—Tim Tardiff and Mike McDonald were named co-winners of the Outstanding Freshman Trophy.

In baseball the team finished the SCIAC season with a 6-21-1 record to take last place in the conference. Coaches said the team started off strong, however, beating Claremont-Harvey Mudd 3-2 and Pomona College 6-5 early in the season.

The Alumni Baseball Trophy was awarded to John Frazzini, '68. Jay Chapyak, '68, was recommended by Caltech as a candidate for an NCAA postgraduate scholarship, based on his athletic ability and his academic record. Earlier this year two Caltech seniors—John Frazzini of the football team, and Jim Stanley of the basketball squad—won NCAA scholarships.

A star performer during the season, Lonnie Martin, '69, was named on the SCIAC all-conference team at shortstop.

In tennis, Caltech also finished last in the conference with a win-loss record of 2-17. The Scott Tennis Trophy went to Greg Evans, '69, after a playoff.

The last spot in the conference was also where Caltech's golf team ended the season, with a 2-12 win-loss record. The J. Ben Earl Golf Trophy went to Neil Holmes, '70.

In fencing, Caltech's swordsmen finished the season with a 3-7 record in foil competition and 1-8 in épée competition. There is no official conference competition in fencing.

Caltech also finished last in wrestling with a season record of 1-11-1. The wrestling trophy was taken by the captain of the squad, Alan Beagle, '70, for the second year.

CALTECH NEWS



ALUMNI SEMINAR DAY on May 4 features special attractions in addition to the 14 excellent lectures. Visitors see medals, equipment, and memorabilia of Robert A. Millikan in the Trustees' meeting room in Millikan Library (above, left); get a new look



at the campus from the top floor of the library (below, left); and see a modern sculpture exhibit in Dabney Garden which in some cases require consultation with the catalog (above, right) and in others need no explanation (below, right).



PLACEMENT ASSISTANCE TO CALTECH ALUMNI

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

- 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.



ASCIT Research Project Rolls Along With Renewed Vigor

Continued from page 1

cal model now exists capable of determining what result an increase or decrease in a given pollutant will have in changing the composition of smog in the Los Angeles area. This group will work toward the construction of such a model."

Rhodes presented the proposal in person to S. Smith Griswold, associate director of the Air Pollution Control Center in Washington, D.C., and former director of the Los Angeles County Air Pollution Control District. Later Yaffe visited the Caltech campus for further consultations.

The Caltech administration has agreed to contribute time, overhead, and services relative to disbursing the funds. The administration was represented, in working out the terms of the grant with the government and students, by Lyman Bonner, special assistant to President Lee DuBridge, and George Canetta, administrator of sponsored research.

"We feel we could never have reached this goal without the support of the Pasadena area community," Garet said, citing the fact that students involved in the project have spoken before many civic groups and have laid their plans before many community-minded citizens. "As a result," he said, "there were enough donations of money and offers of assistance to keep us going when we needed it most."

The student research project was originated by Joe Rhodes, who began recruiting fellow students a year ago. In addition, Rhodes has made trips to other college campuses during the year to interest other undergraduates in assisting with plans for what he has visualized as student research in some vital area of public interest.

As a result, along with the 30 Caltech students committed to the 12-week summer project, 29 undergraduates from 15 other institutions have arrived at Caltech. Eighteen are women, who are living in one of the student houses.

Schools represented include Swarthmore, Sarah Lawrence, Wellesley, Carnegie-Mellon, Harvard, Pembroke, and Lake Forest. There will be California college representatives from Occidental, Immaculate Heart, UCLA. the University of California at Santa Barbara, and California State at Fullerton.

More Hornig: 'What Are Science's Needs?' Only A Part of the Question

Continued from page 1

the development of universities, and even holding down health research. Congressional committees . . . are more immediately concerned with possible overlap, duplication, and proper accounting procedures than with the quality and vitality with which the frontier is explored. They see a scientific community which, insisting on its purity, will not deign to communicate with the public and justify itself, but prefers to believe its virtues are so self-evident that a right-minded society must necessarily support it on its own terms."

Hornig pointed out that while industrial, government, and university research takes a quarter of the federal budget, the prevailing attitude of the people doing research is that the important question is "what are science's needs" rather than "what are the nation's needs for science?"

"In short," he says, "the scientific community has done much to alienate itself from the society which supports it." He admitted that much of the alienation is inevitable, because science's very success frightens many people, and the promise of science is counterbalanced by the threat of uncertain change.

Moreover, he added, the public regards science as responsible for the unpleasant by-products of technology. "It is no use to say that science and technology have nothing to do with the uses society makes of them. As President Johnson said when he awarded the National Medals of Science in January: 'An aggrieved public does not draw the fine line between good science and bad technology. In a democratic society the public attitude toward science must always be a real concern of the scientific community. If that attitude is to be favorable, science must be prepared to play its part in correcting the flaws in our environment.' "

Hornig warned that the public will withdraw the support it has shown for science for the last 20 years if science cannot adapt itself to the solution of society's problems—which, he admits, are largely social.

But science's crisis, he said, is really America's crisis and revolves around the question of how we want to use our wealth. "Are we going to insist on more TV sets and electric toothbrushes—or better schools, better universities, and more day-care centers?"

He pointed out that we now spend \$8 billion a year on tobacco and \$13 billion on alcohol (more than the total spending by governments at all levels on higher education), but we nurture a belief that private spending is good and public spending is bad.

"So we have money for luxury and affluence, but not to meet the problems tearing our society apart."

In effect he suggested that one solution could be higher taxes, saying that even now—with large defense expenditures—we tax ourselves less than any major advanced nation.

He concluded, "I cannot believe we will really withdraw from the challenge of space exploration, or of education, or of health, or the supreme challenges of intellectual people. I believe the present crisis is but a pause, but it will \ldots be solved \ldots only as we abandon our favorite myths, give up a few luxuries, and set out in earnest to do what needs to be done." July 1968

CALTECH NEWS



Sterling B. Hendricks



Thornton A. Wilson

William G. Young

National Academies Pick 11 More Caltech Alumni

Frank W. Davis

Eleven Caltech alumni are newly elected members of the National Academy of Sciences and National Academy of Engineering.

The six elected to the NAS are:

Horace R. Crane

- William C. Herring, Ex '37, of Bell Telephone Laboratories.
- Edward B. Lewis, PhD '42, Caltech biologist.
- Henry W. Menard, Jr., '42, MS '47, University of California, San Diego.
- Matthew S. Meselson, PhD '57, Harvard University.
- Arthur B. Pardee, PhD '47, Princeton University.
- Leo J. Rainwater, '39, Columbia University.

Five new members of the NAE are:

- Ray W. Clough, MS '43, University of California, Berkeley.
- Elburt F. Osborn, PhD '38, Pennsylvania State University.
- Eberhardt Rechtin, '46, PhD '50, U. S. Department of Defense.
- William R. Sears, PhD '38, Cornell University.
- Dean A. Watkins, MS '47, Watkins-Johnson Company, Palo Alto.

The 1968 elections bring to 50 the number of Caltech alumni who are currently members of the National Academy of Sciences. Total membership of the body now stands at 806. The National Academy of Engineering—only four years old—has 24 Caltech alumni among its 237 members.

Alumni previously elected to the NAS (and year of election):

- Carl Anderson, '27, PhD '30, Caltech (1938).
- Thomas F. Anderson, '32, PhD '36, The Institute for Cancer Research, Philadelphia (1964).
- (1964).William A. Arnold, '31, Oak Ridge National Laboratory (1962).
- Horace W. Babcock, '34, Mt. Wilson and Palomar Observatories (1954).
- Richard M. Badger, '21, PhD '24, Caltech (1952).
- James F. Bonner, PhD '34, Caltech (1950). Ira S. Bowen, PhD '26, Mt. Wilson and
- Palomar Observatories (1936). Leo Brewer, '40, University of California,
- Berkeley (1959).
- Frank Brink, Jr., MS '36, Rockefeller University (1959).
- Robert B. Brode, PhD '24, University of California, Berkeley (1949).
- John M. Buchanan, MS '48, MIT (1962).
- H. R. Crane, '30, PhD '34, University of Michigan (1966).
- Paul H. Emmett, PhD '25, Johns Hopkins University (1955).
- William A. Fowler, PhD '36, Caltech (1956).Donald A. Glaser, PhD '50, University of California, Berkeley (1962).

Sterling B. Hendricks, PhD '26, Plant Industry Station, Beltsville, Md. (1952).Vernon W. Hughes, MS '42, Yale University

(1967). Harold S. Johnston, PhD '48, University of California, Berkeley (1965).

- Martin Karplus, PhD '54, Harvard University (1967).
- Leon Knopoff, '44, PhD '49, UCLA (1963). Robert B. Leighton, '41, PhD '47, Caltech (1966).
- Chia-Chiao Lin, PhD '44, MIT (1962). William N. Lipscomb, PhD '46, Harvard Uni-
- versity (1961). Joseph E. Mayer, '24, University of California, San Diego (1946).
- Harden M. McConnell, PhD '51, Stanford University (1965).
- Edwin M. McMillan, '28, MS '29, University of California, Berkeley (1947).
- Walter H. Munk, '39, MS '40, University of California, San Diego (1956).Wolfgang K. H. Panofsky, PhD '42, Stanford
- University (1954). Eugene N. Parker, PhD '51, Laboratory for
- Astrophysics, Chicago (1967). Linus Pauling, PhD '25, University of Cali-
- fornia, San Diego (1933). William H. Pickering, '32, PhD '36, JPL
- (1962). John R. Pierce, '33, PhD '36, Bell Telephone
- Laboratories (1955). Kenneth S. Pitzer, '35, Rice University
- (1949). Alfred S. Romer, PhD '35, Harvard Uni-
- versity (1944). Allan R. Sandage, PhD '53, Mt. Wilson and
- Palomar Observatories (1963). William Shockley, '32, Stanford University (1951).
- Folke Skoog, '32, PhD '36, University of Wisconsin (1956).
- Charles H. Townes, PhD '39, Columbia University (1956).
- E. Bright Wilson, Jr., PhD '33, Harvard University (1947).
- Olin C. Wilson, PhD '34, Mt. Wilson and Palomar Observatories (1960).

Saul Winstein, PhD '38, UCLA (1955). Oliver R. Wulf, PhD '26, Caltech (1949). Don M. Yost, PhD '26, Caltech (1944).

William G. Young, PhD '29, UCLA (1951).

Alumni previously elected to the NAE: Arnold O. Beckman, PhD '28.

Maurice A. Biot, PhD '32. James Boyd, '27. Frank W. Davis, '36. Richard G. Folsom, '28, PhD '32. George W. Housner, PhD '41. Arthur T. Ippen, PhD '36. Frederick C. Lindvall, PhD '28. William B. McLean, '35, PhD '39. Ruben F. Mettler, '44, PhD '49. Bernard M. Oliver, PhD '40. William H. Pickering, '32, PhD '36. John R. Pierce, '33, PhD '36. Allen E. Puckett, PhD '49. Simon Ramo, PhD '36. L. Eugene Root, MS '33. George E. Solomon, PhD '53. H. Guyford Stever, PhD '41. Carlos C. Wood, MS '34.

Caltech, which presented 23 alumni with distinguished service awards for the first time in October 1966, has made the award to five more men. The honors, for outstanding achievement in their chosen fields, were announced at the Alumni Seminar Dinner on May 4, 1968. Re-

Horace R. Crane, '30, PhD '34.

cipients are:

After receiving his PhD, Dr. Crane stayed on at Caltech for one year as a research fellow. He became a member of the University of Michigan faculty in 1935, became professor of physics there in 1946, and was named chairman of the Department of Physics in 1965. Over the years he has served on a number of scientific projects, including the proximity fuze project and the atomic energy project from 1941-45. He is especially noted for his early discoveries in the field of artificially produced radioactive atoms, his development of the "racetrack-type" synchrotron, and his measurement of the magnetic moment of the free electron.

Dr. Crane is a Fellow of the American Physical Society, which awarded him the Davisson and Germer Prize in 1967, a Fellow of the American Association for the Advancement of Science, and a member of the National Academy of Sciences. In recent years he has been active in the development of new teaching methods for physics and was president of the American Association of Physics Teachers in 1965.

Frank W. Davis, '36.

Mr. Davis has been president of the Fort Worth Division of General Dynamics Corporation since 1961. He joined the division in 1954 as chief engineer and was its manager from 1959-61. He joined one of the predecessor companies of Ceneral Dynamics in 1940 as an engineering test pilot, was the first pilot to fly a turboproppowered aircraft, and was General Dynamics' first jet pilot. During his 28 years with the corporation, his design and management responsibilities have included many "firsts." He is best known for his work with delta-wing aircraft such as the F-102 and the B-58, and more recently with the F-111 variable sweep airplane.

Mr. Davis received the Engineer of the Year-1957 Award from the Fort Worth Chapter of the Texas Society of Professional Engineers, and in 1960 he was named to *Sports Illustrated's* Silver Anniversary All-America Team. The Society of Experimental Test Pilots made him an Honorary Fellow in 1965, and in 1967 he was elected to membership in the National Academy of Engineering.

Sterling B. Hendricks, PhD '26.

Dr. Hendricks is head scientist of the

Mineral Nutrition Laboratory of the U.S. Department of Agriculture, which he joined in 1928. His work has centered on applications of chemistry and physics to agriculture, including x-ray diffraction studies and, most recently, control of flowering.

He is the recipient of several national awards in chemistry, geology, and agriculture, including the Day Medal of the Geological Society of America in 1952, the Rockefeller Award for Distinguished Civilian Service in 1962, and the Hoblitzelle Award in Agriculture in 1964. He is a past president of the Chemical Society of Washington, the Mineralogical Society of America, and the American Society of Plant Physiology. He has been elected to membership in the National Academy of Sciences and the American Philosophical Society, and he belongs to seven professional societies in geology, chemistry, and plant science. His avocation is mountaineering in northwestern America.

Thornton A. Wilson, MS '48.

Mr. Wilson joined the Boeing Company in 1943 as a member of the engineering staff. He became manager of the Minuteman ICBM program, was named vice president and manager of the missile branch in 1962, in 1964 became executive vice president, and became president of Boeing Company in 1968.

Mr. Wilson is a member of the American Institute of Aeronautics and Astronautics and of the board of governors of the Iowa State University Foundation. He was a Sloan Fellow in industrial management at the Massachusetts Institute of Technology from 1952-53.

William G. Young, PhD '29.

Dr. Young has pursued an academic career since he received his PhD at Caltech and went to the Carnegie Institution of Washington as a research assistant. From there he went to Stanford University as a National Research Fellow, after which he became an instructor at the University of California at Los Angeles. He was a chemistry professor until 1946, when he became Dean of the Division of Physical Science. He was elected vice chancellor of the University of California at Los Angeles in 1957.

A specialist in physical-organic chemistry and molecular rearrangements, Dr. Young received the Richard Tolman Medal from the American Chemical Society in 1961, the American Chemical Society's Award in Chemical Education in 1963, and the Society's highest honor, the Priestley Medal, in 1968. He is also a member of the National Academy of Sciences and Sigma Xi.

15



PERSONALS

1916

BERNARD E. CHAMBERLAIN, an engineer, died May 10 in Altadena, Calif., where he bad resided for 60 years. Chamberlain retired in 1963 as assistant city engineer with the city of Pasadena. He is survived by his wife, two daughters, a son, and eleven grandchildren.

1917

ARCHIE R. KEMP, MS '18, a noted rubber chemist, died in March in Long Beach, Calif., at the age of 73. Kemp was a consulting chemist and held several managerial positions with the Bell Telephone Laboratories and the Western Electric Company from 1918 to 1948. Since his retirement, he had been a consultant to Dow Chemical Company, Marmeo, Jabseo, Western Electric, and Western Insulated Wire. Kemp authored a number of books and articles and held over 300 United States and foreign patents for his developments in the areas of submarine cables, rubber covered wire, and polyethclene applications. He was named one of the ten most outstanding rubber chemists in 1947 by the American Chemical Society. He is survived by his wife, four children, and a brother.

1921

RICHARD E. HAMBROOK, retired executive vice president of the Pacific Telephone Company, died recently in San Francisco. He was 68. In addition to his more than 40 years with Pacific Telephone, he also served as a director of a number of corporations, including the Bank of California. He was a member of the Bohemian Club, the Pacific Union Club, and the Transportation Club of San Francisco. He is survived by his wife, two daughters, a sister, and eight grandchildren.

ALFRED J. STAMM, professor of wood chemistry at North Carolina State University in Raleigh, is the recipient of the 1968 Anselme Payen Award of the American Chemical Society. Dr. Stamm was credited with "contributing more to the understanding of the physical chemistry of wood than any other scientist." Stamm, a member of ACS since 1924, is also a fellow of the International Academy of Wood Science.

1922

DOUGLAS C. MACKENZIE, former city engineer for the City of Pasadena, died in Laguna Beach, Calif., in May. He was 69. Mackenzie, who served in Pasadena's engineering department for 37 years, was the designer of the Pasadena Freeway. He also served as a city engineer in Laguna Beach, where he had maintained a home for the last 20 years. He is survived by his wife and a niece.

1923

LOREN E. BLAKELEY, secretary for the Class of 1923, died of a heart attack June 8, 1968. He had been a consultant for a number of years in civil and sanitary engineering, and was an active member of the American Waterworks Association. Blakeley worked for the Pasadena Water Department from 1923 until 1937. He was an engineer for the Santa Ana Valley Irrigation Co. from 1937 to 1942. He served one year with the California State Health Department Bureau of Sanitary Engineering, during which time he was regional waterworks advisor for Southern California. Blakeley opened his own consulting office in Orange County in 1943 as a consulting civil and sanitary engineer, specializing in water rights. In 1962 he moved his offices from Orange County to South Pasadena. He also served as a consultant on water problems for Alpine County. Blakeley is survived by his widow, Lois Blakeley; daughter, Barbara B. Fowler, of Claremont; son, Dr. Robert L. Blakeley, '58, of the University of Queensland, Brisbane, Australia; and five grandchildren.

1924

EUGENE WOOD SMITH, president of Cogswell Polytechnical College in San Francisco, has been elected vice president of the American Society for Engineering Education and chairman of the Society's Technical Institute Administrative Council.

1926

JEN-CHIEH HUANG, president of the China Merchants Steam Navigation Corp., died in February in Taipei, Formosa. He is survived by his wife, his mother (who still lives in mainland China), and two daughters, both studying in the United States.

LAWRENCE G. MAECHTLEN is the new chairman of the board of directors of Square D Company of Park Ridge, Ill., manufacturers of electrical distribution and control equipment. Maechtlen became president of Square D in 1960 and has been with the company since 1926.

1930

HERBERT G. SAWYER, retired president of the Sawyer Tanning Company of Napa, Calif., died in March. He is survived by his wife.

1941

ROBERT F. MYERS and his wife have just moved into a new home in Mexico City. They have lived in Mexico for nearly a year.

1943

LESTER N. NEUFELD, owner and manager of the Lester Neufeld & Son Ranches in Wasco, Calif., died in February after a long illness. He was 49. Neufeld and his family moved to Corona del Mar, Calif., 13 years ago. He was an enthusiastic yachtsman and participated in yacht races in Tahiti, Acapulco, and Hawaii. He is survived by his wife and son, who have returned to Wasco, four brothers, one sister, and one grandchild.

1944

FRED W. MORRIS JR., vice president-corporate planning and special assistant to the president of Radiation Incorporated, Washington, D.C., has been appointed technical consultant to The President's Task Force on Communications. This is under the chairmanship of Under Secretary of State Eugene Rostow and was established last year by President Johnson.

1945

MERRITT A. WILLIAMSON, MS, was recently named president-elect of the American Society for Engineering Education. He will take office as President in 1969. Williamson is the Orrin Henry Ingram Distinguished Professor of Engineering Management and director of studies in engineering management at Vanderbilt University.

1946

WILLIAM N. LIPSCOMB JR., PhD, professor of physical chemistry at Harvard University, has received the American Chemical Society Award for Distinguished Service in the Advancement of Inorganic Chemistry, sponsored by the Mallinckrodt Chemical Works. Lipscomb is noted for his x-ray diffraction studies of crystals. Prior to joining the Harvard faculty in 1959, Lipscomb had been a lecturer for the National Science Foundation, the University of Michigan, Howard University, Western Reserve University, and Pennsylvania State University.

1947

FERNAND P. de PERCIN, MS, is now chief of the regional and special projects branch of the Environmental Sciences Division of the Office of the Chief of Research and Development, Department of the Army, in Washington, D.C.

1948

CONWAY W. SNYDER, PhD, project scientist at Caltech's Jet Propulsion Laboratory, was recently awarded an honorary Doctor of Science degree by the University of Redlands at their Founders' Day ceremonies in April. He was noted for his outstanding achievement and leadership in studying interplanetary space. Snyder has worked on Mariner projects at JPL and is currently developing instruments for the astronauts in the Apollo program to implant on the moon's surface.

THORNTON A. WILSON, MS, executive vice president of the Boeing Company, has been elected president of the firm. Wilson, who first worked for Boeing in 1943, is perhaps most noted for his work as program manager for the Air Force Minuteman missile, to which he was assigned in 1958. He became a vice president in 1962 and was elected to the board of directors in 1966, the same year he became executive vice president.

1949

WALTER A. DANTINE died in 1963, it was reported recently by his former employer, General Electric of Santo Andre, Brazil.

1951

JAMES Q. DENTON has been promoted to associate professor of mathematics at Amherst College, Amherst, Mass.

1953

LUIZ H. DIRICKSON, MS, is manager of technical services for Xerox do Brasil S.A. -Reproducoes Gráficas, the subsidiary of Xerox Corporation in Brazil, and is living in Rio de Janeiro. Prior to joining Xerox in 1966, Dirickson worked for IBM in Brazil for 6 years.

1956

ROBERT R. JOHNSON, PhD, was recently elected vice president-engineering of Burroughs Corporation in Detroit, Mich. He has held several executive engineering positions since joining Burroughs in 1964 and was most recently director of engineering for commercial data processing systems and equipment and electronic business machines. Johnson was formerly with Hughes Aircraft Company and General Electric Company.

1957

MARTIN C. TANGORA is currently an instructor in mathematics at the University of Chicago. His last two summers were spent in Paris, where he gave two piano recitals for the Fondation des Etas-Unis of the Cité Internationale de l'Université de Paris.

Looking for a New Job? Let a Computer Help

The Caltech Placement Service now offers alumni who are looking for placement assistance the use of the GRAD system, by which their resumes can be made available—via computer—to thousands of potential employers throughout the United States and Canada.

Participating in GRAD (Graduate Resume Accumulation and Distribution) are more than 1,000 colleges and universities and some 2,000 employers. The College Placement Council is sponsoring this new nonprofit program.

According to Donald S. Clark, Director of Placements at Caltech, resumes are sent to the CPC's data center where key factors concerning the applicant's education and background are extracted and placed on computer files. Information from employers seeking persons with specific experience and educational qualifications is also fed into the computer, and resumes of qualifying applicants are then sent to the employers.

This service is being provided to alumni by the Institute at no charge. For placement service, fill out the coupon found on page 14.

1958

NORTON STARR is teaching mathematics at Amherst College, Amherst, Mass. He and his wife have one son and write that they are anxious to see any members of the class of '58 who visit their area.

1961

ALEXANDER F. H. GOETZ, MS '62, PhD '67, is now a member of the technical staff at Bellcomm Inc., a part of American Telephone and Telegraph, in Washington, D.C. He is working on geologic mission planning for the Apollo Space Program.

DOUGLAS S. JOHNSON, MS, AE '62, a major in the U. S. Air Force, was recently decorated with the Air Medal for meritorious achievement at Bien Hoa, Vietnam. He was cited for his "outstanding airmanship and courage on successful and important missions under hazardous conditions." Johnson is a member of an Air Force advisory team in Vietnam and will return to his position of special assistant to the dean of faculty at the U. S. Air Force Academy upon completion of his Vietnam tour.

DOUGLAS W. SHAKEL was married to Carolyn Leigh Fulton June 8 in Wichita, Kansas. Shakel is a licutenant in the U.S. Air Force, stationed at McConnell AFB, Kan.

1962

CARL W. HAMILTON and his wife write to announce the birth of their second son, Eric, on May 12 in Boston. Hamilton is completing his doctoral work in mathematic programming and economics at MIT.

LANCE J. TAYLOR, instructor in economics at Harvard University, will be working as an economic advisor/researcher in Chile until January 1970. His headquarters will be the ODEPLAN-MIT Economic Research Project Office in Santiago.

1966

WILLIAM B. BROSTE, a graduate student at the University of Wyoming, Laramie, has received a grant from the Society of the Sigma Xi to assist him in his study of "neutron polarization from low energy deuterondeuteron interaction." The Society awards financial grants each year to promising young scientists to further their research careers.

PROCEDURE FOR MAKING GIFTS OF SECURITIES

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