

ENGINEERING AND SCIENCE

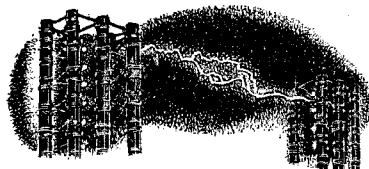
October, 1949



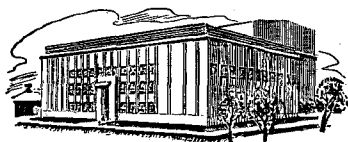
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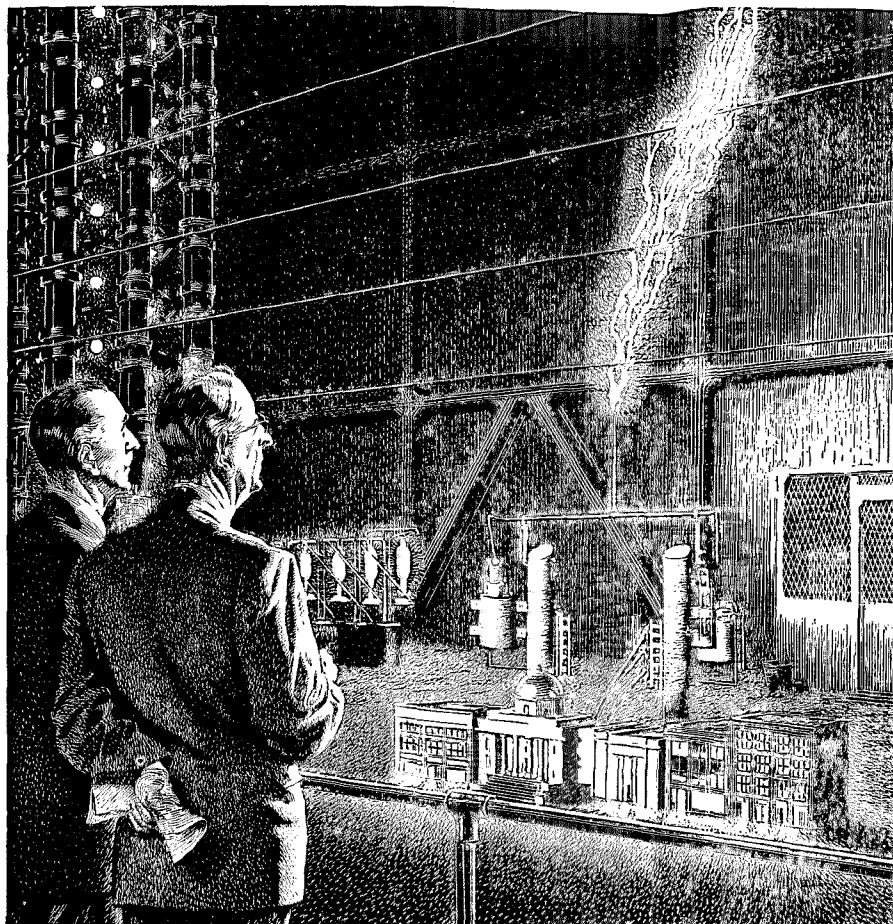
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In this issue

On the cover is a picture of Dr. F. C. Lindvall, Chairman of the Division of Civil and Mechanical Engineering and Aeronautics, addressing the men of the class of '53 in the big stone amphitheater at the new Student Camp. You'll find some of the highlights of this year's camp in Ralph Lovberg's pictures on pages 16 and 17 and in the Beaver's column on page 18.

Number One

Please note that, in the 1949 Magazine Awards Competition sponsored by the American Alumni Council for alumni publications in the United States and Canada, E & S got the nod last spring for Outstanding Editorial Achievement. We took First Place Award for our articles. Skeptical readers can drop in at the office anytime at all and we will dazzle them with the incontrovertible evidence—an ornate certificate, complete with gold seal.

Pauling's Proposition

Linus Pauling, distinguished head of Caltech's Division of Chemistry, is also President of the American Chemical Society. His article on page 5 of this issue, "Chemistry and the World of Today" is adapted from his presidential address to the society, at the annual fall meeting in Atlantic City in September.

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ENGINEERING AND SCIENCE MONTHLY

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STAFF

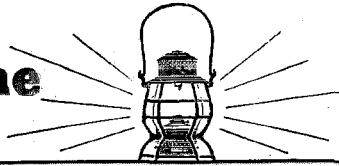
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The Main Line



The picture above doesn't begin to do justice to our fanciest piece of new equipment.

It was taken aboard the *Cascade Club*, swank kitchen-dining car-lounge, now in nightly service on the *Cascade* between Portland and San Francisco. But you really have to see it first hand to appreciate it.

In railroad parlance, it's a three-car articulated unit. All that means is that it is three cars long over all, and the dining and lounge sections provide an unbroken vista 135 feet long. The kitchen adjoins.

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Number Please . . .

Speaking of the *Lark Club*, incidentally, there'll be a telephone aboard soon. It works by radio, while the train is in full flight. And it will handle both incoming and outgoing calls. Aside from legitimate business and personal calls, we expect it to get a heavy play from folks who know people with the right name to

whom they can call at odd hours to say, "Mr. Watson, come here, I want you."

Cactus Fever?

Like the desert in the wintertime? If you do, chances are you'll like it even better in early season. It isn't too soon to be thinking of spots like Palm Springs, Phoenix, Tucson and the rest of the resort and guest ranch country.

For one thing, if you go soon, the resorts won't be crowded, and the weather will be at its best. Then, too, lots of places have special reduced rates for Indian Summer vacationers.

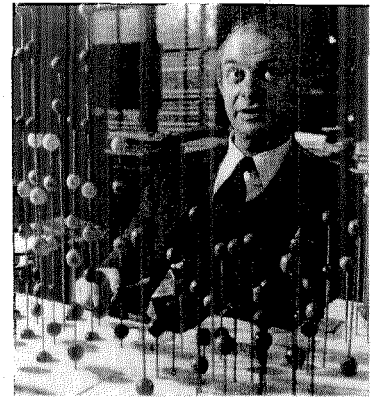
And remember, in making your plans, Southern Pacific has the only main line trains direct to Palm Springs, Phoenix and Tucson. We know our way around that country pretty well, and have a couple of generously illustrated folders to prove it. One of them is entitled simply "Palm Springs," and the other is "Your Vacation in Arizona and the Southwest."

If you'd like one or both to help plan your trip, just mail a card to Mr. Geo. B. Hanson, 610 South Main, Room 406, Los Angeles 14. He'll send them to you right away.

Ski Heil

The world's longest ski lift (8000 feet long, 2000-foot lift) is almost finished at Squaw Valley, not far from Truckee on our Overland Route. Opens next month.

In this issue CONT'D.



Pauling

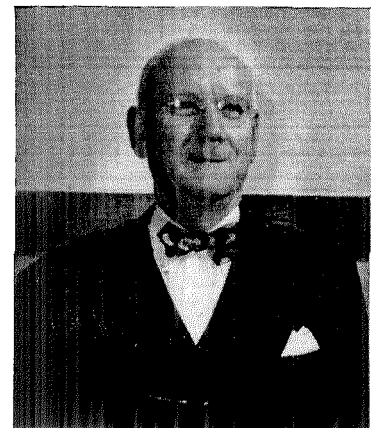
Don't let the title of the article fool you. Beneath that bland label Dr. Pauling—as is his wont—has planted a time-bomb. He tackles the knotty problem of how we are to insure support for basic scientific research in the United States, and comes up with an ingenious, and extremely logical proposition for getting this insurance.

Water Fight

Franklin Thomas tackles an even hotter potato in his article on page 9. "The Battle of the Colorado" is an attempt to unravel the complicated legal threads that are tied up in the California-Arizona disagreement over water rights in the Colorado River, and to explain, as simply as possible, what all the shouting's for.

Dean Thomas does the job in fine style, we think. Understandably, he sides with California in the fight—understandably because he played a key part in bringing Colorado River water to California in the first place.

Irate Arizona readers are promised a full hearing, however, in our columns—a promise it seems safe to make in the light of Dean Thomas' article, which doesn't seem to leave Arizonans much to say.



Thomas

S·P The friendly Southern Pacific

BOOKS

UNRESTING CELLS

by R. W. Gerard

Harper & Bros., N.Y., 439 pp. \$4.

Reviewed by Arthur W. Galston
Senior Research Fellow in Biology

This is a well conceived and highly readable book dealing with the basic characteristics of living systems. It is pitched at the level of the intelligent layman, and its highly literate author succeeds remarkably well in preserving both scientific accuracy and reader interest. As scientists and laymen alike can testify, this is no mean task.

It should be noted that this is not, strictly speaking, a new book. It was completed at the outbreak of World War II, and because of paper shortages and the diversion of biological personnel to more applied fields, soon passed out of print. The fact that it is now being reissued in its original form does not mean that it is outdated, for as the author reminds us, the normal pursuits of science were so interrupted by the war and its aftermath that very little fundamental work was produced which could alter any of our basic biological concepts.

The author's purpose in writing such a book is best expressed in his own words: "I have become ever more convinced by the sweep of world events that the scientist—yes, the pure scientist — is not merely justified in expending some energy on the popularization of sound science, but even more, has some duty to civilization to do so . . . Scientists must help recruit men in other walks of life to the use of the method and attitude of science in dealing with problems of state and society."

The opening chapters deal with the fundamental attributes of protoplasm and its possible mode of origin here or on some distant planet. Then, after a brief excursion into basic chemistry, the author returns to biology to build his complicated organism out of the well-defined concepts he has presented. Chapters on Enzymes, Metabolism, and Energy describe the manner in which organisms utilize the molecules about them for the work which they must do if they are to preserve their biological integrity. The sub-

sequent chapters deal with such topics as cell structure, growth, differentiation, reproduction, and heredity.

The greatest single virtue of the book is that it reflects the author's carefully considered scale of values. Concepts are properly regarded as the book's major domain; specific facts and details are introduced only in such quantity as is necessary for the proper development of the concepts. The gratifying result is the reader's feeling that an organism does possess, above all, unity. In an era when most biologists stress isolated enzymes, analytical procedures, and the progressive dismemberment of the organism, it is encouraging to see so capable a synthesis at the elementary level.

In general, this is highly recommended reading for all non-biologists. Engineers and physical scientists especially will quickly learn to talk the biologist's language by a careful perusal of this work.

RESEARCH IN INDUSTRY

Edited by C. C. Furnas

D. Van Nostrand, N.Y., 574 pp, \$6.50

Reviewed by Frederick C. Lindvall
Professor of Electrical
and Mechanical Engineering

Industrial research in the United States has become a billion dollar business. This present level of annual activity has been achieved in a relatively few years, stimulated in large measure by the preparations for and prosecution of World War II. In 1920 approximately 7,000 people were employed in industrial research in 300 laboratories. The growth was slow in the early twenties, but has continued at an accelerating rate, attaining in 1940 an employment level of approximately 70,000, and in 1948 somewhat over 150,000 in 2,400 laboratories.

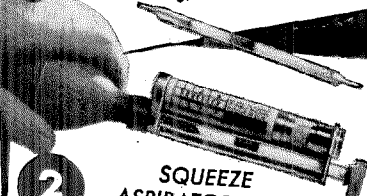
During this period of rapid expansion many of the growing pains common to the various laboratories in this new segment of American industry were studied by the National Research Council through its Division of Engineering and Industrial Research under such Council leaders in research as Dr. Frank B. Jewett and Dr. R. A. Millikan. In addition,

The New Precision Method of CO DETECTION

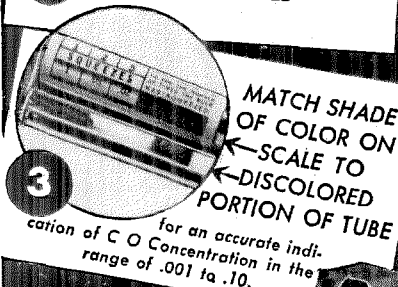


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to achieve even greater effectiveness in the study of the problems of industrial research management, the National Research Council fostered the founding of an independent organization known as the Industrial Research Institute. This Institute is limited in total membership, in order that its conferences may not become unwieldy, but fairly represents the industrial research laboratories of the country in size, scope, and objective.

The Industrial Research Institute, established in 1938, had as its general aims:

(1) To promote, through the cooperative efforts of its members, improved, more economical and more effective techniques of organization, administration, and operation of industrial research.

(2) To develop and disseminate information as to the organization, administration and operation of industrial research.

(3) To stimulate and develop an understanding of research as a force in the economic, industrial, and social activity of the nation.

(4) To promote high standards in the field of industrial research.

From the subsequent conferences of the Institute much general information of value to research administrators has accrued. A compilation of some of these results is now generally available in *Research In Industry*, edited by C. C. Furnas, Director of the Cornell Aeronautical Laboratory.

The twenty-nine chapters of the book are contributions of representatives of various member companies of the Industrial Research Institute. They range all the way from "The Philosophy and Objectives of Research in Industry," "The Research Director's Job," "The Research Budget," "Salary Policy," "Professional Growth of the Research Man," to "Relations with the Public and Government," "Research in America and Europe," and "Goals and Problems for the Future."

Three of these chapters are by Caltech alumni. W. R. Hainsworth, who wrote the chapter "By-Products of Research," and, jointly with R. S. Taylor, that on "Translating Research Results into New Products and Factory Procedures," received his M.S. from Caltech in 1918, the second M.S. to be granted by the Institute. Hainsworth is Vice-President

of Serval, Inc. Paul D. V. Manning, author of the chapter on "Goals and Problems for the Future," received his M.S. here in 1917, the first to be granted by Caltech. Manning is Vice-President in Charge of Research of the International Minerals & Chemical Corporation.

The volume is in no sense intended to be a handbook or manual of research administration, but nevertheless it includes many valuable examples of tested practices and procedures in industrial research management. This information, together with the discussion of the more general topics of research philosophy and objectives, the functions of the research director, the research program itself, and the position of the research laboratory in the corporate structure, will be of much value to research administrators in reviewing their own objectives, study of reorganization and expansion problems, and in planning organized procedures in research activities in which growth now demands more formal organization. Corporate management also will find much of value in the book in clarifying the position and function of industrial research in re-

CONTINUED ON PAGE 32

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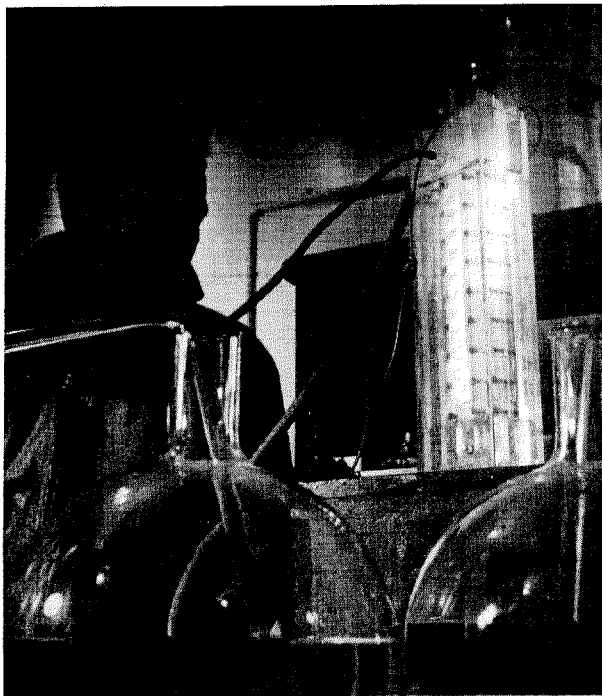
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An invitation—and a warning—
to private industry to come to the
aid of basic research.

by LINUS PAULING

Chemistry and the World of Today

WHAT can I say under the title "Chemistry and the World of Today?" I can say anything, discuss any feature of modern life, because every aspect of the world today—even politics and international relations—is affected by chemistry.

Everyone has experienced in his daily life the effects of the discovery and development of a new fiber, nylon. We all have seen the revolution that has taken place in medical treatment through the discovery and extensive use of penicillin and other powerful antibiotics. During the last decade the world has been changed in a very significant way by the atomic bomb, which was constructed through the joint efforts of physicists, chemists, and engineers.

Only recently, during the war years, when we began using up in practical applications our backlog of new basic discoveries, did it become clear to me that, although all scientists make their contributions to scientific progress, modern life is really based on *fundamental science*, on *pure research*, and that the nature of the world today has been determined, and the nature of the world of the future will be determined, by the work, and especially the ideas, the imagination, of a small number of people—the "impractical scientists," mainly university professors, who strive to add to our body of

knowledge in every way, rather than to solve certain practical problems that obviously need solution.

I am not minimizing the importance of developmental research and of industrial application of new discoveries; but am instead pointing out that the direction in which progress occurs is in fact determined by the basic discoveries that are made, and that accordingly it is the progress of pure science that determines what the nature of the world will be a generation later.

It is clear that the synthesis of nylon resulted from the early researches on the structure of natural fibres, and that the application of penicillin in medicine would have been impossible except for the original, accidental discovery of penicillin, by Professor Fleming. The clearest example of the determinative part that is played by research in pure science is probably that of the controlled release of atomic energy.

There has, of course, been a tendency to attribute to the physicists alone the development of atomic bombs and atomic power plants, but it is my feeling that chemistry should have a large part of the credit. For example, neptunium, the first of the trans-uranium elements to be discovered, was discovered by Professor Edwin McMillan and Dr. P. H. Abelson. Although Edwin McMillan is professor of physics at the University of

This article is adapted from the Presidential Address delivered by Dr. Pauling at the annual autumn meeting of the American Chemical Society, September, 1949.

California, his first research was carried out in chemistry, under my direction, and I have a strong feeling that his work along these lines has been strikingly effective because he has a sound knowledge of chemistry as well as physics.

Let us consider the steps that were involved in the development of this new part of our civilization, the manufacture of atomic bombs and production of power from the atomic nucleus. First, there was the discovery of something really new, both the observation of new natural phenomena and the inspiration of new ideas. Becquerel observed that a rock (containing radium, as was found later) could fog a photographic plate through black paper. Einstein, just *thinking* about the nature of the physical world, saw with the inner vision of his great intellect that a simplified picture of the world could be formulated, and that this picture led to the conclusion that matter and energy are interrelated: scientists then knew how great the amount of energy was that could be released by the destruction of matter. The positron was discovered, by Carl Anderson, who wasn't looking for it. The neutron was discovered. The phenomenon of the fission of atomic nuclei was discovered. The transuranium elements were discovered.

All of this foundation for the development of the atomic bomb and atomic power plants is a part of fundamental research—the search for unpredictable results, the effort to add to man's body of knowledge in any significant way. Becquerel could not lay plans to discover radioactivity—no one in the world had had imagination wild enough, bold enough, to predict or suspect that atoms could explode. Nobody, not even Einstein himself, could *plan* to discover the theory of relativity. No bank would have lent money to Chadwick to subsidize his search for the neutron—twenty years ago investment in atomic energy would have been called a preposterous idea by everybody. But it is these basic discoveries that determined the direction in which developmental research and subsequent practical application could be carried out.

A Monopoly of the Universities

Fundamental research is carried out almost entirely in universities, by university professors, and to a smaller extent in private or governmental laboratories and, as a minor activity, in industrial laboratories. It is carried out by men and women whose temperament, ability, and training are such as to fit them for this unusual activity—that of looking for new knowledge without concern about its immediate use in the solution of practical problems—and the environment in universities seems to be especially well suited to this activity.

I believe that we all recognize that progress will cease unless new fundamental discoveries are made, and that the rate of progress is determined by the amount of fundamental research that is carried on. Two years ago the President's Committee on Scientific Research emphasized the importance for the security and welfare of the nation of carrying on basic scientific research on an expanded scale. The recommendation was made that a National Science Foundation be established, and that federal funds amounting to 250 million dollars per year by 1957 be appropriated for the support of basic scientific research, *mainly in the universities of the nation.*

Three years ago, in delivering the first Remsen Memorial Lecture, the distinguished Chairman of the Board of Directors of the American Chemical Society, Professor Roger Adams, discussed the importance of federal support and scientific research. He mentioned that there was controversy about the nature of the administration

of the proposed Science Foundation—that the Kilgore Bill presented a plan for a politically controlled organization, and the Magnuson Bill proposed that the control and distribution of funds be left in the hands of the scientists. He mentioned the compromise bill that was under discussion—but let me quote from his talk:

“Even though the organization of the proposed National Research Foundation under the compromise bill resembles that which Hitler decreed for the Kaiser Wilhelm Geseellschaft after 26 years of extraordinarily successful operation by scientists, American scientists are supporting the bill as probably the best to be hoped for with our democratic government. They recognize that the necessity of a foundation in this country to support scientific research and the training of scientists is of utmost importance to the health, security, and welfare of the nation. They have faith that the present President of the United States or a successor will not allow political influences to prejudice his appointments or decisions.

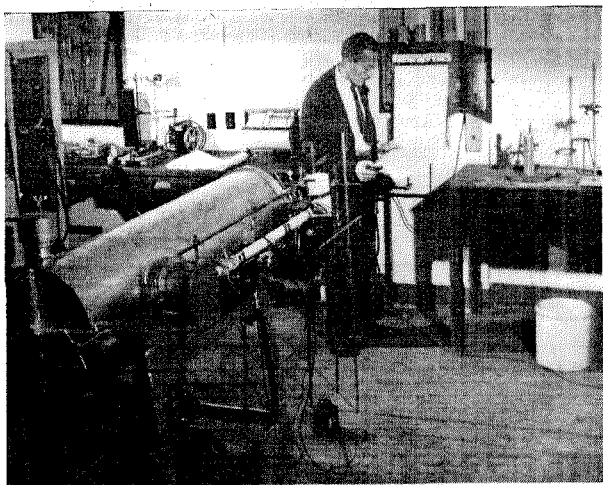
The British and Russian Systems

“In Great Britain, the government allocates a liberal amount of money for scientific research and development. These funds are administered by a small committee of distinguished scientists with full authority to distribute them to the best of their ability for the benefit of science and the British people.

“In Russia, all reports emanating from that country are to the effect that the government is supporting a very extensive program in fundamental research. But the Russian scientists have their troubles. A few quotations from an address by P. L. Kapitza, the world-renowned Russian physicist and engineer, delivered before the Soviet Academy of Sciences in 1943 on ‘The Institute of Physics’ of which he is the director, deserve repeating.

“He said: ‘The organization of science in our country must be more systematic and conscious of its aims than it is in capitalistic countries where it is rather left to chance and has a spontaneous character.’ His institute had a complicated financial system which he strenuously opposed and which was finally changed. He stated: ‘In my debates with officials of the Commissariat of Finance on their so-called “schematic system” of accounting, I wrote them the following: “When you look at a painting of Rembrandt, are you interested in the question how much Rembrandt paid for his brushes and canvas? Why, when you consider a scientific job, do you want to know the cost of apparatus or the material used in it?” If a scientific job has produced considerable results, its value is not comparable with the material expenditure on it. The money cost of scientific work is not comparable with its cultural value. I asked, “How much would the Peoples’ Commissariat for Finance have considered allotting to Isaac Newton for his work which led to the discovery of gravity?” The Commissariat objected tirelessly. Our discussions went on for over six months and I think I could not have won unless the Council of Commissars had come to my aid.’ In commenting on these statements the director of another Russian institute remarked, ‘An everlasting war has to be waged with “bookkeeping.”’ It appears that the accounting systems required by the Russian and United States governments are not far different. . . .

“Progress in applied science depends upon advances in fundamental science. The power of science in the United States will be no more effective than the quality of our teachers and students who create the background for future industrial discoveries. Once again I quote



In the absence of a National Science Foundation, research like Prof. Badger's studies of molecular spectroscopy related to molecular structure is subsidized by Navy.

Kapitza who pleaded for recognition of fundamental science and its importance—he said, ‘We, however, are often apt to judge scientific achievements only by their practical results and consequently it appears as if the person who picked the apple had done the main job, while in actual fact, the apple was created by the person who planted the tree.’

‘The strength of a country has depended in the past on its possessions—in earlier days on land, its control of transportation and waterways, or its supply of raw materials, but today a nation’s strength will lie largely in the quality of its science and scientists. Government must support the work of scientists but not control it in such a way as to hamper development or to direct it into military channels. . . .’

Now it is 1949. Three years have gone by since Professor Adams delivered this Remsen address, four years since the National Science Foundation was strongly recommended to the President in the Bush Report, two years since the recommendation was repeated, still more strongly, in the Steelman Report—and there is still no National Science Foundation. Can we say that the members of the Congress alone are to blame for this situation? Are not we ourselves, the members of the American Chemical Society, also to be blamed? Should we not have done something more than to send a representative to a hearing of a Congressional committee, to send a letter or two written by the Board of Directors? I myself feel that we *should* have done something more, and that we should now do something more, in order to make clear to the people of the nation that the scientists themselves believe the statements that they make about the importance of basic research.

The objection might be raised that it is not proper for the American Chemical Society to take part in political activities. I do not believe that this objection is a valid one.

It seems to me that under our Charter we have not only the right but the duty to educate the people of the nation, including the members of the Congress, about the questions that are discussed in the Bush Report and the Steelman Report. The American Medical Association, in some respects a sister organization to the American Chemical Society, is now taking a vigorous part in the discussion of the federal compulsory health insurance plan proposed by Federal Security Adminis-

trator Oscar Ewing and endorsed by the President of the United States.

President Truman, in his message to the Congress on January 5, said ‘‘We must spare no effort to raise the general level of health in this country. In a nation as rich as ours it is a shocking fact that tens of millions lack adequate medical care. We are short of doctors, hospitals, and nurses. We must remedy these shortages. Moreover, we need, and we must have without further delay, a system of prepaid medical insurance which will enable every American to afford good medical care.’’

The American Medical Association’s campaign against this proposal involves a program of public education to promote advancement of health under our present voluntary system. The program of public education is costing several million dollars, raised by assessments of \$25 per man on the membership of the AMA.

Clem Whitaker, one of the two publicists who are the directors of the National Education Campaign of the American Medical Association, has described the purpose of the campaign in the following way: ‘‘American medicine, in its campaign against compulsory health insurance, cannot afford to fight alone. This must be a campaign to arouse and alert the American people in every walk of life, until it generates a great public crusade and a fundamental fight for freedom. We need the help of every American who honestly believes in the American way of life—and our campaign must be geared to get that help. Any other plan of action, in view of the drift toward socialism and despotism all over the world, would invite disaster.’’

In mentioning the American Medical Association and its National Education Campaign I hope that I do not give the impression that I myself am sympathetic to its aims. As an individual, I feel that a system of socialized medicine in the United States may well be desirable, and that at any rate it needs serious consideration. I find it difficult to understand why this nation, which prides itself on being the richest nation in the world, should be inferior to Sweden and other small nations in the standards of health and medical care of its people.

Call to Action

However, that is aside from the point. What I want to emphasize is that the American Medical Association is taking significant action on a question relating to federal legislation, and that there is, in my opinion, no reason why the American Chemical Society should not put on a strong program of public education about the overwhelming importance of federal support of scientific research, as advocated in the Bush Report and the Steelman Report.

It is true that there is danger in having basic scientific research in our universities supported exclusively or predominantly by the Federal Government—the danger of bureaucratic control of the universities and of scientific research. In the absence of a National Science Foundation, the Public Health Service and the Armed Forces, especially the Department of the Navy, have been subsidizing pure research in our universities, because of the recognition of the very great need of the nation for work in this field. Many scientists, such as President DuBridge of the California Institute of Technology, have recognized the danger in predominant support of research by the Armed Forces. A similar danger would of course apply to some extent to federal support through a National Science Foundation, amounting to 250 million dollars a year. We recognize that there is this danger, and yet we see that the need to

carry on basic research on the proposed scale exists, and must be met. What can be done in this situation?

I feel that there is a way in which the threat of complete domination of basic scientific research by the Federal Government can be met, and I suggest that the American Chemical Society give serious consideration to an active program of education along this line, as well as for the National Science Foundation.

The way in which the people of the United States can avoid the danger of federal domination of research in the universities of the nation is by the provision of a comparable sum of money for support of research from other sources.

Private-Enterprise Research Fund

I have in mind the formation of a foundation, like the Nutrition Foundation, which will collect funds from the industrial corporations of our great nation and will distribute these funds among our universities and pure research institutes. I suggest that, in order to be effective, this private enterprise fund for pure research be of considerable magnitude, amounting to 75 million dollars per year by 1957.

I have reached the figure 75 million dollars per year by considering what sum would be effective as protection against the danger of a Federal subsidy of research in pure science of 250 million dollars per year and what sum would be reasonable in comparison with the sums expended by industry for developmental scientific research.

A private-enterprise research fund of 75 million dollars per year would be just 20 percent of the proposed Federal subsidy; a smaller fraction could not be expected to have a significant effect in averting the dangers of bureaucratic domination. The funds expended in research by industry in 1947 have been estimated at 450 million dollars, and the extrapolation in the Steelman Report indicates that this sum will be increased to 750 million dollars by 1957.

Accordingly my proposal is that a sum be provided by industry for research in pure science in our universities equal to 10 percent of that expended for developmental research. I believe that this fraction is reasonable, considering that the sum proposed for expenditure by the Federal Government in support of pure research in the universities would amount to 25 percent of the Federal budget for research in its own departments.

Insurance for Industry

We must not consider that support by the nation's industrial corporations of the proposed Research Foundation would come under the heading of charity. Dr. F. R. Bichowsky in his book on industrial research has stated that industrial research should be considered by our corporations as insurance—insurance that the corporations will have new products to manufacture in the future. In the same way, I would say that the proposed support of pure research should be considered as insurance—insurance that the research departments of the corporations will have basic knowledge that will permit them, in the future, to pursue their own insurance activities.

I do not believe that the sum of 75 million dollars per year is an unreasonable one, in comparison with either the profits or the gross income of the industrial corporations of the nation. The figure 20 billion dollars has been quoted as the annual profits of our industrial corporations. Seventy-five million dollars is only 0.375 percent of the profits—surely not a large fraction to pay for insurance. I do not know what the annual

gross income of our industrial corporations is, but it must be of the order of 100 billion dollars. Seventy-five million dollars is 0.075 percent of this gross annual income—surely a very small amount to expend on insuring an improved product for the next generation.

Where the Need Is Greatest

In the distribution of the funds under the control of this Research Foundation I would hope that the private institutions of the nation would be especially favored. The effects of the great increase in the cost of living—and the cost of carrying on research—during the past ten years have been in some degree alleviated in our State-supported universities by a great increase in the annual appropriations of the State legislatures. The privately controlled and privately supported universities have, however, not had a corresponding increase in the earnings from their endowments and in new gifts.

There is in my opinion an especially crucial situation in our private universities in that the size of the professorial staffs in chemistry and other sciences has not increased proportionately to the number of undergraduate and graduate students. Although the undergraduate students as well as graduate students in our universities have doubled in the last decade, the number of faculty members has increased by only about 25 percent on the average, and by a smaller fraction in the privately supported universities.

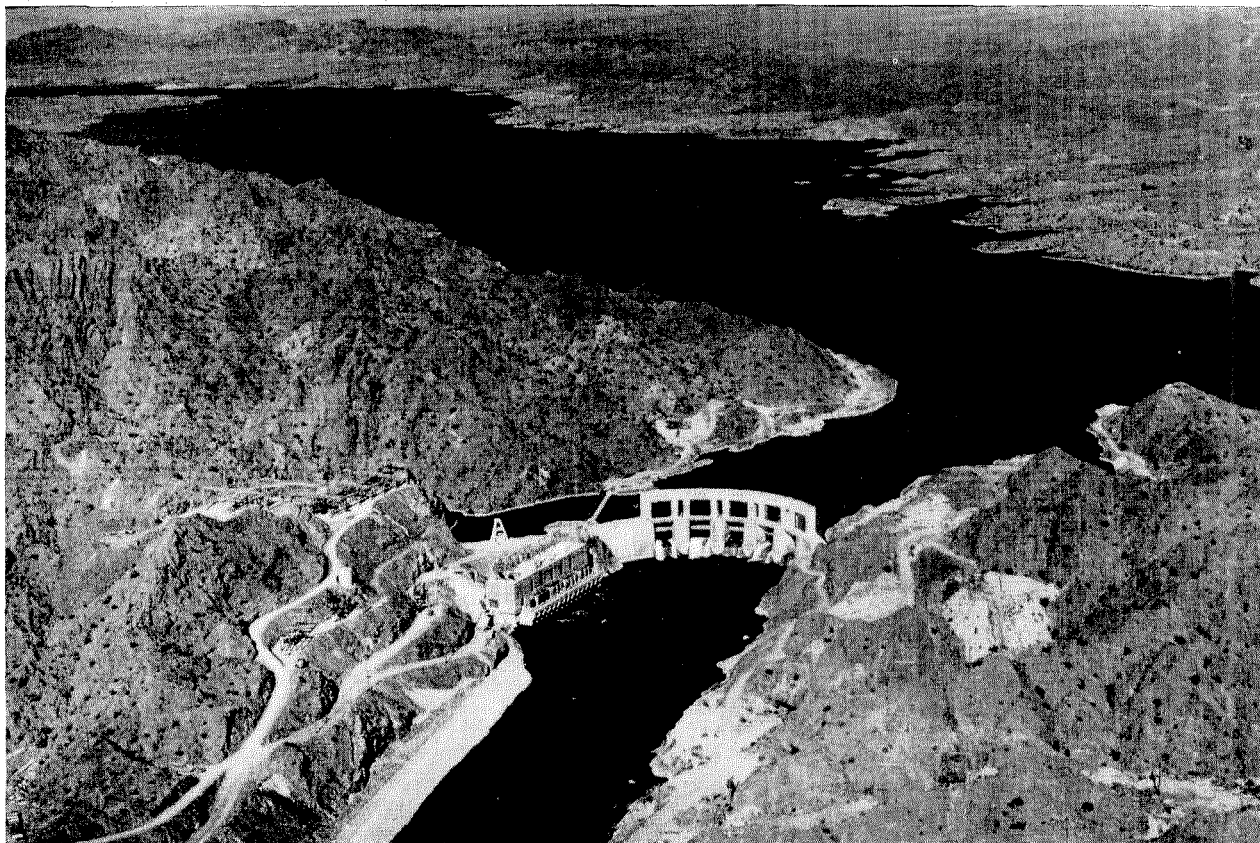
Overloading the Professors

At Harvard University there were twelve members of the Chemistry Department in 1939; today this number has increased to thirteen. In 1939 there were fourteen members of the professorial staff of the Division of Chemistry and Chemical Engineering in the California Institute of Technology, and now there are only sixteen, although the number of post-doctorate research fellows working in the Division has increased during the decade from sixteen to forty and there has been a corresponding increase in the number of graduate students.

The expected consequences of such a deficiency in the professorial staffs are serious. The professors, because of the overload of teaching, may not find it possible to keep even with the advance of scientific knowledge. The students whom they train may come to the end of their period of training already somewhat behind the times; the universities would then be producing an unsatisfactorily trained group of men to carry out scientific work in the coming decades.

This situation emphasizes the fact that, in order to be effective, the funds distributed by the proposed Research Foundation should be given to the universities essentially without restrictions as to the way in which the money may be expended, and the Research Foundation should be set up in such a way that there is assurance that the funds will continue to be available year after year.

I hope that the members of the Boards of Directors of our industrial corporations, in justice to our American system of private enterprise, will see that they have the opportunity to help to avert the danger that they foresee by themselves providing a more significant part of the support of pure research in our universities and research institutes. I believe that we, as individuals, and the American Chemical Society, as a corporation, have the duty to work vigorously both for a National Science Foundation to implement the recommendations in the Bush Report and the Steelman Report and for a great Research Foundation subsidized by industry.



At Parker Dam Colorado River water begins its 380-mile flow, through desert and mountains, to California cities.

The Battle of the Colorado

In this tough legal fight over water rights, the whole future development of Southern California may be at stake.

by FRANKLIN THOMAS

THE fight for the water of the Colorado River goes on. Of the seven states that use the river, four—Colorado, New Mexico, Utah, and Wyoming—have agreed on a way of distributing the share of the Upper Basin; one more, Nevada, has been taken care of in a separate agreement. But between the other two states, Arizona and California, the eight and a quarter million acre-feet of water per year that are left, remain a bone of bitter contention.

Focus of the fight at present is the Central Arizona Project Bill. This bill, if Congress passed it, would take from the Colorado 1,200,000 acre-feet a year. But that amount, added to the present and planned consumption of the two competing states, brings the total demand for Colorado River water well over the supply available. Since no one has yet discovered a way to increase the amount of water flowing in a river, one of the two states will have to modify its claims; and that, of course, is where the trouble lies.

The part of California directly threatened by a short-

age of Colorado River water lies south of the Tehachapi range, and is less than one-third of the total area of the state. This area supports more than half of the state's population and represents half of the state's wealth; and yet to it is tributary less than one percent of the surface waters of the state—the Colorado River excluded.

In this area, replenishment of surface flows and groundwater accumulations depends on highly variable rainfall seasons. The 72-year rainfall record in Los Angeles, representative of the coastal area, consists of alternating sequences of above-average and below-average rainfall extending from 10 to 17 years in length. Currently there has just been experienced the fifth sub-normal season in succession following the end, in 1944, of a 10-year wet sequence. The pattern of the record indicates that from 6 to 10 below-normal years lie immediately ahead (see "Are We In For a Long Drought?" by Franklin Thomas, E & S, Oct. '48). Water from the Colorado must fill the gap.

Water supply must increase as population grows. The population changes of Los Angeles are representative of the rate of increase in the metropolitan area. When in 1925 the first meeting was held to launch a Colorado River Aqueduct, the population of Los Angeles was approximately 1,000,000. In 1941, when Colorado River water became available, the population was approximately 1,600,000. At the present time it is estimated at 2,000,000. The population within the Metropolitan Water District—the whole area served by the aqueduct—is nearly 4,000,000.

Keeping pace with population growth, the use of Colorado River water in the coast counties has increased by annual increments of from 30 to 50 percent until during the summer of 1949 the delivery was 350 cubic feet per second, or nearly one-fourth of the capacity of the aqueduct.

The water representing full flow in the aqueduct, when added to the local supplies, would provide a total over the habitable portions of the valleys of the Los Angeles, San Gabriel, and Santa Ana Rivers of 1.5 acre feet per acre per annum. This amount of irrigation water would approximately meet the needs for agriculture and would also, by coincidence, adequately serve the needs of the area if transformed to urban development. Expressing the potentialities of Southern California's allocation of Colorado River water in another way, the allotment to the Metropolitan Water District of 1655 cubic feet per second of continuous flow would supply somewhat more than 6,600,000 persons living on city lots.

Thus it is apparent that, for several decades at least, the local and developed water from other sources, supplemented by the full flow of the Colorado River Aqueduct, will meet the needs of the area comprising the three valleys of the Los Angeles, San Gabriel and Santa Ana Rivers, and that portion of San Diego County included within the San Diego County Water Authority, a unit of the Metropolitan Water District. It is pertinent to cite here that not included are a substantial area to the west of the San Geronio Pass and also much fertile land in San Diego County where developments are permanently limited because no water is available.

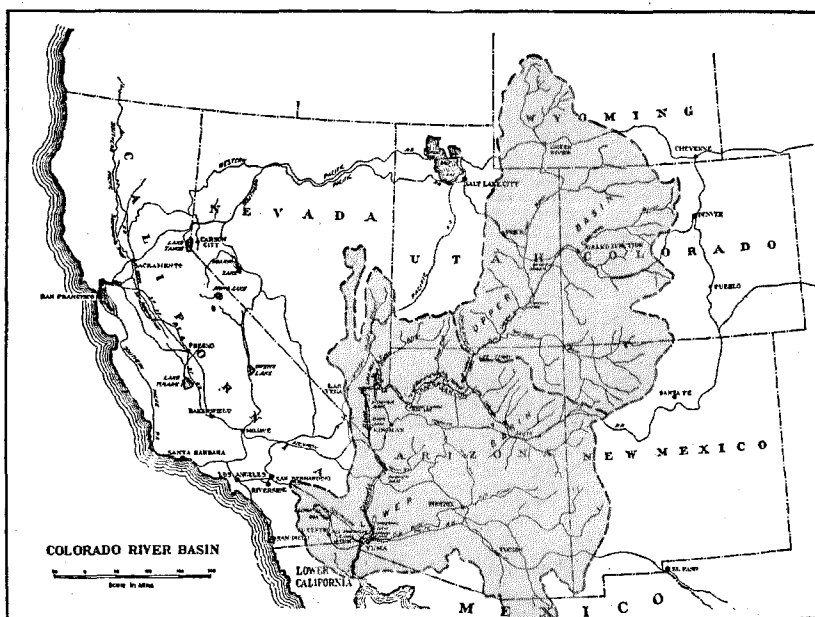
Furthermore, the yields of local basins are dependent upon the preservation of those basins from salt water

intrusion. If excessive overdraft upon these basins persists, as at present, when in some localities water is being pumped from below sea level as far as 15 miles inland, the yield of some of these basins may be lost.

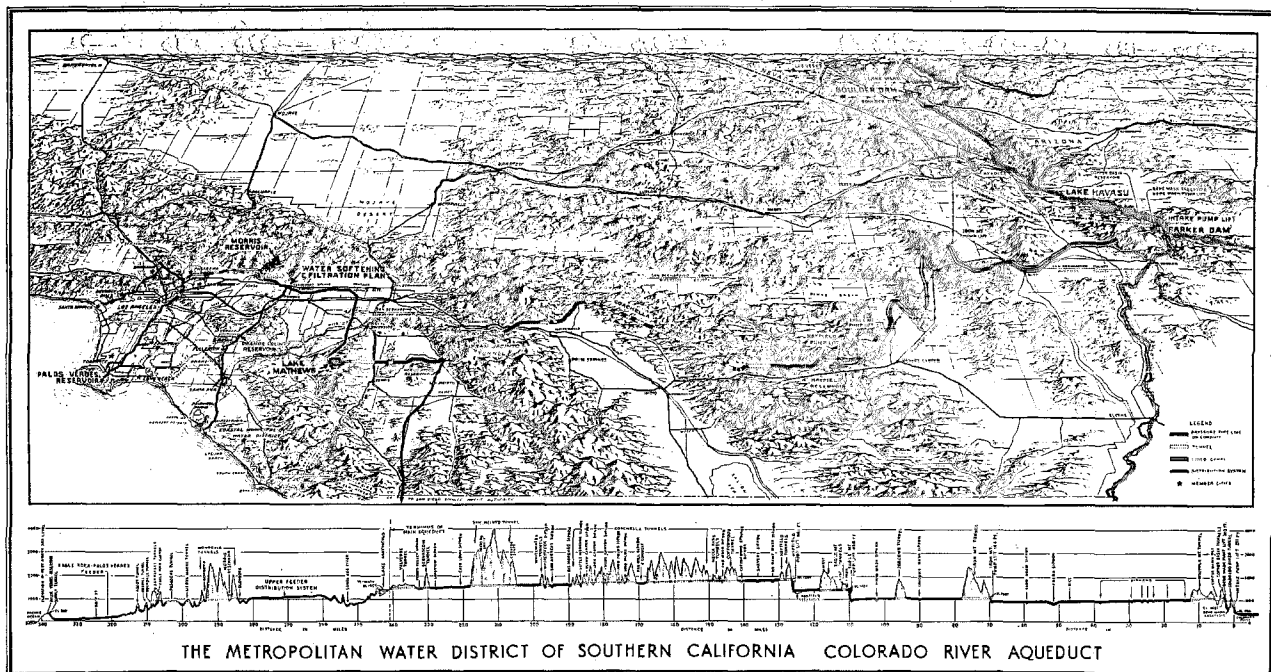
In the public interest it would be highly desirable for the entire metropolitan area to use imported water in order to relieve the overdraft upon the seriously depleted groundwater basins underlying much of the coastal plain. These basins should be permitted to recharge and be kept replenished as a cheaply stored reserve supply against the possibility that a drought may occur simultaneously on the local watershed and on the watershed of the Colorado River.

The most spectacular example of how outright disaster would have befallen some Southern California cities but for the availability of Colorado River water is the case of San Diego. As is well known, the City of San Diego has, during its period of development, been dependent largely upon water caught in reservoirs from occasional floods and carried over in storage through several years of negligible runoff from the tributary catchment areas. To meet a war time doubling of population up to 400,000 people and an inadequate replenishment of reservoir supplies, the Navy Department took emergency action to construct a connection with the Colorado River Aqueduct at the west portal of the San Jacinto Tunnel as the only means whereby a supplementary water supply could be obtained to support the civilian population and extensive establishments of the Navy and the Army. When Colorado River water began flowing into San Diego's San Vicente reservoir in December, 1947, the City had in storage water for barely one year's needs, while some of the other areas of the San Diego Water Authority had stored water sufficient to last only three months.

Such a narrow escape from disaster due to exhaustion of water in a locality of high strategic importance should serve as a warning to public officials of the necessity of assuring an ample water supply well in advance of the time of need. Other localities could be cited where the local groundwater supplies have diminished in quantity or deteriorated in quality, if near the ocean, until all or nearly all of the current needs are met from the Colorado River. New areas where local groundwaters are acutely overdrawn are seeking annexation to the Metro-



The Colorado River Basin extends over seven states—Wyoming, Nevada, Utah, Colorado, California, Arizona, New Mexico. All but California and Arizona have agreed on a way of distributing their share of the precious water.



THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA COLORADO RIVER AQUEDUCT

Aqueduct provides the essential supplementary—in some cases the only—water supply for 4,000,000 Californians.

politan Water District in order to gain a supply of imported water.

Formidable as was the undertaking of providing the physical works required to transport Colorado River water 380 miles to the Pacific Coast across an unmapped desert, directing it through several mountain ranges, and lifting it 1616 feet, the construction was preceded by a series of compacts, legislative acts, governmental agencies, negotiations, agreements, and contracts even more formidable.

Under the chairmanship of Herbert Hoover, then Secretary of Commerce, representatives of the states of Colorado, Wyoming, Utah, New Mexico, California, Arizona, and Nevada, meeting in Santa Fe in November, 1922, drew up the Colorado River Compact. In the language of Article I: "The major purposes of this compact are to provide for the equitable division and apportionment of the use of the waters of the Colorado River System." Article II, in part, divides the area served by the Colorado into the "Upper Basin" and the "Lower Basin," the latter (which includes Southern California) being defined as "those parts of the States of Arizona, California, Nevada, New Mexico, and Utah within and from which waters naturally drain into the Colorado River System below Lee Ferry, and also all parts of said States located without the drainage area of the Colorado River System which are now or shall hereafter be beneficially served by waters diverted from the System below Lee Ferry."

Article III contains the all-important paragraph (b), concerning the interpretation of which widely divergent and hostile viewpoints have arisen. "(a) There is hereby apportioned from the Colorado River System in perpetuity to the Upper Basin and to the Lower Basin respectively the exclusive beneficial consumptive use of 7,500,000 acre feet of water per annum, which shall include all water necessary for the supply of any rights which now exist. (b) In addition to the apportionment in paragraph (a) the Lower Basin is hereby given the right to increase its beneficial consumptive use of such waters by one million feet per annum."

This compact did not become effective until 1944, when Arizona finally ratified it in the course of approving a water contract with the Secretary of the Interior. But in the interim, the Boulder Canyon Project Act was taking form. It became a law in 1928; and since the compact had not been ratified and therefore no agreement on the distribution of Colorado River water between the lower-basin states existed, there was written into the act a proposal:

"The States of Arizona, California, and Nevada are authorized to enter into an agreement which shall provide (1) that of the 7,500,000 acre feet annually apportioned to the lower basin by paragraph (a) of Article III of the Colorado River Compact, there shall be apportioned to the State of Nevada 300,000 acre feet and to the State of Arizona 2,800,000 acre feet for exclusive beneficial consumptive use in perpetuity and (2) that the State of Arizona may annually use one-half of the excess or surplus waters unapportioned by the Colorado River compact—"

The act provided, however, that it would not become effective until six states, including California, had ratified the compact and the California Legislature "shall agree inexorably and unconditionally—that the aggregate annual consumptive use (diversions less returns to the river) of water of and from the Colorado River for use in the State of California—shall not exceed 4,400,000 acre feet of the waters apportioned to the lower basin states by paragraph (a) of Article III of the Colorado River Compact, plus not more than one-half of any excess or surplus water unapportioned by said compact, such uses always to be subject to the terms of said compact." The California legislature in 1929 adopted such a limitation.

It is the conflict of interpretation of the compact and the limitation act regarding III-b water which constitutes one of the major issues of the controversy between the states of Arizona and California. Arizona contends that, by the limitation act, California's rights in the Colorado River are fixed at 4,400,000 acre feet per annum. California contends that its rights include,

besides the 4,400,000 acre feet per annum, half of the (surplus) 1,000,000 acre feet or more unassigned by the Colorado River Compact.

Four cases involving Arizona's contentions have come before the United States Supreme Court. In the second suit, started by Arizona in 1933, the Supreme Court rejected Arizona's claims that the 1,000,000 acre feet of III-b water was designated for Arizona's exclusive use and stated that the clear intent of the compact was that the water belonged "to the States of the Lower Basin and not specifically to Arizona alone."

The Boulder Canyon Project Act provided that, prior to any appropriations by Congress for constructing the Dam, it would be necessary for the Secretary of the Interior to execute contracts for the sale of power and the storage of water which would return the investment to the Federal treasury with interest in fifty years.

Power and water storage contracts

Such contracts were negotiated in 1930 with both public and corporate interests. These agencies were the Cities of Burbank, Glendale, Pasadena, and Los Angeles, and the Southern California Edison Company, the California Electric Company, and the Metropolitan Water District of Southern California. The Metropolitan Water District was allotted the largest block of firm power—36 percent of the plant output or 350,000 horsepower—for operating the five pumping stations. Thus the aqueduct became a major guarantor of the Hoover Dam, the source of its own power. During the interval before the pumping needs require all of the District's allocation of power, the surplus is being resold to other power distributors. The total of \$550,000,000 has been paid otherwise, or full payment guaranteed to the Federal treasury by Southern California interests concerned with irrigation, power, and domestic water, for the Metropolitan Aqueduct, Hoover Dam and Power plant, 11 transmission lines, and the All-American Canal.

All of these California projects utilizing the power or water of the Colorado River are entirely self-liquidating to such a degree as to satisfy the most exacting standards of economic feasibility. The agencies are financing the developments with private investors or through Federal contracts involving full repayment. In fact, the Metropolitan Water District in providing the funds for the construction of Parker Dam—to be owned by the United States—set a precedent which, unfortunately for the Federal treasury, will seldom be repeated. The head created by Parker Dam is being utilized to generate much of the electrical energy currently used in Arizona.

The complete financial underwriting of the Boulder Canyon Project was done by California agencies in 1930. Under the terms of the Act, Congress could not make appropriations for Hoover Dam until firm contracts for repayment of the cost with interest had been executed by the Secretary of the Interior. On the basis of these contracts (for storage of Colorado River water and for power for pumping water into and along the aqueduct) the Metropolitan Water District of Southern California has sold bonds to the public aggregating nearly \$200,000,000, with which it built the Colorado River Aqueduct. This locally financed aqueduct provides the essential supplementary, and for some localities the only, water supply for 4,000,000 Californians and for vitally important military and naval establishments along the Coast.

In the light of these facts, it is inconceivable that an informed Congress would authorize construction of a non-self-liquidating project, infeasible by any present

economic standards of the Bureau of Reclamation, and having no water right except for claims—which are in conflict with those of California—involving the water represented by the contracts between the Federal Government and the Metropolitan Water District of Southern California. Yet the Central Arizona Project Bill, which has been pending before Congress for the last two sessions, is just such an infeasible proposal.

The project, to be carried through at government expense, would cost \$700,000,000, would provide for the irrigation of field crops and involves, among other features, a pump lift of 985 feet for 1,200,000 acre feet of water per year from behind Parker Dam and an aqueduct 241 miles long to the valley near Phoenix. The power for the pumps would come from the proposed Bridge Canyon Dam 117 miles upstream from Hoover Dam.

The estimated cost of the project per acre is several times the value that the land to be benefited would have when improved. It is not contemplated that any of the construction costs would be repaid directly by the land to be irrigated, and the operating costs would be so high that they could only partly be paid by the acreage served.

In reporting to Congress upon the Central Arizona Project, the Secretary of the Interior has specifically called attention to the existing conflict between the two states on the interpretations of several of the contractual instruments which apply to the division of water in the Lower Basin of the Colorado River, and has stated that this conflict can be adjusted only by negotiations or by court adjudication, and that the Congress should give this conflict full consideration.

Negotiations fail

Since attempted negotiations between the two states have not produced any adjustment of their differences, it is California's contention that the issues should be submitted to the United States Supreme Court for adjudication. Such a suit would require the consent of Congress. Arizona has resisted this procedure and has endeavored to obtain authorization from Congress for the immediate construction of its project by the Bureau of Reclamation. Protracted hearings on the two proposals have been held this year by the Senate Committee on Interior and Insular Affairs, and by the House Committee on Public Lands on the Central Arizona Project Bill. As yet, the House Committee has declined to report out the bill. The Senate Committee early in August issued a majority report favoring the Central Arizona Project Bill, and at the same time recommended authorization of a Supreme Court adjudication of the controversy regarding water rights. Six months is specified as the time within which suit must be brought. The report recommended that no appropriations for construction be made while the Court had the case under consideration.

At such a time as consideration of the committee report comes before the Senate there is certain to be vigorous opposition to any contingent approval of the Arizona Project prior to a clear determination of the availability of an adequate water right for the project.

This issue affecting California's rights in the Colorado River is of such critical importance to a large section of the state that it calls for alert action by all Californians to impress upon Senators and Congressmen from all parts of the country the acute threat to established development which the Central Arizona Project Bill represents.

Caricatures of Men of Science

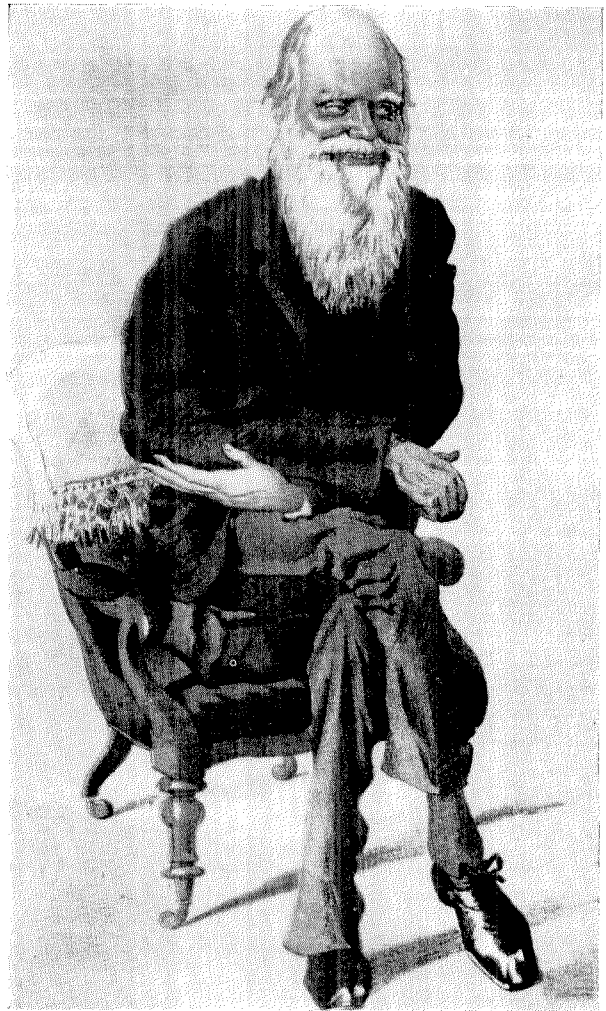
by E. C. WATSON

LIKE John Tyndall, whose caricature introduced this series (E & S, July '49), Charles Darwin was "inseparably connected with the battle which began in the middle of the nineteenth century for making the new standpoint of modern science part of the accepted philosophy in general life." The justly famous caricature of Darwin reproduced here, together with the written account (below) which accompanied it when it was originally published in *Vanity Fair* in 1871 clearly shows the prestige science acquired during the Victorian era.

"In all times, and among all peoples, whenever and wherever the faculty of thought has existed, men have asked the question: How come we here?" and there is scarcely a form of society but has produced one or more kinds of answer to the inquiry. Up to within the last hundred years these answers have one and all been presented in the form of a Revelation from an Authority entirely outside the men and the world to whom and to which the matter relates. The fables that have thus been presented to mankind have been of the most various and the most conflicting character, and have been referred to the sanction of the most dissimilar Authorities. They have agreed in one only respect—that they have all been of the most childish invention, and that the elaboration of the systems built up thereupon has been of the very rudest kind.

"While the vulgar many of all countries have universally received the local Fable as it was presented, the stronger-headed few have as invariably rejected it. For hundreds of years, as we know, and as we may infer, for thousands, the few were fain to content themselves with the conclusion that they knew nothing whatever about the earth and its inhabitants. In modern times, however, the method has been adopted of interrogating that earth and those inhabitants themselves without reference to any real or supposed external Authority; and although in so vast a field of labour it has as yet not been possible to achieve any very great results, certain new theories have been built up of which it can at least be said that they are more presentable than any of the old fables.

"Among these theories one of the most striking is that which Mr. Darwin has given to the world with reference to the Origin of Species by means of Natural Selection. Mr. Darwin, who was born sixty-two years ago, has spent



Darwin: "His writings have all the charm of romances."

the whole of a most laborious life in close converse with the material world in which we live, and the beings that it has from time to time seen upon its surface. He has thus become one of the most accomplished naturalists now in existence, and any theoretical structure that he builds upon his researches must be regarded with great respect. His books are written to a large extent for and appeal to ordinary men. This, indeed, it is which gives them their great importance. This, however, makes it also allowable to say that to ordinary men the chain of inferences seems to be very loosely hung together by which he seeks to establish that the various species of animals now existing on the earth inherit all their immense dissimilarities from a common ancestor, and that they have acquired their wide differences of development simply from individual aberrations. Nevertheless, so unknown to us are our fellow-beings that even for ordinary men his writings have all the charm of romances; while they will remain to all time, if nothing else, at least a record of earnest and honest devotion to the solution of the most momentous of the problems by which mankind are surrounded."

THE SUMMER AT CALTECH

To the Arctic

Prof. George E. MacGinitie, Associate Professor of Biology, who has been in charge of the Kerckhoff Marine Laboratory at Corona del Mar since 1932, was granted a year's leave of absence from the Institute in June, to become Scientific Director of the Arctic Research Laboratory operated by the Office of Naval Research at Point Barrow, Alaska. With his wife as co-worker, Prof. MacGinitie spent three months at Point Barrow in the summer of 1948, doing research on the distribution and ecology of marine life in that area. Now, as director of the laboratory, he will continue this work, and also supervise related projects in physiological and biochemical research of both land and marine animals, and birds of the far north.

One of these projects is under the direction of Dr. Dan H. Campbell, Associate Professor of Immunochimistry at the Institute. Dr. Campbell left for Point Barrow early in August to continue work he had begun in the summer of 1948 on the blood chemistry of Arctic birds and animals, to find out how they can withstand extreme cold—with a view to helping human beings withstand it better.

Caltech's third research team to head for the Arctic this summer was the party of glaciologists and geophysicists led by Dr. Robert P. Sharp, Professor of Geomorphology, which returned to the Seward Ice Field near Yakutuk to continue the study of Alaskan glaciers which was begun in 1941—and was described by Dr. Sharp in his article "Project 'Snow Cornice'" in E & S for Nov. '48. Five Caltech graduate students went on the junket—Laurence Nobles, John R. Reese, S. Norman Dominico, Bernard O. Steenson, and Frederick Gross.

New Coach

Bert LaBrucherie (see page 20), whose UCLA team played in the Rose Bowl in 1946, was named in July to replace Mason Anderson as varsity football and track coach at the institute.

LaBrucherie resigned as head coach at UCLA at the end of last year's season, after serving for four years. A graduate of UCLA, where he played three years of varsity ball and also competed in track, he coached at Los Angeles High School for 16 years, during which time he had ten league championships. He went to UCLA in 1945 and in 1946 his team won the Pacific Coast Conference. This was the only unbeaten and untied season the Bruins ever had, until they lost the Rose Bowl game to the University of Illinois 45-14.

For the record, Bert LaBrucherie isn't expecting to work a miracle and win a lot of games this season. For one thing, the team lost ten of its twenty lettermen by graduation last June—including four of its best linemen: Don Hibbard, End; Dennis Long, Guard; Manuel Bass and Bob Walquist, Tackles. The season gets under way Sept. 24 when the team plays Arizona State at



Speakers' table at Industrial Relations' tenth anniversary dinner included Dale Yoder, Lawrence Appley, Arthur Young, R. A. Millikan, Dr. DuBridge, and Leo Wolman.

Flagstaff. The rest of the schedule:

- Oct. 1—La Verne at La Verne.
- Oct. 8—Whittier at Rose Bowl.
- Oct. 14—Frosh vs. Whittier at Whittier.
- Oct. 22—Pomona at Rose Bowl.
- Oct. 28—Occidental at Rose Bowl.
- Nov. 12—Redlands at Redlands.
- Nov. 18—Cal Poly at San Dimas.

Ten Years Old

On July 21 the Industrial Relations Section of the Institute celebrated its tenth anniversary with a special conference honoring Dr. Robert A. Millikan, who organized the section in 1939. Nearly 400 representatives from some 200 companies, unions, and universities turned out for the all-day conference and dinner meeting. Outstanding industrial relations authorities who participated in the conference included Alexander R. Heron, vice-president of the Crown Zellerbach Corporation; Leo Wolman, Professor of Economics at Columbia University and a member of the research staff of the Bureau of Economic Research; Lawrence A. Appley, president of the American Management Association; and Dale Yoder, Director of the Industrial Relations Center of the University of Minnesota, and a member of the Committee on Labor Market Research of the Social Science Research Council.

Merck Fellow

Paul S. Farrington, graduate assistant in chemistry at the Institute for the past three years, was chosen in August as the first recipient of the \$2,500 Merck Graduate Fellowship in Analytical Chemistry. The fellowship, established last year by the Merck Co. of Rahway, New Jersey, goes to the applicant who is considered—by a special award committee of the American Chemical Society—likely "to contribute most to the advancement of the theory and practice of analytical chemistry during the tenure of the fellowship and the course of his future career."

Farrington received his B.S. from the Institute in 1941, his M.S. in 1947, and the degree of Chemical Engineer in 1948. He will use the Merck award to finance a year's study towards a Ph.D.

During the war Farrington was employed at the Institute on a National Defense Research Committee project, dealing with the analysis of chemical warfare agents on a semi-micro scale. He did research on procedures for the determination of iron, manganese, titanium, chloride, fluoride, and carbon.

Sage Award

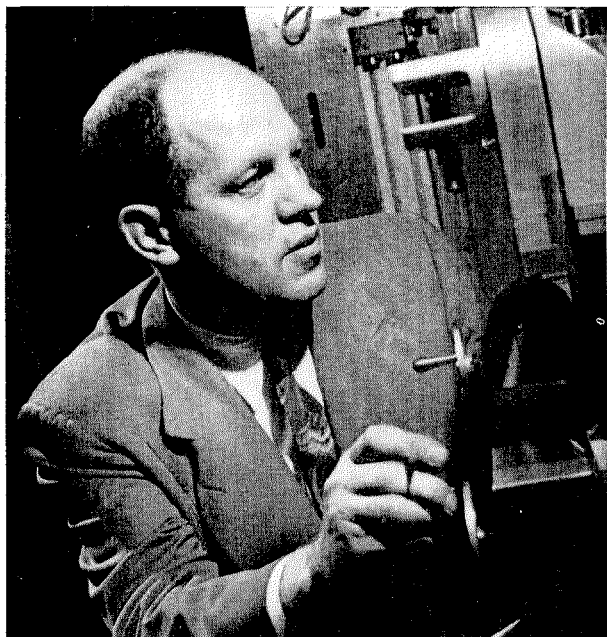
Bruce H. Sage, Professor of Chemical Engineering, was first-time winner of a \$1,000 award for achievement in petroleum chemistry at the national meeting of the American Chemical Society in Atlantic City on Sept. 19. The new \$1,000 Precision Scientific Co. award was established to "recognize, encourage and stimulate outstanding research achievements in the field of petroleum chemistry or in some phase of science that contributes directly and materially to the knowledge of petroleum and its products."

Specifically, Dr. Sage received the award for "the independence of thought, experimental ingenuity, and originality demonstrated in his 17 years of research on phase equilibria in petroleum hydrocarbon systems."

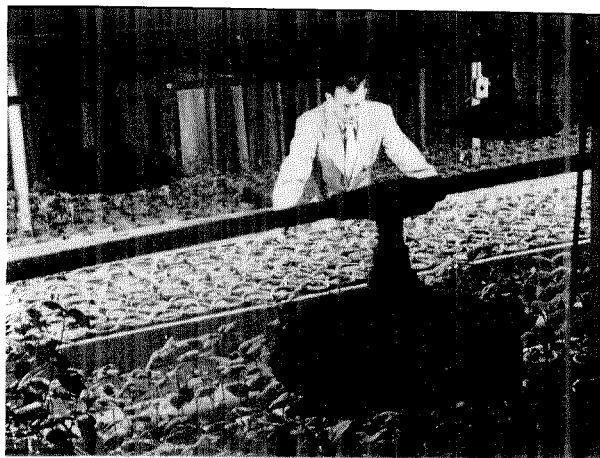
Dr. Sage, whose petroleum research is credited with significantly enlarging the recoverable natural oil resources of the United States, is now Associate Director of Engineering and head of the Explosives Department at the Naval Ordnance Test Station, at Inyokern, Calif.

Bonner Down Under

Dr. James F. Bonner, Professor of Biology, took off in August for Sydney, Australia, to attend the (deep breath here) British Commonwealth Agricultural Specialist Conference on Plant and Animal Nutrition in Relation to Soil and Climate. One of three Americans who were invited to address this annual conference, Dr. Bonner spoke on plant enzymes. After the meeting, he



Dr. Bruce H. Sage, Professor of Chemical Engineering, is honored for his achievements in petroleum chemistry.



Dr. James F. Bonner, Professor of Biology, is the new president of the American Society of Plant Physiologists.

began a three-month lecture tour of Australia and New Zealand universities, planned to return to Caltech in November.

Shortly before leaving for Australia, Dr. Bonner was elected president of the American Society of Plant Physiologists, succeeding Dr. Donald B. Anderson of North Carolina State College. Dr. Bonner is the second Caltech biologist to head this organization in recent years; Dr. Frits Went was president in 1947-48.

Short Notice

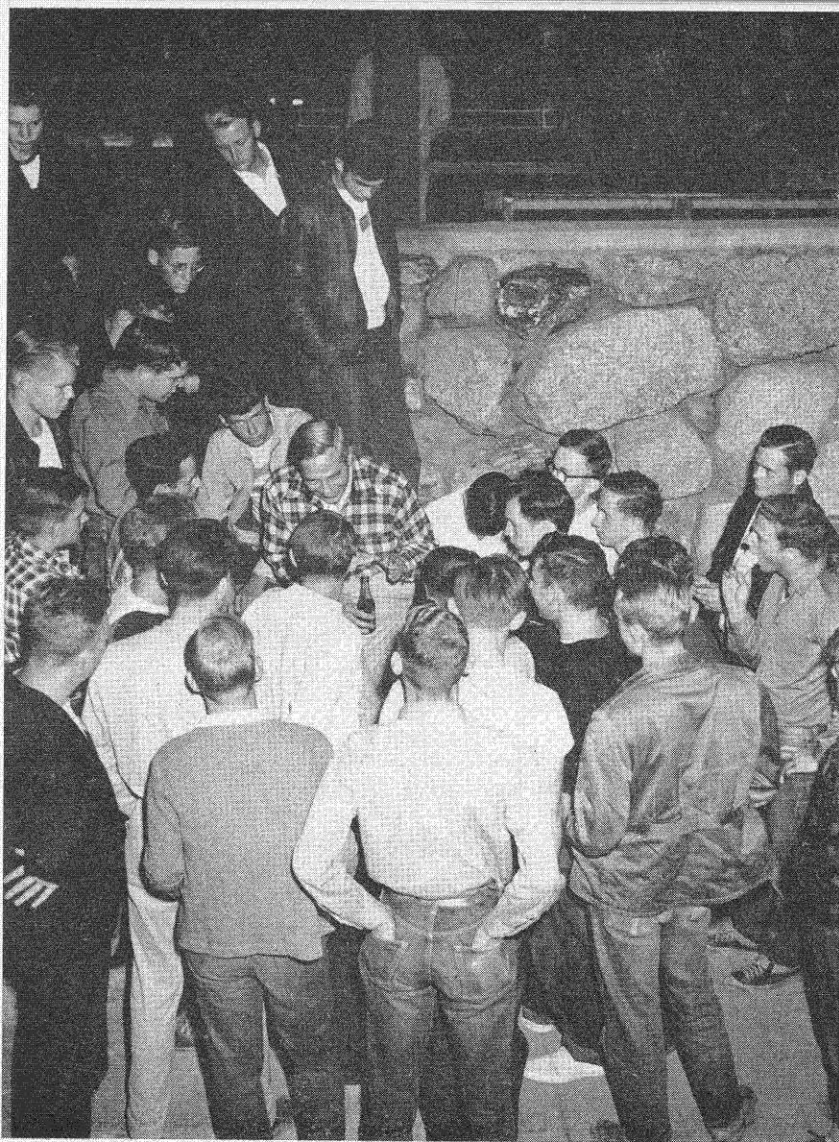
Dr. Edwin P. Hubble, Research Chairman of the combined Mount Wilson and Palomar Observatories, was recently elected a member of the French Academy of Sciences in honor of his having taken the first photographs with the 200-inch telescope (E & S, May '49) of "island universes" 1,000,000,000 light years from the earth.

Dr. Jack E. McKee has been named Associate Professor of Sanitary Engineering at the Institute, filling the vacancy left by the death of Arthur Perry Banta last spring. Dr. McKee received his training in civil engineering at the Carnegie Institute of Technology and Harvard University. He has been affiliated with the U. S. Public Health Service and the TVA.

Members of Caltech's Management Club, composed of Institute supervisory personnel, contributed \$600 to the Institute to assist some worthy undergraduate student. The student is to be chosen by the faculty scholarship committee.

The University of Michigan has set up a cooperative research project with the Mount Wilson Observatory to study the makeup of the atmosphere about the earth and the stars. The project involves installing an infra-red spectrometer on a solar telescope at Mount Wilson, similar to one which has been in operation at the University of Michigan for some time. The Michigan spectrometer has already helped in the discovery of methane and two heavy forms of carbon dioxide in the earth's atmosphere.

The National Institute of Health has awarded money grants for the coming year to five faculty members—\$9,504 to Dr. Henry Bersook, Professor of Biochemistry, for research in transmethylation for diet improvement; \$33,048 to Drs. Linus Pauling, Dan Campbell, and Carl Nieman to carry on work on the chemistry of the blood; \$5,508 to Dr. Joseph Koepfli, Research Associate in Chemistry, to continue research in anti-malarial drugs.



1949

Freshman Camp

**The Class of '53 starts
its college career at
Camp Radford**

Left—Frosh surround President DuBridge (who wore the loudest shirt in camp) after his evening talk on Russia and the bomb. Below—Photographers' round-up of faculty members at the camp (there were about 30 in all) netted the 17 rumpiled representatives shown here.

Haagen-Smit

Eagleson

Nieman

Kyropoulos

Clark

Varney

Mead

Strong

Jahns

H

Hershey

Tanham

Eaton

Jones

Smith

Thomas

Lindvall





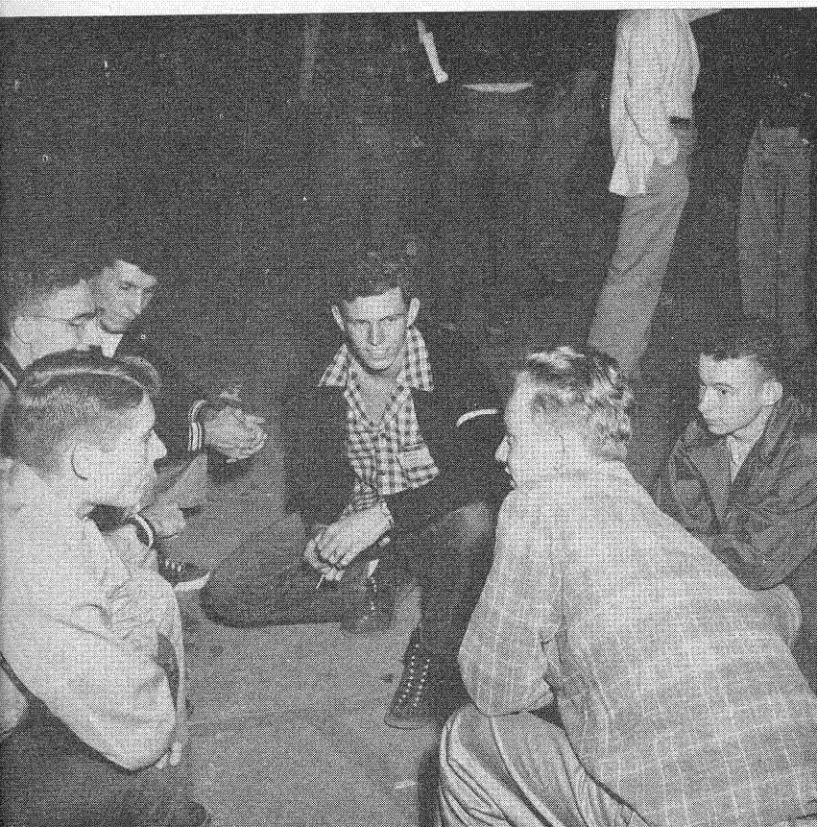
Attentive audience listens to faculty talk in stone amphitheater.



Frosh-faculty ballgame ended in defeat for the pros, 24-21.

THE annual New Student Camp is one of Caltech's hardest and soundest traditions. This year, from Friday, September 23 to Sunday, September 25, some 200 newly-registered freshmen and transfer undergraduates began their first year at the Institute at Camp Radford in the San Bernardino Mountains. There they met the student body leaders and faculty members with whom they would be associated in their years at Caltech. At regular morning and afternoon meetings in the big stone amphitheater they listened to informal talks about life and work at Caltech. The rest of the day they ate and loafed in the sun and played at everything from football to croquet. The pictures on these pages show some of the varied activity at this year's freshman camp. For some of the highlights, see the Beaver's column on page 18.

Student Wheel Dick Libbey '51 (center) joins frosh bull-session.



Sue Huck, Manager of the Student Houses, serves it forth.



BEAVER'S



MONTH

SURROUNDED by a chaos of half-unpacked trunks, suitcases, and travel-rumpled clothes, the Beaver peered at his room in the House disconsolately. Unpacking seemed to require an intolerable mountain of effort and he had grave doubts about the possibility of stacking into his small room all the accumulata of past years, dragged up from the trunk room in the basement.

He avoided the problem by leaning out the window to watch the passing groups of students and he began to think how strange it seemed to call last year's sophomores juniors and last year's juniors seniors. At least last year's frosh were making it obvious that they were now sophs, for when the phone rang, it was always a stentorian soph voice that bellowed, "FROSH!!"

Frosh Camp

Frosh camp, the Beaver decided, was a fine institution. The frosh had all arrived and registered last Thursday, and were feeling very confused and faced with a cold, indifferent world over the efficient registration tables. Then Friday morning they had been herded into buses in front of Dabney and carted off to Camp Radford in the San Bernardino mountains. Up there Tech began to assume a friendly, coherent personality. There they met upperclass wheels and faculty, dressed informally in camp clothes and treating the frosh to a warm, personable welcome.

Meet the People

Rapidly the new frosh began to feel at home, talked to the royalty of Tech like brothers, and gained that comfortable glow of being accepted as an equal and a friend. Royce, prexy of all Dabney house, was just another guy in a T-shirt who came up to ask you where you were from, and Lovberg, president of the whole student body (it had seemed like a pompous position worthy of a campus Napoleon on Thursday) was just another nice guy with a suggestion of a needed shave instead of an aura of celestial light.

Can This Be Tech?

In the informal talks, a picture of Tech began to crystallize in the froshs' minds and they were invariably

surprised to be told to leave their books on weekends to go out and raise hell, or to be urged into athletics and activities. Joe Lewis, an alumni wheel, had even told them that a knowledge of their capacity for alcohol was part of their education. One frosh told the Beaver he was amazed to find the renowned Institute merely a "country club for exuberant extroverts." The Beaver shook his head wisely and gently administered the truth. But the whole encouraging truth of the camp was simply this: Tech does not want the precocious snakes who slither out of their study cells to blink at the sunlight only when they go to class; it does not want the brilliant engineer who doesn't know beer from skittles outside his cherished field, or whether cherries or olives go into martinis. The frosh were surprised indeed!

Good Crop

And the crop of frosh the Institute had picked were good boys, the Beaver observed, as Mr. Killgrove ran the many musicians among them through an excellent concert, and as he watched them sign up for football and baseball and track in droves. Frosh Coach Ed Preisler had stood by the sign-up board, beaming like a miser in his gold room as more frosh signed for football than the entire varsity squad. The guys were big and eager athletes, already excitedly spinning plans to take on the varsity and trim their posteriors in scrimmages. Here was a real set of frosh, the Beaver grinned, as he moved into the crowd gathered around an impromptu poker game, or listened in to a bull session where the frosh talked about women instead of electronics.

Faculty Without Bifocals

Frosh camp is always notable for some strange reversals among the revered faculty when they take off their bifocals and grope out onto the baseball diamond to take on a bloodthirsty crew of frosh athletes. The tradition had long been that the faculty was to win, but this year (like last year) conditions had changed. The frosh, already sensing the moral need for a reservoir of revenge, had belted the ball in the second inning time after time through the slippery fingers of Fielders Foster Strong, Butch Clark and George Hall until they had made some 15 runs. Dean Strong and Clark, who had both emphasized the need for exercise and athletics in a Tech routine, were the more conspicuous now in their obvious lack of training. However, in succeeding innings a core of muscle-minded geologists and coaches kept the faculty at least within a competitive bracket and the frosh walked off with a 24-21 vengeance, which the Beaver hopes they will harbor in their memories in the tests to come.

The most spectacularly casual gesture of the day was made by Dean Thomas, who snagged a fly ball far out in the spectators' section in the most debonair manner possible, without moving a muscle. The Beaver cheered, the Dean smiled appreciatively, then hefted the ball back to the embarrassed fielder.

A New Life

The Beaver turned back to his unpacking with a wry frown, and sat down on a pile of clothing to peruse a stack of last year's love letters lying on top of an orange crate. Finally he dropped them in a wastebasket. Start life anew, he mused, and began sorting Varga girl pictures for his wall.

—Jim Hendrickson '50

ALUMNI NEWS

Director Hare



ROBERT J. HARE, who was appointed by the Board of Directors to fill the vacancy created by the resignation of Fritz Karge, received his B.S. in Electrical Engineering in 1921. In his senior year he was treasurer of the student body, secretary-treasurer of his class, and captain of his class track team. On the campus he was the organizer of a mandolin club,

and at one time played in the orchestra. Since graduation he has served as permanent secretary to the Class of '21.

After graduation he joined the Southern California Telephone Company as a student engineer. After a few years in the Outside Plant engineering department, he spent a number of years on Protection work in the Transmission and Protection group, with time out in 1935 to serve as Assistant Manager of the Bell System exhibit at the San Diego International Exposition. Currently he is a Staff Engineer in the office of the Chief Engineer of The Pacific Tel. and Tel. Co. in Los Angeles, working on Plant Extension engineering studies.

He is a member of the Institute of Radio Engineers and American Institute of Electrical Engineers.

Chapter Notes

On Saturday, August 27th, the San Francisco Chapter of the Alumni Association held its annual fall picnic and swim at the Concord residence of Mr. and Mrs. Robert Bowman. A heavy mist dampened the ardor of most of the swimmers, but a few hardy souls didn't let the weather interfere with the use of Bowman's beautiful pool. After a fine barbecue, tables were cleared for an evening of singing and cards.

Among the more than 50 alumni and families present were J. B. Sturgess, H. B. Wellman, R. W. Haskins, R. B. Vaile, W. H. Corcoran, G. Billman, M. T. Jones, R. Heitz, J. J. Halloran, R. I. Stirton, W. A. Wickett, A. Grossberg, Carl Schrader, K. W. Johnson, L. H. Erb, E. Dorreston, Chuck Lewis, R. B. Bowman, H. O. Nies, J. Kohn, R. E. Alderman, Bob Bowles, G. T. McKee, Howard Vesper, Ted Coleman, and Bill Moore.

The Chicago Chapter held its fall meeting at the Chicago Engineers Club on Sept. 9, with Prof. Frederick C. Lindvall, Chairman of Caltech's Division of Civil and Mechanical Engineering and Aeronautics, as special guest.

Main business of the evening was the election of new officers: Robert T. Dillon, President; Jack M. Roehm, Vice-President; Eben Vey, Secretary-Treasurer; Walter S. Jasper, Director. Additional members of the Executive Committee are those from last year: Gene B.

Heywood, Director; Edward A. Wheeler, Ex-Officio Member.

Jack Roehm was appointed chairman of a Program Committee, with Gordon Ewing and William A. Lewis, Jr. as his assistants. And the financial report for 1948-49 showed a satisfactory net balance over expenses to start the 1949-50 season.

Following the business session, the group heard a wire recording of Prof. Horace Gilbert's talk on "World Economic Prospects" at the annual meeting of the Alumni Association in Pasadena last June. Prof. Lindvall then gave some first-hand news and comments on the Division of Mechanical Engineering at the Institute.

By-Laws Amended

Another indication of the progress of the Alumni Association toward increasing maturity comes in a change in the by-laws regarding chapters, which was adopted by the Board of Directors on August 16. In common with most of the larger alumni groups, the Association has found that a direct rebate of a part of each member's dues from the parent group to the chapters is an unbelievably complicated and unworkable rule. Instead, provision has been made for direct grants to chapters needing financial assistance. The amendment also lowers the number of members required to form a new chapter, thus making more new chapters possible.

These and other minor changes necessitated an extensive revision of Article V of the by-laws. So that all members of the Association will be informed of the changes, the complete text of Article V, as amended, appears below.

ARTICLE V—CHAPTERS

SECTION 5.01 Formation

A chapter of the Alumni Association, California Institute of Technology may be formed by resolution of the Board of Directors upon receipt of a written application signed by five or more members of the Association, and shall exist at the discretion of said Board and until revocation of the Charter by resolution of the Board of Directors. The resolution of the Board of Directors creating a Chapter shall constitute the Charter of the Chapter and define the Chapter and its scope. No Chapter shall have the power to obligate the Association.

SECTION 5.02 Chapter Membership

Any person eligible to membership in the Association may become a member of a Chapter by paying the annual Chapter dues. Other persons may be admitted to Chapter membership at the discretion of the Chapter.

SECTION 5.03 Annual Chapter Dues

Each Chapter shall prescribe the amount and fix the time for payment of the annual dues which shall be paid to the Chapter as the pre-requisite for Chapter membership.

SECTION 5.04 Chapter Officers

Each Chapter shall select a chairman and a secretary-treasurer from its members. The Board of Directors shall have the power to appoint a temporary chairman or secretary-treasurer to serve until the Chapter members select officers.

SECTION 5.05 Duties of Chapter Officers

Chapter officers shall cooperate with the Association, its officers and directors, in membership campaigns, fund raising drives, California Institute of Technology student candidate selection efforts, and other Association activities as requested by the Board of Directors or its representatives. Said officers shall currently notify the Secretary of the Association of any changes in personnel of Chapter officers. They should arrange at least four (4) meetings per year of the Chapter members, notifying each Chapter member of the time and place of such meetings and shall send notices and reports of such meetings to the Secretary of the Association. The chairman and secretary-treasurer shall submit to the Secretary of the Association such reports and accountings as the Board of Directors may require from any Chapter.

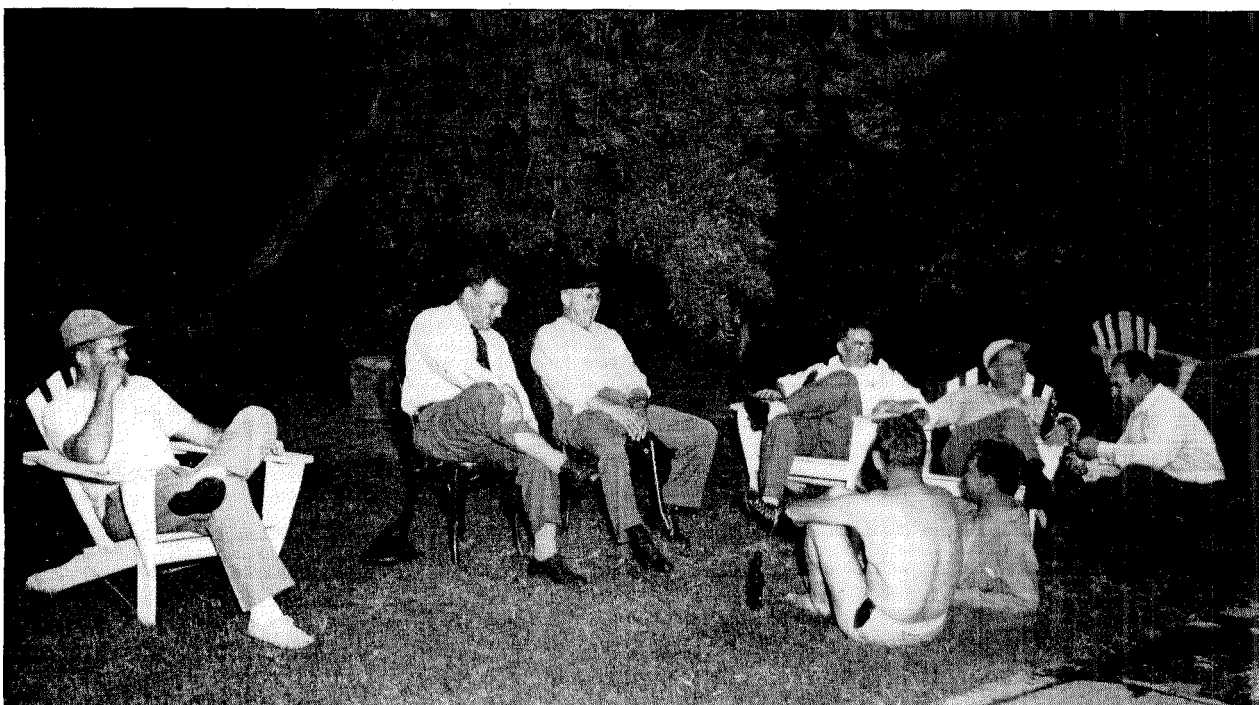
SECTION 5.06 Financial Aid to Chapters

Whenever it shall appear to the Board of Directors that it is for the best interest of any Chapter and the Association that financial assistance be given by the Association to that Chapter in aid of any Chapter activity or undertaking, and funds for that purpose are available, the Board may allow and order paid to that Chapter such sums as may be necessary for that purpose.



Bill Althouse '38 belts one out to left field in Throop-Ricketts alumni game. Warren Potter '35 is disappointed catcher.

Alumni Field Day



Taking their ease beside the pool—Dick Armstrong '28, Coach Bert LaBrucherie, Hal Musselman, Larry Grunder '29, Al Drasdo Ex-'26, Bob Lehman '31. Down in front, an unidentified swimmer and Wendell Miller '37.



Bob Bennett '45, Rube Mettler '44, an unidentified beer-drinker, Don MacDougall '45, and Joe Lewis '41.

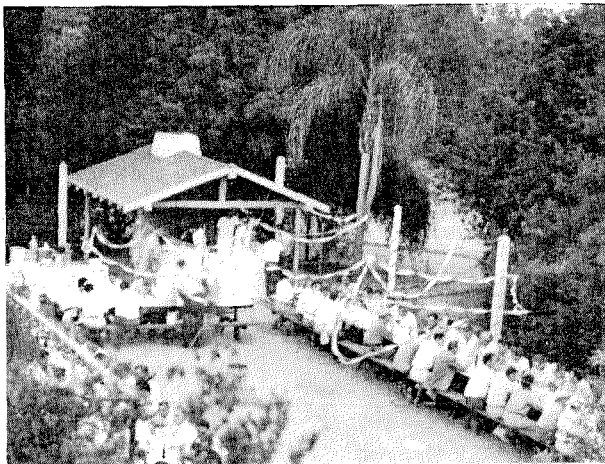


Fanciest diving of the day, as anybody can tell from the evidence above, was contributed by Russell Love '28.

ON July 23 the Alumni Association held its first stag field day at the Anoakia School (for Girls) in Arcadia. The girls were on vacation, but they left behind an ideal location for the alumni event, with facilities for baseball, volleyball, tennis, badminton, swimming, outdoor dining, and indoor cardplaying.

Approximately 100 alumni turned out for the occasion, and some of the hardier (younger) grads stayed with it from the time the gates opened at one in the afternoon until they closed at one the next morning.

Social Committee Chairman Bob Barry '38 was in charge of the event, and Bill Wetmore '37 served as General Chairman. Bill Althouse '38 took care of the dinner; Bill Lawson '39 saw that there was plenty of bottled beer icing in buckets under every tree; Jack Baker '38 handled the after-dinner games and cards; Stan Wolfberg '38 ran the athletic events; Chuck Forrester '49 and Jep Garland '44 served as reception committee. A rousing success on all counts, this field day now looks set as an annual Alumni Association event.



Al fresco dinner, after a hyperactive day in the sun, was followed by a quiet indoor evening of cards.



Coach LaBrucherie heads the chow line. Behind him, Bob Barry '38, Hubert Clark '46, Stan Wolfberg '38.

ALUMNI FUND

Report of the Second Year - 1948-1949

OUR SECOND YEAR saw the Caltech Alumni Fund spring suddenly from infancy into childhood. We can now look forward to adolescence, and, one day to maturity; but we've already gone far enough to convince even the confirmed skeptics that the Fund is here to stay. Contributions during the first two years, with interest earned, have brought our total to \$37,870.49.

During the twelve months preceding June 30, 1949, the Fund collected a total of \$17,649.05 from 1020 C.I.T. Alumni. Contributions were received from "Bachelor-degree" alumni, from alumni who took only graduate work at C.I.T., and from others; although most of the money collected and the majority of the contributors (981 to be exact) came from the Bachelor or undergraduate-degree alumni. This is perhaps to be expected, but at the same time the importance of the position of graduate-degree men at Tech is being confirmed by the

growing support and interest in the Fund on the part of graduate-degree alumni.

Gifts received by the Fund, broken down by graduating classes, are tabulated below. Class ranking, based upon percent of eligibles giving during the combined two years of the Fund, is also set forth on the page. By voting to make a class gift to the Fund, the class of '49, our newest alumni, have the distinction of being the first to reach the goal of 100% participation.

As in the first year, many men gave many hours of work to produce the results pictured here. The Chapters outside Southern California are doing their part to support the Fund. All of you who have contributed have the sincere thanks of your Fund Committee; but more than this—you will have the enduring gratitude of future generations of Tech men who will one day enjoy the products of your generosity.

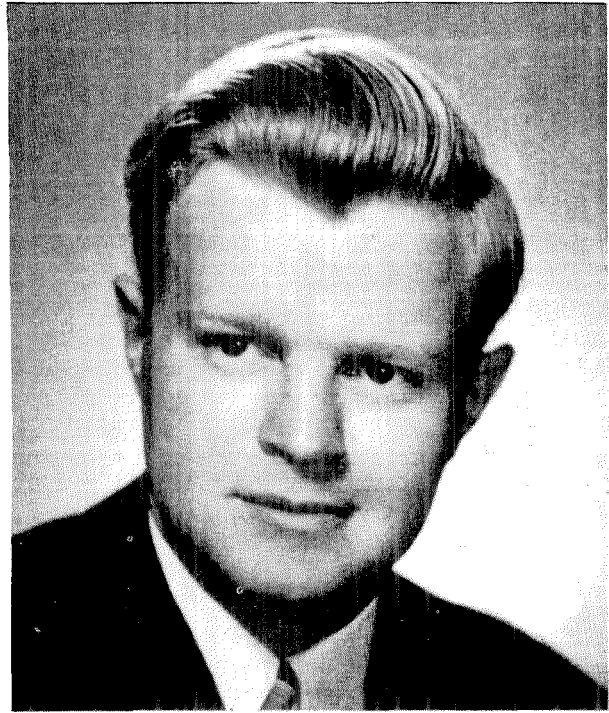
SECOND YEAR—1948-1949

(As of June 30, 1949)

Year	Total Money Received	Results from Alumni who took Undergraduate Work at C.I.T.						
		Money Rec'd.	Number Giving	Average Gift	Number Eligible	% of Eligibles Giving	Class Ranking (% Giving)	Two-Year Class Ranking
Prior '15	\$ 47.00	\$ 47.00	5	\$ 9.40	—	—	—	
1915	1.00	1.00	1	1.00	8	12.5	33	'49
1916	—	—	—	—	7	—	34	'44
1917	60.00	60.00	4	15.00	10	40.0	3	'17
1918	135.00	135.00	4	33.75	29	13.8	32	'22
1919	—	—	—	—	3	—	34	'20
1920	285.00	285.00	9	31.67	32	28.1	11	'43
1921	845.00	845.00	10	84.50	36	27.8	13	'42
1922	1630.00	1625.00	22	73.86	57	38.6	4	'15
1923	3210.00	3210.00	8	401.25	42	19.0	25	'41
1924	700.00	700.00	14	50.00	73	19.2	22	'36
1925	710.00	710.00	16	44.38	77	20.8	19	'29
1926	486.00	486.00	19	25.58	102	18.6	27	'40
1927	511.00	485.00	20	24.25	93	21.5	18	'21
1928	532.00	332.00	17	19.53	61	27.9	12	'32
1929	476.50	474.50	24	19.77	83	28.9	9	'23
1930	424.00	419.00	20	20.95	107	18.7	26	'28
1931	421.00	421.00	19	22.16	99	19.2	22	'47
1932	459.00	459.00	29	15.83	98	29.6	8	'24
1933	252.00	235.00	15	15.67	94	16.0	30	
1934	480.00	430.00	18	23.89	103	17.5	28	'25
1935	257.00	257.00	26	9.88	114	22.8	17	'26
1936	831.00	781.00	35	22.31	104	33.7	5	'35
1937	375.00	265.00	23	11.52	113	20.4	20	'31
1938	226.00	207.00	20	10.35	127	15.7	31	'39
1939	223.50	200.50	23	8.72	115	20.0	21	'37
1940	428.50	413.50	39	10.60	142	27.5	14	'34
1941	596.50	594.50	39	15.24	129	30.2	7	'27
1942	404.50	359.00	42	8.55	149	28.2	10	'46
1943	453.00	448.00	40	11.20	124	32.3	6	'48
1944	665.00	665.00	60	11.08	119	50.4	2	'45
1945	358.00	306.00	43	7.12	260	16.5	29	'30
1946	189.50	181.50	30	6.05	157	19.1	24	'33
1947	268.05	243.05	32	7.60	138	23.2	16	'38
1948	204.00	204.00	44	4.64	189	23.3	15	'18
1949	505.00	505.00	211	2.39	211	100.0	1	'16
Total	\$17,649.05	\$16,989.55	981	\$17.32	3405	28.8	—	'19

The men who are creating the Fund

NO one has asked for recognition, nor has any special recognition of donors been promised; but to give credit to those who are creating the Fund, the following pages are devoted to the publishing of lists of donors, broken down by classes, for each of the first two years of the Fund. Immediately following the second-year list there is included a list of donors whose gifts were received after June 30, 1949, but before August 31, 1949. Such gifts are not included in the tabulation which was prepared as of June 30, 1949.



Joe Lewis, chairman of the Alumni Fund Committee for 1947-48, and 1948-49, now heads the Alumni Association.

CONTRIBUTORS TO THE ALUMNI FUND 1948-49

1896
Haynes, Diantha M.
1906
Maxson, Edgar S.
1911
Ward, Royal V.
1912
Merrifield, J. D.
1913
Parkinson, Ralph W.
1915
Soyster, Charles J., Ex
1917
Kemp, A. R.
Kensey, Alexander
Poole, Fred L.
Richards, Roy T.
1918
Capra, Frank R.
Essick, Louis F.
Heywood, Gene B.
McDonald, C. R.
1920
Andrews, Horace
Barnes, Hartwick
Barton, Paul D.
Hollinger, Abraham L., Jr.
House, Harvey W.
Renshaw, William C.
Smith, R. Carson
Whitworth, George K., Ex
Woodbury, R. E.
1921
Boggs, Chester A.

Case, Henry R.
Clarke, Philip S.
Hare, Robert J.
Hensen, Fred C., Ex
Honsaker, H. H.
Koyan, Ernest, Ex
Morrison, Lloyd E.
Raymond, Albert L.
Stamm, Alfred J.

1922
Alles, Gordon A.
Bulkley, O. R.
Catland, Alfred C.
Crisaman, Robert J.
Essick, Bryant, Ex
Fleming, Thomas J.
Grost, Edmund T.
Hall, Albert D.
Henney, George C.
Honsaker, John
Hopper, Francis L.
Jasper, Walter, Ex
Keith, Clyde R.
Knight, Alfred R.
Kohtz, Russell H.
Learned, Kenneth A.
Marsh, Hallan N.
Morita, Jiro, Ex
Myers, Thomas G.
Shield, John E.
Smith, C. Kemper
Vesper, Howard G.
Whistler, Arthur M.

1923
Barnett, Harold A.
Fitch, Charles E.
Lewis, Howard B.

Puls, J. H.
Reeves, Hubert A.
Roth, Lawrence P.
Walling, Lloyd A.
Walter, John P.

1924
Anderson, Kenneth B.
Barcus, Everett D.
Clark, Rex S., Ex
Coffey, Jule H.
Dorresten, Edward E., Ex
Irwin, Emmett M.
Moody, Max W.
Pardee, Lyall A., Ex
Squiers, Willis L.
Stoker, Lyman P.
Stone, George B.
Tellwright, F. Douglas
Wilson, Edward A.
Winegarden, Howard M.

1925
Alderman, Raymond E.
Burmister, Clarence A.
Chapman, Albert
Cheney, Lyle H., Ex
Clayton, Frank C. A.
Freeman, Henry R., Ex
Fulwider, Robert W.
Hart, Edward W.
Heilbron, Carl H., Jr.
Henderson, Lawrence P.
Jones, Walter B.
Karelitz, Michael B.
Noll, Paul E.
Prentice, Leland B.
Thayer, Edwin F.
Thompson, Wilfred C.

1926
Beverly, Burt
Coleman, Theodore C.
Edwards, Manley W.
Farly, G. M.
Farman, Ivan L.
Gockley, Roscoe
Granger, Wayne E.
Halverson, Homer A., Ex
Kirkeby, Eugene
Kroneberg, Alex A.
Laws, Allen L.
Maag, Ernst
Macfarlane, Donald P.
Moodie, R. W.
Morrison, Allan J.
Pompeo, Domenick J.
Serrurier, Mark
Streit, Frank H.
Van Den Akker, Johannes

1927
Baxter, Ellery R.
Bower, Maxwell M.
Copeland, Ray E., Ex
Crevling, Robert
Diamos, George, M.S.
Farrar, Harry K.
Forster, John B.
Heilbron, Robert F.
Hinkston, Donald
Jaeger, Vernon P., Ex
Larson, Hilmer E.
Lilly, Forrest J.
Loxley, Benjamin
Mendenhall, H. E., Ph.D.
Peterson, Thurman S.
Schultz, Murray N.
Snyder, Leonard L.

Stanton, W. Layton
Starke, Howard R.
Swartz, Charles A.
Thompson, Russell E.
Vaile, Robert B.

1928

Armstrong, Richard C.
Beckman, Arnold O., Ph.D.
Berman, Jack Y.
Biddle, Stratford B., Jr.
Coulter, Robert I.
Cutler, Ralph W.
D'Arcy, Nicholas A., Jr., Ex
Duval, Richard H.
Evans, Robley D.
Gewertz, Moe W.
Joujon-Roche, Jean E.
Kaneko, George
Kuhn, Jackson G.
Lash, Charles C.
Lindvalle, Frederick C., Ph.D.
Lombard, Albert E.
Miller, Elbert E.
Olsen, William L.
Tuttle, Edward E.

1929

Berman, Isadore
Birge, Knowlton R.
Clark, D. S.
Cline, Frederick
Cravitz, Philip
Fredendall, Beverly F.
Grimes, Walter B.
Grunder, Lawrence J.
Haefl, Andrew V., M.S.
Hugg, Ernest B.
Keeling, Harry J.
Kingman, Kenneth F.
Kircher, Raymond J.
Larrecq, Anthony J.
Lee, Edson C.
Mohr, William H.
Myers, Albert E.
O'Haver, Hubert M.
Roberts, Bolivar
Rofelty, Richard G.
Russell, Kenneth F.
Schumacher, Karl F.
Schullin, James C.
Sperling, Milton H.
Wheeler, Fred A.

1930

Ayers, Wilbur W.
Arnquist, Warren N., Ph.D.
Bechtold, Ira C.
Bernhardi, Tom G.
Bode, Francis D.
Carlson, Chester F.
Giebler, Clyde
Hamilton, J. D.
Hatch, William B., Jr.
Hodder, Roland
Hopper, Rea E.
Howse, S. Eric
Johnson, Josef J.
Levine, Ernest
MacDonald, James H.
Ross, George A.
Sheffet, David
Stirton, Robert I.
Strong, Austin W.
Thayer, Eugene M.
Waite, Howard W.

1931

Amann, Jack H.
Axline, R. A.
Boothe, Perry M.
Cogen, William M.
Detweiler, John S.
Green, E. F.
Kircher, Charles E., Jr.
Leeper, Laverne D.
Lewis, George E.
Liedholm, George E.
Osborne, John B., Ex
Peer, Edward S.

Peterson, Raymond A.
Pratt, Leland D.
Sinette, John T., Jr.
Stein, Myer
Widess, Rubin
Wineland, Jeffery A.

1932

Anderson, David W.
Atwood, Albert W., Jr.
Bergren, William R.
Bradburn, James R.
Burman, Paul G.
Carey, Robert V.
Claussen, William H.
Finney, Howard W.
Freeman, Robert B.
Hibbs, Frank J., Jr.
Hodge, Mills S.
Keachie, Edward C.
Kent, W. L.
Lyons, P. B.
Mathews, Thomas E., Jr.
McLaughlin, James P.
Pruden, Worrel F.
Rule, Bruce H.
Saylor, William H.
Schultz, Henry W., Ex
Schultz, William O., Ex
Sheffet, Joseph
Shockley, William
Shull, George O.
Sparks, Brian O.
Swart, Kenneth H.
Venerable, Grant D.
Wilson, Chester E.

1933

Berkeley, G. Merrill
Binder, Raymond O., Ph.D.
Chesson, George H., Ex
Clifford, Alfred H., Ph.D.
Davis, Madison T.
Downie, Arthur J., Ex
Engel, René, Ph.D.
Fletcher, Robert D.
Herlin, Robert G.
Johnson, J. Stanley
Lewis, Wyatt H.
MacDonald, Robert G.
Meskell, John E.
Mitchel, Ted S.
Perrine, Charles D., Jr.
Randall, John A., Ex
Russell, Richard L.
Widess, Moses B.

1934

Anderson, Robert C.
Boykin, Robert
Childers, Milford C.
Donahue, Willis R., Jr.
Etter, L. Fort
Gordon, Garford
Howard, Ernest R.
Little, John R.
McCann, Gilbert
McRae, James W., Ph.D.
Miller, Guy O.
O'Neil, Hugh M.
Paxson, Edwin W.
Pearne, John F.
Rooke, Donald R.
Sharp, Robert P.
Sherborne, John E.
Smith, George Sidney
Whistler, Ralph E., Ex

1935

Baldwin, Lawrence W.
Chamberlain, Donald N.
Davenport, Horace W.
Davenport, Lind B.
Davies, James A.
Dawson, Charles A.
Deweese, Norman B.
Engelder, Arthur E.
Etz, Arthur N., Ex
Ewing, Gordon R.
Fuhrmann, Hans H., Ex
Fussell, Robert G.

Garner, Clifford S.
Jahns, Richard H.
Ketchum, M. C.
Lindsay, C. W.
Ray, Allen
Reynolds, Edward H.
Ribner, Herbert S.
Rossum, John R.
Slater, Alfred L.
Stick, John G., Jr.
Stuppy, Laurence J.
Thomas, Charles F.
Young, Bradley H.

1936

Boothe, Raymond H. F.
Bush, Kenyon T.
Carley, Glenn R.
Davis, Frank W.
Dickinson, Holley B.
Dunn, Louis G.
Elliott, Robert D.
Frost, Arthur M.
Graham, Ernest W., M.S.
Hammond, Paul H.
Heath, Charles O.
Heitz, Robert G.
Henderson, Everett B.
Johnson, Ford L.
Jordan, Charles B.
Kiger, Wallace L.
Klocksiam, John P.
La Boyteaux, Ellsworth, Ex
Lauritsen, Thomas
McMahon, M. M.
McRary, Willard L.
Meneghelli Hugo A.
Muller, Conrad R.
Nutting, Perley G.
Petersen, Richard J.
Peugh, Verne L.
Serrell, Peter V.
Sklar, Maurice
Smith, A. M. O.
Snow, Neil W., Ex
Spalding, Luther P.
Stitt, Fred B., Ph.D.
Swanson, W. E.
Thompson, Tyler F.
Veysey, Victor V.
Watts, Euclid V.
Whipp, David M.

1937

Brice, Richard T., Ph.D.
Campbell, Robert S.
Carroll, George Edward
Dorwart, George M.
Ellison, William J., M.S.
Frost, Holloway H.
Gates, Charles F.
Horkey, Edward James
Johnson, Carl B.
Kimball, Dorr
Leggett, Jasper Ridgely
Lloyd, Paul E., Ph.D.
Mann, George E., Jr.
Miller, Harry Hayburn
Miller, Wendell B.
Moore, Walter Leon
Nichols, Dean
Nolte, Claude B.
Schaffner, Paul C.
Seaman, James R.
Smith, Joe Mauk
Van Dusen, C. A.
Walley, Bernard
Webster, Martin H.
Wheeler, Walter G.
Wickett, Walton A., Ex

1938

Althouse, William S.
Brenner, William Carl
Cardwell, W. T.
Clarke, Charles W.
Davidson, Donald D.
Dennis, Paul A.
Dixon, Blaine A., Jr.
Ellis, Herbert B.

Evans, Henry K.
Farneman, John D.
Friend, Carl F.
Ives, Philip, Ph.D.
Jewett, Frank B., Jr.
Keller, Samuel H.
Jurs, Albert E., Jr.
Kyropoulos, Peter R., M.S.
McGraw, John T.
McLean, John G.
North, Harper Q.
Osborn, Elbert, Ph.D.
Scully, C. Norman
Wolfberg, Stanley T.
Wood, Homer J.

1939

Battle, John
Beck, Duane
Bishop, Richard H.
Brown, Perry H.
Carstarphen, C. F.
Clark, Stephan C., Ex
Connelly, Ronald B.
Devirian, Philip S.
Diehm, Walter A.
Fischer, Harold
Goodell, Jack H.
Green, Albert P.
Kolb, Louis L.
Lawson, William George
Morikawa, George K.
Pond, Richard K.
Pullen, Keats A.
Regan, Louis John, Jr.
Roudebush, Bert V.
Ruggiero, Ralph J.
Smith, Josiah E.
Smith, Paul Louis
Stones, J. Eugene
Tsieng, Hsue-shen, Ph.D.
Winchell, Robert W.
Winston, Joseph, M.S.

1940

Barber, George C.
Bissison, C. M.
Blackington, R. J.
Brose, Frederic M.
Burton, Clifford C.
Cleveland, William A.
Compton, Arthur Mandeville
Daams, Gerrit
Dickerson, Edward O.
Foster, Gerald P.
Gewe, Robert A.
Guillou, Alfred V.
Haffner, Bernhard
Hofeller, Gilbert W.
Jacobs, Millard W.
Janssen, Robert Ramsey
Jongeneel, James W.
Keighley, Geoffrey L., M.S.
Kohl, Jerome
Lane, Eric G.
Loeffler, Donald E.
Meyer, Robert B.
Moore, Robert S., M.S.
Quarles, Miller Winthrop
Reynolds, Howard W., Jr.
Russell, Charles D., M.S.
Scarborough, William B.
Schrader, Carl George
Spooner, W. A.
Staatz, Mortimer
Stevens, Jean Barriett
Stone, William W., Jr.
Tielrooy, Jack
Todd, George J.
Van Dyke, Gilbert
Watkins, James M., Jr.
Weaver, Theodore S.
Weir, Gordon B.
White, Howard J.
Worcester, Herbert M., Jr.

1941

Abbey, Edward K.
Acker, Roy M.
Bersbach, Alfred J.

Billman, Glenn W.
Billmeyer, Fred W., Jr.
Bowles, R. R.
Bramhall, George H.
Campbell, D. C.
Chapin, William
Corcoran, William H.
Davis, Walter Z.
Dawson, Donald E.
Dobbins, Willis E.
Edwards, Gene L.
Elliott, Quentin
Faust, Paul H.
Gally, Sidney
Greenhalgh, Francis
Harr, George B.
Ikawa, Miyoshi
Jones, G. A.
Lewis, Joseph W.
Myers, Robert F.
Partlow, John
Reimers, George I.
Richardson, John M.
Rupert, Claud S.
Sakai, George C.
Schaff, Alfred, Jr.
Silberstein, Richard
Small, John G.
Snodgrass, Reuben
Stewart, Wilton A.
Wagner, William J.
Wahrhaftig, Austin L., Ph.D.
Wahrhaftig, Clyde A.
Wald, Edwin P.
Wallace, Roger
Widdoes, Lawrence C.
Wood, David S.

1942

Albrecht, Albert
Allan, John R.
Allen, Paul H.
Almassy, George W.
Andrews, Richard A.
Atkinson, Thomas G.
Baird, Hugh A.
Brandt, Roger
Brown, Charles M.
Brown, Sheldon W., Prof.
Clingan, Forest Melrose
Cox, Richard H.
Densmore, Robert E.
Devault, Robert T.
Franzini, Joseph B.
Fuller, Willard P., Jr., M.S.
Hall, Robert N.
Head, Richard
Hendrickson, Willard J.
Hicks, William B.
Hill, David L.
Howell, Benjamin F., M.S.
Hunt, Carter
Irving, Jack H.
Jephcott, Donald K.
Kumm, Emerson L.
Larson, Erwin R.
Lutz, Philip B.
MacRostie, Wayne
Mader, Paul M.
Makepeace, G. R.
McKibbin, Paul S.
Piatt, Alvin R.
Pichel, W. Pickel
Price, Harrison A.
Roese, Henry V.
Rubel, John H.
Schureman, K. D.
Smallberg, Merle
Strader, Maynard
Urbach, Kenneth
Veenhuyzen, Paul N. A.
Veronda, Carol M.
Smith, Jack, Ph.D.
Webster, Paul
Weller, LeRoy, Jr.

1943

Atkins, Earle R., Jr.
Bishop, Amasa S.

Brown, Edward I.
Carter, Claude L.
Chase, Patrick S.
Christianson, Warren L.
Dazey, Mitchell H.
Dubbs, Clyde A.
Ellis, Albert T.
Enikeieff, Oleg
Farmer, Howard N., Jr.
Fleisher, Ed
Granicher, Donald I.
Griffith, George D.
Gustavson, Robert G.
Johnson, Kenneth W.
Jones, W. L.
Kendall, George A.
Larson, Robert L.
Lawrence, Theodore G.
Lingle, Harrison C.
Macartney, Everett J.
Mason, D. Malcolm
McGee, Charles G.
Moore, Robert A.
Powlesland, Kenneth L.
Reid, Douglas C.
Schamberg, Richard S.
Schneider, Arthur J. R.
Shoner, David E.
Smith, M. Curtis
Snyder, William
Stirling, Cedric W., M.S.
Strickland, Charles P.
Sutton, Richard A.
Tenney, Frederick
Terrell, Oscar D.
Wheeler, Edward A., Ex
Wheelock, Wayne S.

1944

Allington, Robert E.
Amster, Warren H.
Andrews, Tway W.
Bair, William P.
Borden, Jay R.
Chadwick, Joseph H., Jr.
Chapman, Dean R.
Clendenen, Frank B.
Davis, William R.
Dethlefsen, Douglas G.
Dodge, Willard A., Jr.
Donsbach, Weldon R.
Freeman, James R., Jr.
Gardner, John H.
Garland, John J., Jr.
Greenwood, Donald T.
Hammel, Jay E.
Higgins, Horace M.
Hinton, Warren D., Jr.
Huggins, John C.
Hughes, Winfield H.
Johnson, Ronald S.
Kerr, James G.
Kettler, Jack B.
Krusse, Frederick W., Jr.
Kuhns, Richard E.
Lester, Robert W.
Lockwood, William E., Jr.
Long, Neville S.
Martin, Joseph S.
McAnlis, Robert G.
Mettler, Ruben F.
Morris, Fred W., Jr.
Nahas, Robert T.
Nelson, John B.
Nicholas, John R.
Nuetzel, Hans
Osborne, Louis S.
Parks, Robert J.
Pastoriz, Ralph B.
Pendery, Donald W.
Pilorz, Bruno Harrison
Price, Longueville H., Jr.
Randall, Robert O.
Rempel, John R.
Saplis, Raymond A.
Schlinger, Warren G.
Schnacke, Willard R.
Scott, Willard R.

Seed, Richard Warren
Shor, George G., Jr.
Sigworth, Harrison W.
Smith, Frank C., Jr.
Smith, George F.
Smith, Philip B.
Soike, Richard J.
Swanson, Wilbur M.
Thomas, Robert G.
Trilling, Charles Alexander

1945

Augenstein, Bruno W., M.S.
Austin, Dale H.
Ball, Halcyon
Bennett, Robert R.
Brough, Harry W.
Borzell, Linden R.
Collins, William L.
Clark, Stanley D.
Crawford, Paul R.
Cutler, Charles R.
Davy, Louis H.
Duncan, Donal B.
Elko, Edward R.
Fenn, George
Francis, Donald L.
Gardner, Paul R., Jr.
Gerber, Raymond C., Jr.
Gerpheide, John H.
Harvey, Clifford O., Jr.
Henry, Richard V.
Hook, Joseph F.
Howe, George M.
Jasper, Richard N.
Killian, Roy G.
Know, Robert V.
Leo, Robert E.
MacDougall, Donald D.
Maloney, John W.
Markham, Richard G.
McMurray, Wayne T.
McRuer, Duane T.
Myers, William A.
Perkins, William R.
Prudden, Terry M.
Reed, Richard J.
Smith, Dudley B.
Stern, John L.
Swanson, Don R.
Taylor, Edward C.
Taylor, Theodore B.
Tillman, Donald C.
Tookey, Robert C.
White, Ralph S.
Wiedow, Carl P., M.S.
Williamson, Merritt A., M.S.
Winter, Ralph D.

1946

Ahren, Dennis J.
Allison, Charles W., Jr.
Aydelott, Max Merton
Barnes, John Winthrop, M.S.
Blocker, Robert F.
Brolin, Elmore G.
Burdg, Charles E.
Davies, Richard
Davis, Donovan O.
Dehnke, Theodore H.
Dick, Charles W.
Downs, Bertram W., Jr.
Essig, Frederick C.
Fleming, John E.
Greenfield, Howard L.
Hopkins, Donn E.
Hufford, George A.
Jensen, Louis K.
Jessen, Howard E.
Johnson, Gordon L.
Kuck, Richard G.
Libbey, William H.
Lockwood, Glynn H.
Misner, William G.
Rechtin, Eberhardt
Sarmiento, Harold L.
Schmidt, Louis V.
Stone, Dean P.

Wade, Orison
Wilburn, William C., M.S.
Zagorites, Jerry A.

1947

Auerbach, Charles E., M.S.
Bennett, Dudley E.
Billheimer, John S.
Comlossy, Harold
Cowan, Edwin J.
Crumly, Charles B.
Dauwalter, Chad
DeMuth, Orin J.
Dynes, Wesley Moore
Felberg, Richard L.
Haas, Wendell
Harris, Robert B., M.S.
Hodges, Merwyn E.
Holby, Kenneth F.
Holmgren, John D.
King, William R., Jr.
Kowan, Joel M.
Lee, Norman Ray
Lund, Le Val
Mendes, Stanley H.
Mon, Donald D.
Mueller, Albert H. J.
Ogier, Walter T.
Opperman, David R.
Pascoe, Lucien A.
Prendergast, John P.
Richeson, Will, Jr.
Rosener, Joseph, Jr.
Royden, Herbert N.
Shoemaker, Eugene M.
Six, Lyle
Sleyton, Jack H.
Stewart, Robert M.
Sturdevant, Clayton R.
Tasker, Raymond B.
an Deerlin, David B.
Vieweg, Arthur F.
Wysspolski, Eugene F., M.S.

1948

Alexander, Richard Clarke
Anderson, Roger A.
Barlow, Griffith C.
Bayley, Rupert M.
Bear, John C.
Bohjanen, Edward A.
Brown, Robert J. S.
Burt, Frederick B.
Chon Chinn, Elroy Kui
Christopherson, Warren A.
Collins, Robert L.
Conner, William M.
Cox, Arthus N.
Fletcher, Taylor C.
Fullerton, Paul W., Jr.
Cavril, Bruce David
Hammermeister, Orval E.
Harrison, Stanley R.
Holm, Harvey Keith
Hybertsen, Horace Martin
Lamson, Philip
Lang, Thomas Glenn
Lewis, Howard Bradbury, Jr.
Lovelace, Donald E.
Macmillan, Robert S.
Markowitz, Irwin L.
Mehl, Ross M.
Mitchel, Glen Henry, Jr.
Morrison, Stephen C.
Murphy, Charles G.
Poindexter, Robert W.
Rasmussen, John, Jr.
Rigsby, George P.
Roskowski, Edward F.
Rypinski, Chandos A., Jr.
Scott, George R.
Sefton, Wayne E.
Spalding, Donald P., Jr.
Spellman, Richard A.
Stix, Thomas H.
Tracy, Tom
Wechsler, Joseph Wolff
Williamson, William J.
Youtz, Byron L.

CONTRIBUTORS TO THE ALUMNI FUND

1947-48

1896
 Haynes, Diantha M.
1898
 Jewett, Frank B.
1912
 Merrifield J. D.
1913
 Gerhart, Ray
1915
 Andrews, Raymond D., Ex
 Holt, Herbert B.
1916
 Rich, Kenneth W.
1917
 Kemp, A. R.
 Youtz, J. Paul
1918
 Hoge, Edison R.
1920
 Hounsell, Theron C.
 Lewis, John C.
 Sawyer, Mark A.
 St. Clair, Harry P.
 Whitworth, George K., Ex.
 Wilson, James R.
1921
 Badger, Richard H.
 Hare, Robert J.
 Honsaker, H. H.
 Morrison, Lloyd E.
 Quirnbach, Charles F.
1922
 Alles, Gordon A.
 Benioff, Ben
 Bozorth, Richard M., Ph.D.
 Crissman, Robert J.
 DeVoe, Jay J.
 Fleming, Thomas J.
 Groat, Edmund T.
 Hall, Albert D.
 Honsaker, John
 Hopper, Francis L.
 Jasper, Walter
 Keith, Clyde R.
 Knight, Alfred W.
 Learned, Kenneth A.
 Morita, Jiro
 Ogden, Harold S.
 Varney, Charles W., Jr.
 Vesper, Howard G.
 Whistler, Arthur M.
 Wilson, W. F.
1923
 Baier, Willard E.
 Bangham, William L.
 Blakeley, Loren
 Fowler, L. Dean
 Lewis, Howard B.
 North, John R.
 Reeves, Hubert A.
 Roth, Lawrence P.
 Walling, Lloyd A.
 Walter, John P.
1924
 Campbell, Daniel, Ex.
 Clark, Rex S., Ex.
 Forbes, Charles L.

Graham, Harold, Ex.
 Henderson, William G., Ex.
 Hopkins, George H.
 Maltby, Clifford W.

1925
 Alderman, Raymond E.
 Burmister, Clarence A.
 Cheney, Lyle H., Ex.
 Ferkel, Albert J.
 Freeman, Henry R., Ex.
 Fulwider, Robert W.
 Hart, Edward W.
 Heilbron, Carl H., Jr.
 Karelitz, Michael B.
 Maxstadt, F. W., M.S.
 Newcomb, Leroy
 Noll, Paul E.
 Pauling, Linus C., Ph.D.
 Prentice, Leland B.
 Sellers, W. D.
 Stewart, Earl D.
 Thayer, Edwin F.

1926
 Cummings, Nephi W., Ph.D.
 Fahs, John L.
 Graham, Glenn
 Granger, Wayne E.
 Hayward, Claude D.
 Kiech, Clarence F.
 Kinsey, J. E.
 Laws, Allen L.
 Macfarlane, Donald P.
 Maechtlén, Lawrence G.
 Michelmores, John E.
 Morrison, Allan J.
 Serrurier, Mark

1927
 Bower, Maxwell M.
 Farrar, Harry K.
 Mendelhall, H. E., Ph.D.
 Moore, George E.
 Rodgers, V. Wayne
 Starke, Howard R.

1928
 Armstrong, Richard C.
 Banta, Arthur Perry, M.S.
 (Deceased)
 Beckman, Arnold O., Ph.D.
 Coulter, Robert I.
 Cutler, Ralph W.
 D'Arcy, Nicholas A., Jr., Ex.
 Evans, Robley D.
 Jacobs, W. Morton
 Joujon-Roche, Jean E.
 Kaneko, George
 Kuhn, Jackson G.
 Lombard, Albert E.
 Olsen, William L.
 Tuttle, Edward E.

1929
 Birge, Knowlton R.
 Clark, D. S.
 Cline, Frederick
 Cravitz, Philip
 Evans, Thomas H.
 Everett, Monroe M., Ex.
 Grunder, Lawrence J.
 Hincke, William B., Ph.D.
 Hugg, Ernest B.

Huston, Harold M.
 Kircher, Raymond J.
 Larrecq, Anthony J.
 Lau, K. H.
 Pierce, Firth
 Roberts, Boliver
 Scullin, James C.
 Wheeler, Fred A.

1930
 Arnquist, Warren N., Ph.D.
 Carlson, Chester F.
 Giebler, Clyde
 Groch, Fred
 Johnson, Josef J.
 Murray, John
 Myers, Henry G.
 Zipser, Sidney

1931
 Arndt, William Fred
 Arnold, William A.
 Bovee, John L., Jr.
 Green, E. F.
 Hergenrother, Rudolf C., Ph.D.
 Kinney, Edward S.
 Kircher, Charles E., Jr.
 Leeper, Laverne D.
 Lehman, Robert M.
 Neher, H. Victor, Ph.D.
 Overhage, Carl F. J.
 Peer, Edward S.
 Pratt, Leland D.
 Saygol, Charles C., Ex.

1932
 Anderson, David W.
 Bradburn, James R.
 Freeman, Robert B.
 Hamlin, C. F.
 Harsh, Charles M.
 Jones, Charles W.
 Kent, W. L.
 Pruden, Worrel F.
 Schaaftsma, Jan G.
 Sheffet, Joseph
 Shockley, William
 Shull, George O.
 Sparks, Brian O.
 Wilson, Chester E.

1933
 Bamberger, Sidney F.
 (Deceased)
 Berkeley, G. Merrill
 Byrne, Ralph E., Jr.
 (Deceased)
 Clifford, Alfred H., Ph.D.
 Johnson, J. Stanley
 McCleery, Walter L.
 Mendenhall, John D.
 Meskill, John E.
 Morgan, Wendal A.
 Omsted, Harald, M.S.
 Pickles, William M., Jr. M.S.
 Pierce, John R.

1934
 Anderson, Robert C.
 Boykin, Robert
 Campbell, James R.
 Dietrick, R. A.
 Donahue, Willis R., Jr.

Etter, L. Fort
 Gregory, James
 Haskins, Ray W.
 Howard, Ernest R.
 Little, John R.
 McFadden, William C.
 McRae, James W., Ph.D.
 Myers, Bryant E.
 Pearne, John F.
 Sharp, Robert P.
 Smith, George Sidney
 Stevenson, Louis
 Whistler, Ralph E., Ex.

1935
 Davies, James A.
 Dewees, Norman B.
 Etz, Arthur N., Ex.
 Gluckman, Howard P.
 Harney, Patrick J. D., M.S.
 Jahns, Richard H.
 Jones, Robert G.
 Ray, Allen
 Ribner, Herbert S.
 Ricketts, Donald H., M.S.
 Roehm, Jack M., M.S.
 Stanley, Robert M.
 Stuppy, Laurence J.

1936
 Boothe, Raymond H. F.
 Bucknell, Wilson H.
 Carley, Glenn R.
 Davis, Frank W.
 Douglass, Malcolm E.
 Folland, Donald F., M.S.
 Frost, Arthur M.
 Graham, Ernest W., M.S.
 Holland, E. Morton, Ex.
 Jones, Paul S.
 Jordan, Charles B.
 Kiger, Wallace L.
 Klocksiesm, John P.
 La Boyteaux, Ellsworth, Ex.
 McMahon, M. M.
 McRary, Willard L.
 Muller, Conrad R.
 Ostergren, Ralph H., M.S.
 Peugh, Verne L.
 Sklar, Maurice
 Stitt, Fred B., Ph.D.
 Swanson, W. E.
 Thompson, Tyler F.

1937
 Brice, Richard T., Ph.D.
 Bussard, Gordon L.
 Carrick, Harry H.
 Ellison, William J., M.S.
 Frost, Holloway H.
 Lycett, E. A.
 Miller, Harry Hayburn
 Miller, Wendell B.
 Ridgeway, Richard L.
 Schaffner, Paul C.
 Sullwold, John
 Webster, Martin H.

1938
 Baker, J. R.
 Clarke, Charles W.
 Dennis, Paul A.
 Dixon, Blaine A., Jr.
 Dowd, Munson W., Jr.

Farneman, John D.
 Friend, Carl F.
 Hopkins, Henry S.
 Ives, Philip, Ph.D.
 Jones, Ralph W., Jr.
 Jurs, Albert E., Jr.
 Keller, Samuel H.
 Kyropoulos, Peter R., M.S.
 Nunan, Kneeland, M.S.
 Osborn, Elbert F., Ph.D.
 Rosencranz, Richard, Jr.
 Shanahan, Edmond F.
 Van Horn, James W.
 Wood, Homer J.

1939

Carstarphen, C. F.
 Flint, Delos E.
 Gerhart, Ray V.
 Green, William M.
 Hance, Harold V.
 Kaye, John
 Lawson, William George
 MacLeish, Kenneth G.
 Ortiz, Jose Pulido, M.S.
 Pullen, Keats A.
 Smith, Josiah E.
 Stones, J. Eugene
 Wilson, John N., Ph.D.
 Winchell, Robert W.

1940

Avann, Sherwin P., M.S.
 Blackington, R. J.
 Burton, Clifford C.
 Dickerson, Edward O.
 Foster, Gerald P.
 Gewe, Robert A.
 Glassco, Robert B.
 Harper, John C.
 House, William C.
 Keighley, Geoffrey L., M.S.
 Longwell, Paul A.
 Moore, Robert S., M.S.
 Palmer, Charles S.
 Richards, Raymond G.
 Russell, Charles D., M.S.
 Samuel, Hubert D., Jr.
 Spear, Robert E.
 Sullivan, Richard L.
 (Deceased)
 Tajima, Yuji
 Tomiyasu, Kiyo
 Van Dyke, Gilbert
 Wells, Robert L., M.S.
 White, Howard J.
 Wouk, Victor, M.S.

1941

Bersbach, Alfred J.
 Bowles, R. R.
 Bramhall, George H.
 Brooks, Philip D.
 Carlson, Carl A.
 Casserly, Frank G.

Chapin, William
 Cooper, Robert G.
 Davis, Walter Z.
 Dobbins, Willis E.
 Edwards, Gene L.
 Gally, Sidney
 Harris, F. S., Jr., Ph.D.
 Howard, Kenyon B.
 Leighton, Robert
 Lewis, Joseph W.
 Lockard, Frank P., M.S.
 Myers, Robert F.
 Richardson, John M.
 Rupert, Claud S.
 Schaff, Alfred, Jr.
 Silberstein, Richard
 Sohler, Stanley E.
 Stroud, Stanley G.
 Wahrhaftig, Austin L., Ph.D.
 Wallace, Roger

1942

Albrecht, Albert
 Allan, John R.
 Almassy, George W.
 Atkinson, Thomas G.
 Bauer, Frederick K.
 Beers, Kenneth H.
 Brown, David H.
 Brown, Sheldon W., Engr.
 Bruce, Victor G.
 Elliott, Thomas D.
 Felberg, Frederick H.
 Fleck, Frank A.
 Franzini, Joseph B.
 Fuller, Willard P., Jr., M.S.
 Gold, Sydney K.
 Grossberg, Arnold L.
 Hall, Robert N.
 Head, Richard
 Hicks, William B.
 Hunt, Carter
 Jephcott, Donald K.
 Kennedy, William G.
 Kumm, Emerson L.
 Lyle, Francis V.
 MacRostie, Wayne
 Makepeace, G. R.
 Marshall, Boyd T.
 Miles, John W.
 Price, Harrison A.
 Rubel, John H.
 Schureman, K. D.
 Skinner, Melvin J.
 Smallberg, Merle
 Smith, Jack C., Ph.D.
 Urbach, Kenneth
 Tomlinson, Everett P., Ph.D.
 Van Ness, E. W.
 Veronda, Carol M.
 Webster, Paul
 Weller, LeRoy, Jr.
 Widenmann, John A.

1943

Alpert, Leonard S.
 Christianson, Warren L.
 Dubbs, Clyde A.
 Ellis, Albert T.
 Elmer, David A.
 Griffith, George D.
 Hodder, Wayne K.
 Johnson, Kenneth W.
 Jones, W. L.
 Kendall, George A.
 Larson, Robert L.
 Lawrence, Theodore G.
 Lingle, Harrison C.
 Macartney, Everett J.
 Miller, Herman
 Morris, Deane N.
 Potts, Donald H.
 Reid, Douglas C.
 Sherwin, Robert M.
 Smith, M. Curtis
 Snyder, William
 Spencer, John R.
 Strickland, Charles P.
 Sutton, Richard A.
 Tenney, Frederick
 Weeks, Allen D.
 Wheelock, Wayne S.
 Wilcox, Phillip E.

1944

Allingham, Robert E.
 Andrews, Tway W.
 Bair, William P.
 Behrens, Frederick A., Jr.
 Chadwick, Joseph H., Jr.
 Dethlefsen, Douglas G.
 Donsbach, Weldon R.
 Earl, Joseph B.
 Greenwood, Donald T.
 Harbottle, Garman
 Higgins, Horace M.
 Johnson, Ronald S.
 Kettler, Jack B.
 Klock, Rolf W.
 Kott, Warren
 Kruse, Frederick W., Jr.
 Kuhns, Richard E.
 Lester, Robert W.
 Lockwood, William E., Jr.
 Long, Neville S.
 Martin, Joseph S.
 McAnlis, Robert G.
 Mettler, Rubea F.
 Mills, Warner E., Jr., M.S.
 Sapliss, Raymond A.
 Schnacke, Arthur W.
 Sigworth, Harrison W.
 Smith, George F.
 Smith, Phillip B.
 Taylor, Garland S.
 Trilling, Charles A.
 Whitmore, John F.
 Wolf, Paul L.

1945

Augenstein, Bruno W., M.S.
 Bennett, Robert R.
 Davis, Charles M.
 Davy, Louis H.
 Day, Frank M.
 Elko, Edward R.
 Francis, Donald L.
 Fulton, Albert S.
 Gerber, Raymond C., Jr.
 Gerty, John M.
 Hadley, James W.
 Harrington, Jerome
 Henry, Richard V.
 Keith, Ivan W.
 Kieckhefer, Robert J., Jr.
 Kling, Harry P.
 Leinweber, Donald M.
 Scarbrough, Alfred D.
 Scott, Eugene L.
 Shauer, Kenneth M.
 Stern, John L.
 Stevenson, K. Martin
 Teets, Charles A.
 Tillman, Donald C.

1946

Buford, Phillip N.
 Field, Jerome S.
 Fayram, Richard A., M.S.
 Fleming, John E.
 Horton, William F.
 Jessen, Howard E.
 Misner, William G.
 Neale, Edward G.
 O'Reilly, James D., M.S.
 Rehtin, Eberhardt
 Ricks, Paul C.
 Strong, Herbert W.
 Taylor, W. Clifford
 Weldon, Thomas F., M.S.
 Wilburn, William C., M.S.
 Zagorites, Jerry A.

1947

Bennett, Dudley E.
 Blink, Robert L.
 Conrath, Philip R.
 Cowan, Edwin J.
 Crumly, Charles B.
 Hawthorne, Robert G.
 Hodges, Merwyn E.
 Holthy, Kenneth F.
 Holmgren, John D.
 Kohler, Henry George
 Lund, Le Val
 Miller, Charles N.
 Mueller, Albert H. J.
 Ogier, Walter T.
 Pascoe, Lucien A.
 Richeson, Will, Jr.
 Rosener, Joseph, Jr.
 Slaton, Jack H., M.S.
 Swerling, Peter

CONTRIBUTORS TO THE ALUMNI FUND

Since July 1, 1949

Baugh, Harold '48
 Beman, Ward W. '35
 Benton, Ralph S., Jr. '37
 Berman, Isadore '29
 Berman, Jack '28
 Blakeley, Loren E. '23
 Black, John W. '39
 Boyd, James '27
 Calligeros, J. P. '46
 Cornwall, Ellsworth W. '37
 Cox, Robert Osborne '40

Crozier, George O. '39
 Dodder, Don '45
 Ellis, Douglas S. '46
 Folland, Donald F. '36
 Gardner, David Z., Jr. '27
 Gold, S. Kendall '42
 Graybeal, Oran A., Jr. '38
 Harper, Thomas S. '37
 Harris, Irving C. '00
 Henderson, W. G., Ex. '24
 Hopper, Basil M. '23

Ida, Edward S. '46
 Loughridge, Donald H. '23
 Linhoff, Harold R. '20
 McClain, F. J. '34
 Mendenhall, H. E., Ph.D. '27
 Moore, Morton E. '34
 Naylor, Ralph A. '34
 Nestle, A. C. '28
 Osgood, George M. '41
 Parker, Warren H., Jr. '45
 Potter, W. D. '22

Reynolds, Roland W. '27
 Rosencranz, Richard, Jr. '38
 Schaak, Frank A., Jr. '34
 Schomaker, Verner, Ph.D. '38
 Shiells, James F., Jr. '48
 St. Clair, Harry P. '20
 Stone, Robert S. '48
 Thomas, John H., Ex. '48
 Ugrin, Nick T. '34
 Van Osdol, George W. '34
 Velazquez, J. L. '38

Youtz, J. Paul '17

PERSONALS

1923

John H. Puls, Assistant Division Manager of the Pacific Coast Division of the Texas Company, has been promoted to Division Manager.

1924

F. Douglas Tellwright has accepted an assignment as Assistant Vice-President of the American Telephone & Telegraph Company in New York. Formerly he was with Pacific Tel and Tel as Vice-President and Manager of the Oregon area.

1927

Florent H. Bailly, formerly Chief Engineer and Chief Geologist of the Pantepec Oil Company, C.A. of Venezuela, has recently been elected President of Pantepec and Pancoastal Oil Company, C.A. of Venezuela. Since 1942 Mr. Bailly has resided in the States but has continued his activities in Venezuela. He is also President of Petroleum Engineering Associates, Inc., and Oil Properties Consultants, Inc., of Pasadena.

1926

Ivan L. Farman, Brig. Gen. USAF, M.S. '39, is Director of Communications of the Army Air Force in Washington. During the war he was in Japan with the Air Transport Command. He lives in Arlington, Virginia.

1928

Mort Jacobs, formerly Manager of General Sales of the Southern California Gas Co., has been made Vice-President in charge of Sales, Advertising and Customers Department activities. The managerial post he leaves vacant is being taken up by **Frank Foster** '25, who moves up from the position of Manager of Residential Sales and Promotion.

1929

Harold M. Huston is employed as an estimating engineer by the Southwest Welding Co. in Alhambra.

Wallace A. McMillan has been promoted from Assistant Director of Research of the Beacon, N.Y., lab of the Texas Company to Director of Technical Services, in New York City.

1930

Norris Johnston, Ph.D., has been named president of the consulting firm, Petroleum Technologist, Inc. in Montebello, Calif. He was formerly with the General Petroleum Corporation, where, for ten years, he was Chief Physicist in charge of Production Research. During this period he was assigned to Socony-Vacuum to set up their Dallas Production Research laboratories.

1931

Herbert E. Haymaker, Ex-'31, is a Sales

Engineer for Fairfield Aerial Surveys, Inc. in Los Angeles. He has two children—Judith, 8, and Lincoln, 6.

Everett G. Trostel received a Petroleum Engineering degree in June from the University of Southern California.

Walt Dickey and **Chuck Lewis**, both '31, and **Richard L. Walker** '40, are employed by the Power Division of the Bechtel Corporation in San Francisco. Work of this organization includes the design and construction of electric generating plants.

Carl Overhage, M.S. '34, Ph.D. '37, is in Rochester working for the Eastman Kodak Co. Recently he was made superintendent of the Color Print Lab.

1932

John B. Miller, Ex-'32, is Professor of Electrical Engineering at Bucknell University, Lewisburg, Penna., and President and Treasurer of the Wyckoff-Bent Corp. in New York City. He has three sons—one a U. S. Navy pilot, another in the U. S. Coast Guard Electronics School and another in the local high school.

Dana B. Bates, Ex-'32, was married last March in the Stanford Memorial chapel at Palo Alto to Marjorie Houghton of Dallas, Texas. They will live in Seattle.

1933

We're sorry to have to report the death

ALUMNI ASSOCIATION OFFICERS

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J. W. Lewis, Jr. '41

VICE-PRESIDENT

G. K. Whitworth '20

SECRETARY

D. S. Clark '29

TREASURER

H. R. Freeman '25

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R. P. Sharp '34

A. C. Tutschulte '31

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Pullman-Standard Car Manufacturing Co.
1414 Field St., Hammond, Indiana

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3300 S. Federal St., Chicago

Robert T. Dillon '25

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Electro Engineering Works, 6021 College Ave., Oakland

VICE-PRESIDENT

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J. Kohl '40
1149 A High Court, Berkeley
Tracerlab Inc., 2295 San Pablo Ave., Berkeley

The San Francisco Chapter meets for lunch at the Fraternity Club, 345 Bush Street, every Thursday.

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Richard T. Brice '37
106 N. Walnut St., East Orange, N. J.
Otis Elevator Co., 260 Eleventh Ave., N. Y. C.

VICE-PRESIDENT

Richard K. Pond '39
174 North 19th St., East Orange, N. J.
Westinghouse Electric Co., 150 Pacific Ave., Jersey City, N. J.

SECRETARY-TREASURER

Erwin Baumgarten '40
302 E. Front St., Apt. B-16, Plainfield, N. J.
Calco Division, American Cyanamid Co., Bound Brook, N. J.

Washington, D. C., Chapter:

PRESIDENT

Donald H. Loughridge '23
Department of the Army
Office of the Assistant Secretary, Pentagon Bldg.

SECRETARY-TREASURER

Charles E. Fitch '23
9214 Long Branch Pkwy., Silver Spring, Md.

of **Kenneth P. Warren**, Ex-'33, on May 25 of a brain tumor, in Queen of Angels Hospital, Los Angeles.

1934

Nico van Wingen has resigned his position as Professor of Petroleum Engineering at the University of Oklahoma to become Vice-President of the consulting firm, Petroleum Technologists, Inc. in Montebello, Calif. Prior to joining the University staff he had been associated for nine years with the Richfield Oil Corp. in Los Angeles.

Carsten Steffens, Ph.D., has resigned as Assistant Director of the Stanford Research Institute to take a position as Associate Professor of Chemistry at the University of New Mexico in Albuquerque.

1935

Donald C. Webster is now head of the Design and Production Department of the Naval Ordnance Test Station, which has headquarters in Pasadena.

Fred C. King, Jr. has been appointed Assistant Manager of the General Petroleum Corporation's Engineering Department. He lives in Long Beach.

Bernard B. Watson, Ph.D., has been appointed, as a specialist in physics, to the Office of Education of the Federal Security Agency in Washington. Before joining the Office of Education he served as Associate Professor of Physics at Temple University in Philadelphia.

1936

E. V. Watts has been appointed Produc-

tion Superintendent of the Southern Division of General Petroleum Corporation. He lives in South Pasadena.

David M. Whipp is on temporary duty in the Arctic for the Coast and Geodetic Survey, at Point Lay, Alaska. His wife and two children live in Glendale.

1937

Harry H. Carrick, M.S. '39, has been made Assistant to the Division Superintendent of the San Joaquin Valley Division of the Production Dept. of the General Petroleum Corp. He lives in Bakersfield.

Kenneth C. Crumrine, Ph.D., is employed in the Geophysical Research Laboratory of the Carter Oil Company in Tulsa, Okla. He has a five-year-old daughter.

Leon Horovitz received an M.S. in Social Work, and **Alan J. Grobecker** an M.S. in Electrical Engineering last June from the University of Southern California.

1938

J. L. Valazquez left North American Aviation in September 1948 and accepted a position with the Piasecki Helicopter Corporation, outside Philadelphia, as head of their Structural Design Group. Since last March he has been a project engineer on the XH-16, a large transport helicopter for the AAF.

1939

Robert M. Mahoney is Manager of Industrial Relations for the United States Vanadium Corporation in Bishop, Calif.

Arthur B. Drescher, M.S., is Chief Engineer, Mines & Exploration, of the Lone

Star Steel Co. in Lone Star, Texas. This summer he was consultant on gold placer deposits in Yukon. He and his wife have a son, six, and, when we heard from him, were expecting a daughter late in the summer.

Stephen C. Clark, Ex-'39, received his Ph.D. from Yale in June. He got both his B.A. and M.A. from the University of Washington. He is now Assistant Professor of Psychology and Acting Chairman of the Department at Alfred University, Alfred, N.Y. He and his wife have a two-year-old daughter, Margaret.

1940

Charles Palmer and his wife announce the birth of Wendy Palmer on June 20.

Herbert M. Worcester, Jr. writes that his son, James Herbert, was born Nov. 23, 1948.

Robert C. Brumfield, M.S. '41, Ph.D. '43, has a second daughter, Cynthia, born in August, 1948.

Robert B. Glasco was married on July 14 to Nancy Jane Brinton. They are living in Temple City.

John W. Jackson, M.S., has been promoted to full professor of Mechanical Engineering at the University of Maryland, College Park.

James B. Glassco and his wife have adopted a two-months-old boy ("after waiting a year and a half and passing numerous examinations much tougher than any given at Tech"). They have named him John Edward.

*The Undergraduate Members of Throop Club
Cordially Invite the Alumni of Throop Club
to Attend Open House at Throop Club Lounge
After the Varsity Games at the Rose Bowl on
October 8th, 22nd and 28th.*

The **Occidental-Caltech Pre-Game Alumni Lunch** will be held on October 27 at 12 noon at the Athenaeum. It is important that Caltech alumni, who are hosts at this now-traditional affair, turn out in full force. Tickets are \$1.25, payable at the door. For reservations call or write Hal Musselman's office by or before October 24 (SYcamore 6-7121 or RYan 1-7171). Accommodations are limited to 120, so make your reservation early.

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Pasadena 2, California RYan 1-8141

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Logan 5-5329 Los Angeles 22, Calif.

1941

Wallace D. Hayes, Ph.D. '47, formerly Assistant Professor of Applied Mathematics at Brown University, has been promoted to Associate Professor.

Robert G. Cooper is Academic Director and Instructor in Math at Stillwater Cove Ranch School in Jenner, Calif.

Eugene A. Lakos, Lieutenant, Civil Engineer Corps, USN, was married on June 25 to Marcia Patrick Fenington-Legere in New Milford, Conn. They will live in New York City.

Robert H. Ehrke is employed as a flight dispatcher for American Airlines, based at La Guardia Field, New York.

James T. Harlan, Jr. writes that he is currently living in New York City with his wife, son David, two, and daughter Patricia, four, having been transferred from San Francisco by the Shell Chemical Corp. in September, 1948.

1942

Edward R. Bartlett, Jr. was married in July to Helen H. Hasler in Cresson, Penna. Ed is working for Dupont in Seaford, Delaware.

Richard M. Head, M.S. '43, Ph.D. '49, is Associate Professor of Aeronautics at the U. S. Naval Postgraduate School in Annapolis, Maryland.

David L. Hill has accepted an appointment as Assistant Professor of Physics at Vanderbilt University in Nashville, Tenn. He has been connected with the Atomic Energy Commission's Argonne Laboratories in Chicago.

George I. Cohn, Instructor in Electrical Engineering at Illinois Institute of Technology, has been promoted to the rank of Assistant Professor.

Major William P. Mellen, M.S., and **Major Hazen N. Bedke** have been assigned by the USAF Institute of Technology, Wright-Patterson AF Base, Dayton, Ohio, to UCLA for completion of educational requirements—Major Mellen in Meteorology, Major Bedke in Oceanography. **Captain Merle P. Woodall** has been assigned to the University of Chicago for work in Meteorology.

Richard A. Andrews is with Food Machinery Co. in San Jose as a Project Engineer.

There are now two Andrews children—Kathleen, four, and Ned, almost two.

Sheldon W. Brown, Comdr, USN, recently transferred from duty as Plans and Policy Officer, Research and Development Group, Bureau of Aeronautics, to the Office of the Under Secretary of the Navy as Special Assistant for Research and Development.

Warren Gillette is in medical school at George Washington University and due to graduate in 1950. He and his wife have a three-year-old son.

1943

Robert F. Larson has been appointed to the staff of the Naval Ordnance Laboratory, White Oak, Maryland, where he will be attached to the Research Department. Before joining NOL Bob was Instructor in Mechanical Engineering at the Case Institute of Technology, and worked for General Motors.

Clyde A. Dubbs is "now employed by Uncle Sam, as a Bio-Chemist in a hospital in West Los Angeles." He had an article "Improved Apparatus for Radiobiological Synthesis" in *Science*, June 3, 1949.

Robert Ralph Johns was graduated from the University of Southern California in June with an M.A. in Physics.

1944

Robert G. McAnlis is still working for Johns-Manville in Lopoc, Calif. at their diatomaceous earth mine and processing plant. He and his wife (née Phoebe R. Scrafford of Pasadena) have a daughter, Kaley Kathleen, born last October.

Garman Harbottle was married in New York City last June to Naomi Perkiss. After a trip to Alaska they are living in Patchogue, Long Island.

William P. Harland writes "With the completion of the construction project at Shawinigan Falls, Quebec, I was moved by my employers, the Shawinigan Engineering Co. to their new power development at Trenche on the St. Maurice River. My position here is 'Night Resident Engineer' in charge of engineering during the night shift. The Trenche Development, the 8th on the St. Maurice River, will produce 380,000 h.p. at a 160 ft. head."

Weldon R. Donsbach is working for Westinghouse in the Industrial Electronics

and X-Ray Division as a design engineer on Marine Radar. He and his wife and daughter, Ruth, born in October, 1947, are living in Baltimore, Maryland.

Grant L. Benson, Jr. received his M.D. from the USC School of Medicine in 1947. Since then he has served one year of internship at the U. S. Naval Hospital in Oakland, and one year of residency in internal medicine at Holy Cross Hospital, Salt Lake City. He is now taking a two year residency training in internal medicine at Queen of Angels Hospital, Los Angeles.

1945

Clyde Gerber, Jr. was married on August 20 to Mary Yazum of Schenectady, N. Y. Clyde is working for General Electric's Knolls Atomic Power Lab., where he has been since October, 1946.

Donald C. Dodder writes that he is a Research Fellow in the Physics Department of the University of Minnesota, where he has been since September, 1947. Also in the department are **Robert J. S. Brown** '48, **Bert Downs** '46, and **Leo Levitt** '41.

Eugene L. Scott received an M.S. in Electrical Engineering from the University of Southern California in June.

Charles R. Cutler's engagement to Margaret Royston was announced August 14. After leaving Caltech he graduated from the George Washington University Law School, and is now associated with the law firm of Kirkland, Fleming, Green, Martin and Ellis—in Washington, D.C.

1946

Stanley R. Nixon, who for the past two years has been on an L.D.S. mission in Western Canada, began working this summer as an electrical engineer with the Telluride Power Company in Richfield, Utah.

James W. Glanville, M.S., was married in June to Nancy Ellen Hart in Dallas, Texas.

Norman A. Gottlieb sends us late notice that he was married October 16, 1948.

Among those receiving degrees at S.C. in June were **Harry L. Wolbers, Jr.**, M.A. in Psychology, and **Jerome S. Field**, M.S. in Business Administration.

Charles W. Allison Jr. started working

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Engineering & Science Monthly, June 1948
are still available.

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Engineering & Science
California Institute of Technology
1201 East California St.
Pasadena 4, Calif.

this summer for the Stanolind Oil and Gas Company in their Exploration Department in Ballinger, Texas.

1947

Charles B. Shaw, Jr., spent the summer as a research assistant at Los Alamos. This fall he is going to the University of Chicago to work on his Ph.D. in theoretical physics. He expects to receive his M. S. by mail from S.C., "if I ever finish my thesis."

Albert H. J. Mueller is taking a two months cruise aboard an Escort Carrier to Hawaii and Guam. He holds an ensigns commission in the Naval Reserve.

Robert L. Wenick received an M.S. in Electrical Engineering in June from the University of Southern California.

1948

Robert L. Collins, M.S., was married last May to Miss Ray McIver in Forth Worth, Texas. They will live in Glendale.

Tom Tracy writes that he is Sales Engineer at the San Francisco office of the Minneapolis-Honeywell Regulator Co., Brown Instruments Division. Also, that he will be going to Philadelphia in September for 13 weeks of school.

Carl Cox is an aerodynamicist at Boeing on a Guided Missile Project.

Lt. Col. Matthew J. Altenhofen, M.S., is an instructor in Math at the U. S. Military Academy at West Point. Lt. Col. Harvey R. Fraser, M.S., is also there as an instructor in the Mechanics Department.

Phillip Eisenberg, Prof. degree, is supervisor of the Fluid Phenomena Section of the Hydromechanics Division of the David Taylor Model Basin in Washington, D. C. His daughter, Elyse Rae, will be two this fall.

Robert Brinkman and his wife have a son, Robert Craig, born last April. Bob is employed by General Motors Styling Section in the Body Development Studio.

1949

Neal Hurley has been given a fellowship to the Eidgenossische Technische Hochschule in Zurich, Switzerland, one of the leading centers for geological study and research in Europe. This summer Neal was on the Caltech expedition to St. Lawrence Island before sailing to Switzerland the latter part of September.

Richard Cornelius was married June 18, in Penlynn, Penna., to Dorothy White.

Marvin Abramovitz and Lionel L. Levy, Jr. have joined the staff of the Ames Aeronautical Laboratory, Moffett Field, Calif., the West Coast research center of the National Advisory Committee for Aeronautics. As aeronautical research scientists at the Laboratory they will participate in NACA's extensive theoretical and experimental studies of the problems of high-speed flight in the transonic and supersonic speed ranges.

John R. Reeve, Jr., M.S., has joined the Texas Company as a Mechanical Engineer in the Beacon, N.Y. Laboratories.

ALUMNI ASSOCIATION

CALIFORNIA INSTITUTE OF TECHNOLOGY

STATEMENT OF INCOME For the year ended June 30, 1949

INCOME		
Dues		\$6,184.75
Income from Consolidated Portfolio of C.I.T.:		
Normal income	\$ 854.96	
Gain upon sale of investments	72.72	927.68
		<u>7,112.43</u>
Less subscriptions to Engineering and Science Monthly for members of the Association		4,056.00
		<u>3,056.43</u>

OTHER INCOME

E & S Monthly, prior to assumption of publication by C.I.T.	\$ 765.20	
Less expense	370.04	395.16
Program Committee	1,743.00	
Less expense	1,439.73	303.27
Social Committee	1,585.03	
Less expense	1,623.10	(38.07)
Seminar Committee	1,472.25	
Less expense	1,412.25	60.00
Sundry	38.03	758.39
		<u>3,814.82</u>

EXPENSE

Administration:		
Directors' expense		170.38
Postage		332.93
Supplies		476.72
Miscellaneous		26.47
		<u>1,006.50</u>
Alumni Fund Committee:		
Printing	671.86	
Postage and supplies	197.23	869.09
Membership Committee:		
Engineering and Science Monthly sent to non-member	323.68	
Postage and supplies	56.84	380.52
Placement Committee		12.46
Publications Committee		12.57
Student Relations Committee	105.40	
Chapter rebates	34.20	2,420.74
NET INCOME		<u>\$1,394.08</u>

BALANCE SHEET As of June 30, 1949

ASSETS		
Demand deposit in bank		\$ 5,283.17
Accounts receivable		47.50
Postage deposit		60.99
Investments, at cost:		
Share in Consolidated Portfolio of C.I.T.	\$23,222.72	
U. S. Treasury bonds	222.00	23,444.72
Furniture and fixtures		221.04
		<u>\$29,057.42</u>

LIABILITIES

Accounts payable	\$ 242.95
1949-1950 annual membership dues paid in advance	3,696.00
	<u>3,938.95</u>

SURPLUS

Life membership reserve:			
Fully-paid memberships	\$23,150.00		
Payments on life memberships under the installment payment plan	1,573.19		
		24,723.19	
Unappropriated income:			
Excess of income over expense, year ended June 30, 1949	\$1,394.08		
Less deficit July 1, 1948	998.80	395.28	25,118.47
			<u>\$29,057.42</u>

AUDITOR'S REPORT

Alumni Association California
Institute of Technology
Pasadena, California

I have examined the balance sheet of Alumni Association California Institute of Technology as of June 30, 1949 and the related statement of income for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as were considered necessary in the circumstances.

The statements do not reflect amounts due from the California Institute of Technology of \$1,954.28 for profit (prior to certain expense provided for in the General Budget of the California Institute of Technology) from publication of Engineering and Science Monthly, and \$1,098.02 of normal income and \$80.65 gain upon sale of investments from the Consolidated Portfolio of California Institute of Technology. Such amounts are subject to audit and, in accordance with the practice of prior years, will not be recorded upon the books of the Association until received.

In my opinion, the accompanying balance sheet and statement of income present fairly the financial position of Alumni Association California Institute of Technology at June 30, 1949 and the results of its operations for the year then ended, except for the matters referred to in the preceding paragraph, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Howard W. Finney
Certified Public Accountant

Los Angeles, California
September 6, 1949

lation to the rest of the business.

One chapter, "Relations with the Educational System," should be of particular interest to colleges and universities, because it discusses from the point of view of an industrial research director many of the same problems which plague college administrators in dealing with questions of applied research, fundamental research, and patents in relation to industrial sponsorship. This chapter raises more questions than it answers, but serves a valuable function in making the implication that much more study should be given to the common problems of academic and industrial research. The present growth of academic research into areas of applied research and development has already created serious problems of policy in academic administrations.

THE CRITICAL READER

Edited by Wallace Douglas,
Roy Lamson and Hallett Smith
W. W. Norton & Co., N.Y., 785 pp, \$5.

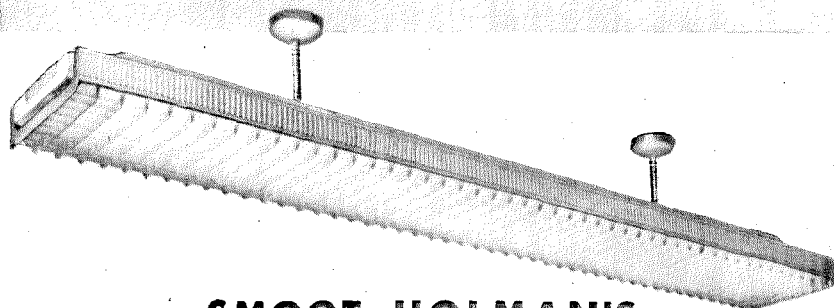
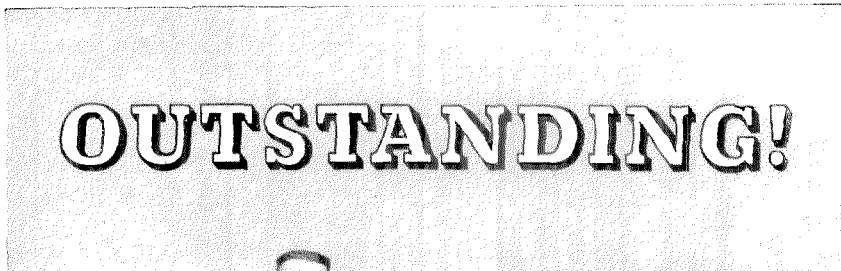
The poems, stories, and essays in this anthology have all been chosen for their ability to develop critical judgment in a reader. Beyond that, they have little in common—which means there are a good many off-the-beaten-track selections mixed in with standard anthology fare here. The book is primarily intended as a college textbook in freshman English. As such, it is readable, stimulating, and difficult. In fact, it should present a considerable challenge, not only to the critical judgment of a freshman today, but to the oldtimer who, as a freshman, was weaned on such simple stuff as Wordsworth, Lamb, and Hawthorne.

Co-editor Hallett Smith is the new head of the Humanities Division.

NATURAL HISTORY OF MARINE ANIMALS

by G. E. MacGinitie
and Nettie MacGinitie
McGraw-Hill, N.Y., 473 pp, \$6.

As Director of the Kerckhoff Marine Laboratory at Corona del Mar, George MacGinitie has been answering questions about the natural history of marine animals for a good many years. Now, with the assistance of his wife, he has collected some of this information in a book, written for the general reader as well as the zoology student, and dedicated "to those people who, after watching the activities of some of our marine animals, have said, 'You ought to write all this down.'"

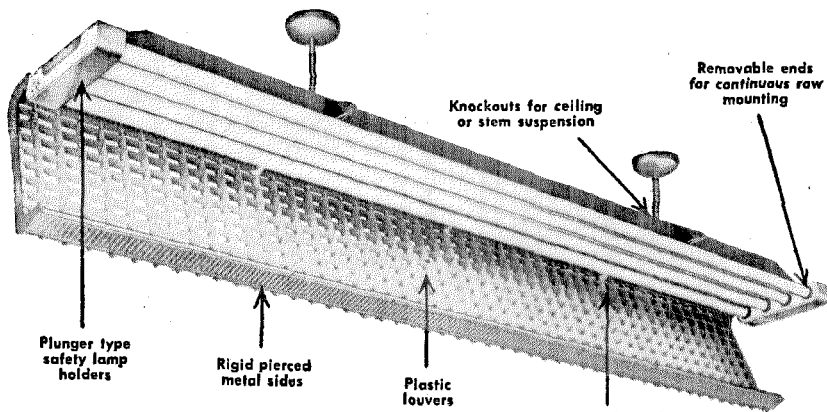


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By EDWIN H. BROWN, Vice-President, Engineering Development Division
Allis-Chalmers Manufacturing Company (Graduate Training Course 1908)

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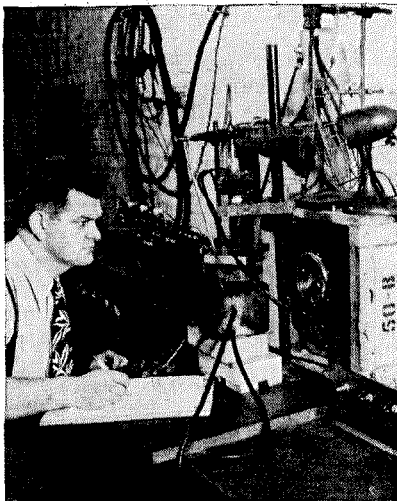
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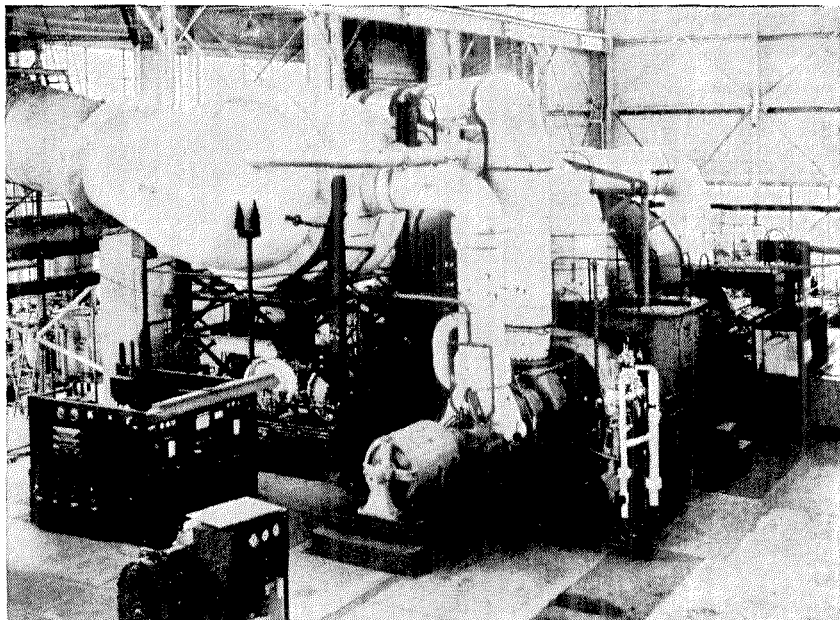
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