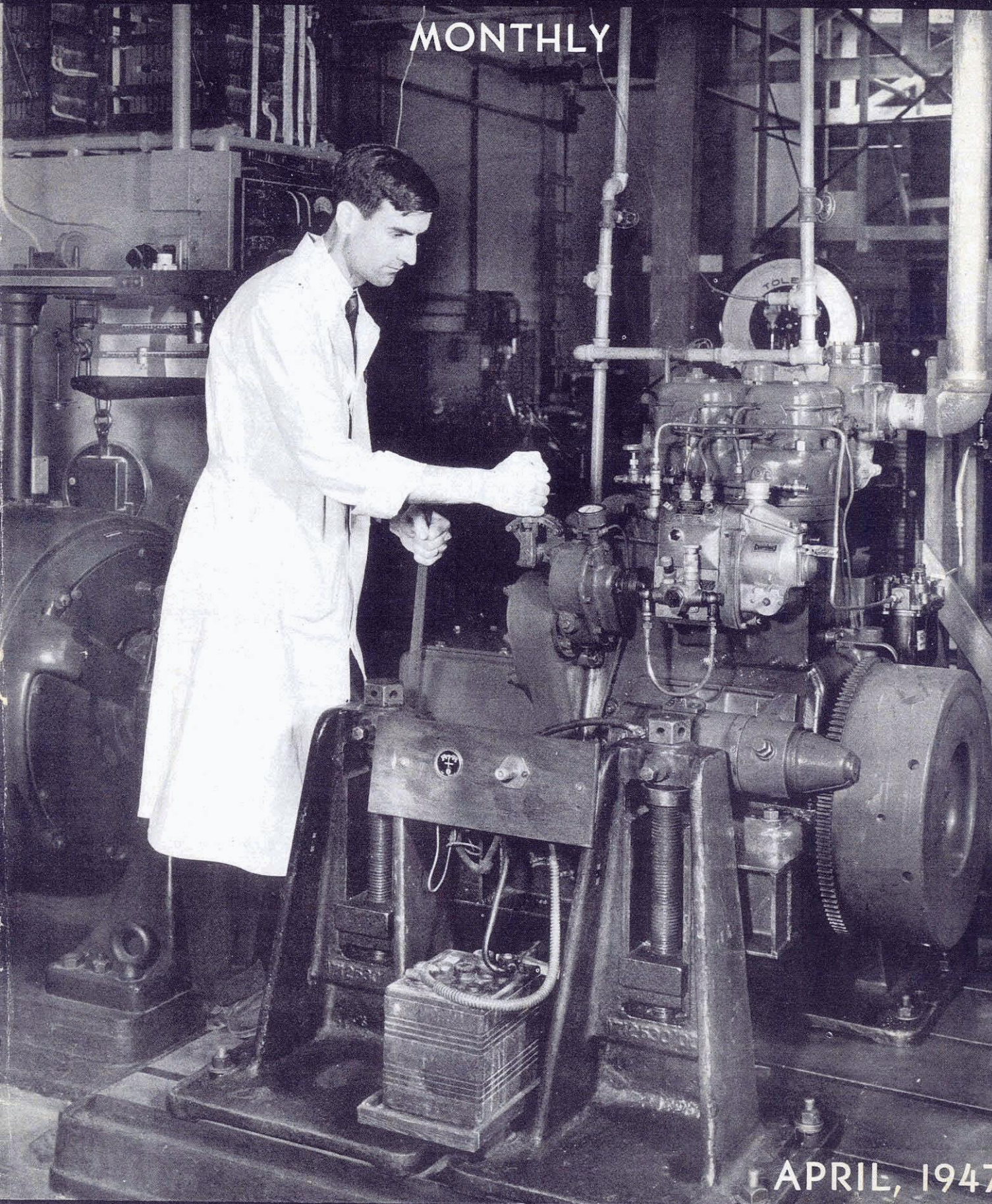


ENGINEERING AND SCIENCE

MONTHLY



APRIL, 1947

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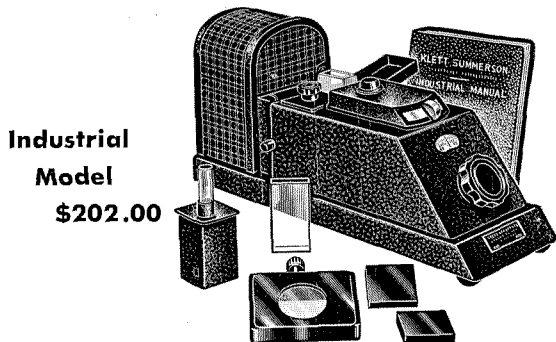
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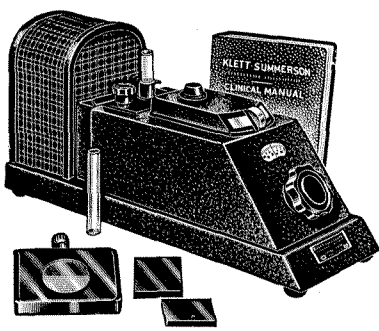
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BY-LINES

CHESTER STOCK

Dr. Chester Stock, professor of paleontology at the California Institute since 1926, has guided the progress of paleontological research in the western states and Mexico, and has contributed to the study of early man in America. Dr. Stock has made important fossil discoveries in the California Coast Ranges, and has conducted important field studies under a John Simon Guggenheim Memorial Foundation Fellowship.



JOHN A. SCHUTZ

In 1945 John A. Schutz joined the Division of the Humanities as an instructor of history in the Navy V-5 program. Since the departure of the Navy, Dr. Schutz has taught American history and coached the CalTech debate squad.



Born in Los Angeles and receiving all of his education in the California schools, Dr. Schutz is a local product. He won his doctorate from the University of California at Los Angeles in 1945, where he had previously instructed in the Army Specialized Training Program and in the civilian courses in British-American relations.

During his years at U.C.L.A. Dr. Schutz achieved the honor of a University of California Fellowship in History for 1943-1944, membership in Phi Kappa Delta, honorary speech society, and a record as champion debater and orator. Dr. Schutz also was one of the founders of the U.C.-L.A. Graduate Guild and served as its first president.

Dr. Schutz is the author of many articles on American colonial history and is at present putting the finishing touches on a biography.

COVER CAPTION

Diesel engine being tested on a dynamometer in the mechanical engineering laboratory at the California Institute of Technology. The test is being made by Peter Kyropoulos, instructor in mechanical engineering.

APRIL, 1947

ENGINEERING AND SCIENCE

Monthly



The Truth Shall Make You Free

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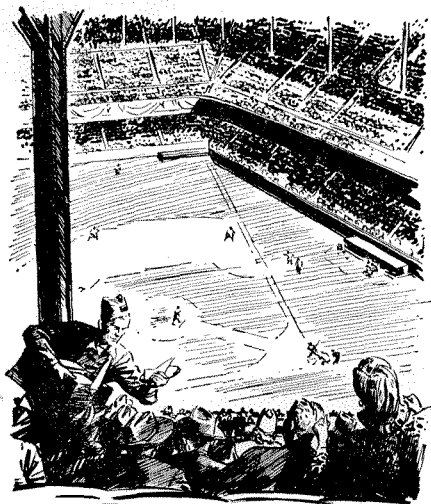
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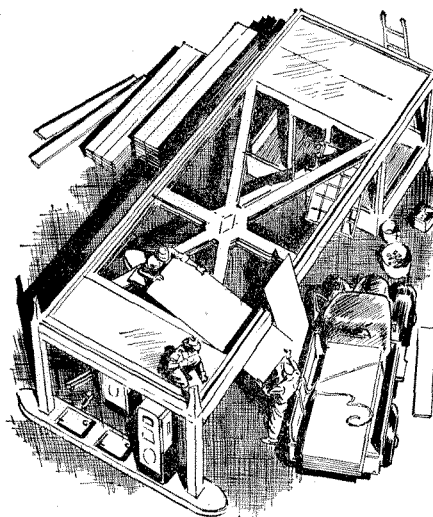
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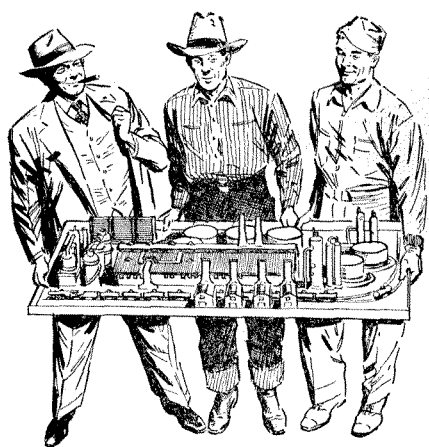
1. In 1946 the owners of Union Oil Company made a total net profit of \$8,867,023. Most of us will admit that almost 9 million dollars is a lot of money. But what many of us fail to consider is that those profit dollars were divided among a lot of people.



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4. In other words, while Union Oil Company looks pretty big from the standpoint of all its oil wells, refineries, service stations, etc., the company is actually owned—and the profits shared—by ordinary Americans like you and your neighbor next door. 70% of these owners live in the West.



5. There are 56 in Spokane, Washington; 10 in Grants Pass, Oregon; 177 in Bakersfield, California, etc. 2,150 are Union Oil employees. The average shareholder owns 133 shares—about \$2,900 worth on today's market. Some own less than this, some more; but the largest owns only about 1% of the total shares outstanding.



6. So it is not the investments of a few millionaires, but the combined savings of thousands of average citizens, that make Union Oil—and most American corporations—possible, and without some such method of providing the necessary tools, American mass production which is based on *free competition* could never have been accomplished.

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AMERICA'S FIFTH FREEDOM IS FREE ENTERPRISE

ENGINEERING AND SCIENCE

Monthly



Vol. X, No. 4

April, 1947

The Professional Engineers' Registration Act

THE PROPOSED Professional Engineers' Registration Act, recently introduced into the California State Assembly where it became Assembly Bill 1930, would make any person guilty of a misdemeanor and subject to a fine of \$100 to \$500 if he engages in the practice of professional engineering without having been registered as provided by this Act, unless he is exempt from registration.

One of the first questions asked about the proposed act by an engineer is whether he is included among those who must be registered. The phrase "practice of professional engineering" is so broadly defined by the bill that no Tech man should entertain any doubts regarding his inclusion so far as this phrase is concerned. Either he is clearly not included because his work is definitely non-engineering in character or he is included by the definition.

The engineer should look closely at this bill if it would make him guilty of a misdemeanor in case he continued working as at present. He may, of course, avoid committing a misdemeanor by registering as a professional engineer. But let us consider the import of the phrase "unless he is exempt from registration." There are two broad exempt classes: first, engineers whose practice does not affect the health and safety of persons, and second, engineers who do not assume responsible charge of work. The first class probably does not exempt as large a fraction of engineers as the second. It appears that work such as evaluation and planning would not affect personal health or safety, but that work such as design and supervision of construction would affect health and safety and would therefore be involved. Members of the second exempt class, subordinate engineers, probably far outnumber supervisory engineers. Altogether it appears that those exempt from registration far outnumber those who must register.

It is conceivable that in a large group of engineers reporting through organization lines to a chief engineer, only the chief engineers would be required to register. However, if a subordinate engineer signs drawing specifications as final approval before construction which might affect personal health or safety, it appears that he would be required to register.

In small organizations where one engineer is in full charge of engineering it appears certain that he would be required to register.

As the bill facilitates registration of those who have practiced professional engineering for some time, there should be no reluctance on the part of present engineers to approve the act for fear they would have difficulty passing registration examinations.

Proponents of the proposed act argue, among other points, that it will aid in safeguarding health, life, property and public welfare by giving the public a minimum standard by which to judge engineering competence and by prohibiting persons of lesser qualifications from offering engineering service to the public. They cite, as an example, the case of Robert Magee who posed as a chemical engineer and, through mishandling of a large quantity of perchloric acid, caused one of the most deadly and property-destructive industrial explosions in the history of Los Angeles when the O'Connor electro-plating plant was destroyed in February. Had the proposed Registration Act been functioning before he was hired, Mr. Magee would have been asked to produce evidence of his registration in qualifying for the position. The act's proponents state that he would have been unable to meet the requirements for registration, his incompetence would have been recognized, and he would not have attained the position of responsibility and trust which permitted him to destroy 14 persons and property worth hundreds of thousands of dollars.

Opponents of the proposed act answer this argument by saying, first, that it would not eliminate incompetence, and second, that misuse of technical competence might still injure the public interest. In answer to the first argument, there is considerable reason to believe that incompetence in responsible positions would be greatly reduced by the act, if not eliminated. Undertakings requiring legal permit would require approval of a registered engineer and experience shows that such approval would become important for projects not legally requiring it. As the re-

(Continued on page 7)

The Dawn Horse or Eohippus

By CHESTER STOCK

RECENTLY COMPLETED in the laboratory of vertebrate paleontology at the California Institute of Technology is the first free or open mount of a tiny early member of the horse family. The difficult task of preparing this specimen and of reconstructing missing parts was accomplished by William Otto, sculptor and preparator at the Institute. An innovation is the use of leucite in the supporting framework of the skeleton, giving a lightness and clarity of presentation rarely achieved in the preparation of such materials. While thousands of fragments of jaws and skulls, teeth, and parts of skeletons of *Eohippus* have been collected by a number of institutions, there are only three or four mounted skeletons of this animal in existence. With the exception of the present individual, the other two or three have been prepared on plaques or as half mounts in which, for the most part, only one-half of the body is shown.

Eohippus, as the early ancestor of the modern horse has come to be called, occurs in lower Eocene strata that were deposited some 45 millions years ago. It is interesting to note in passing that the name of this animal was actually coined by Thomas Henry Huxley during a visit to the United States in 1876. On that occasion, Huxley, the great proponent of the theory of evolution, was much impressed by the factual evidence in support of the theory offered by the Yale University collection of fossil horses. The collection had been gathered by Professor O. C. Marsh in the course of his explorations for fossils in the badlands of the Great Plains and Rocky Mountains. It was not long after Huxley's comments during this visit that Marsh applied the name *Eohippus* to a type of horse discovered in the lower Eocene deposits of the West.

The California Institute specimen shown in figure 1 was collected in the summer of 1931 by Professor E. L. Troxell of Trinity College, Connecticut, who discovered the material in landlaid strata of the Big Horn Basin, northwestern Wyoming. Unfortunately, the skeleton and skull do not belong to the same individual, but the disparity in size of the skull with regard to that of the body is such as to not give the head an appearance of being disproportionately large. Both parts of the mounted specimen were found in the same deposit. When discovered the skull was badly smashed and preserved in an extremely well indurated, fine grained sandstone. The available parts were removed from the matrix and oriented in proper position, as they would have occurred in an undamaged skull. This operation required considerable skill and patience on the part of Mr. Otto.

The most obvious difference between *Eohippus* and the modern horse is the tiny size of the former (see figure 2). The *Eohippus* specimen has a shoulder height of only 13 inches, in contrast to 5 feet, 3 inches which represents the height of a modern horse of average size. There are many additional features to be seen in this diminutive early member of the horse tribe. Its body, for example, is long and the back is arched. The bones of the legs retain their primitive and generalized relations. Those of the lower segments of the limbs do not show the coalescence and reduction of elements seen in later, more specialized types of horses. *Eohippus* likewise possesses a greater number of functional toes, namely four in the front and three in the hind feet, while in *Equus* there is only a single functional digit in each foot. The cheek-teeth are short-crowned with low cusps, and thus noticeably different from the long-crowned

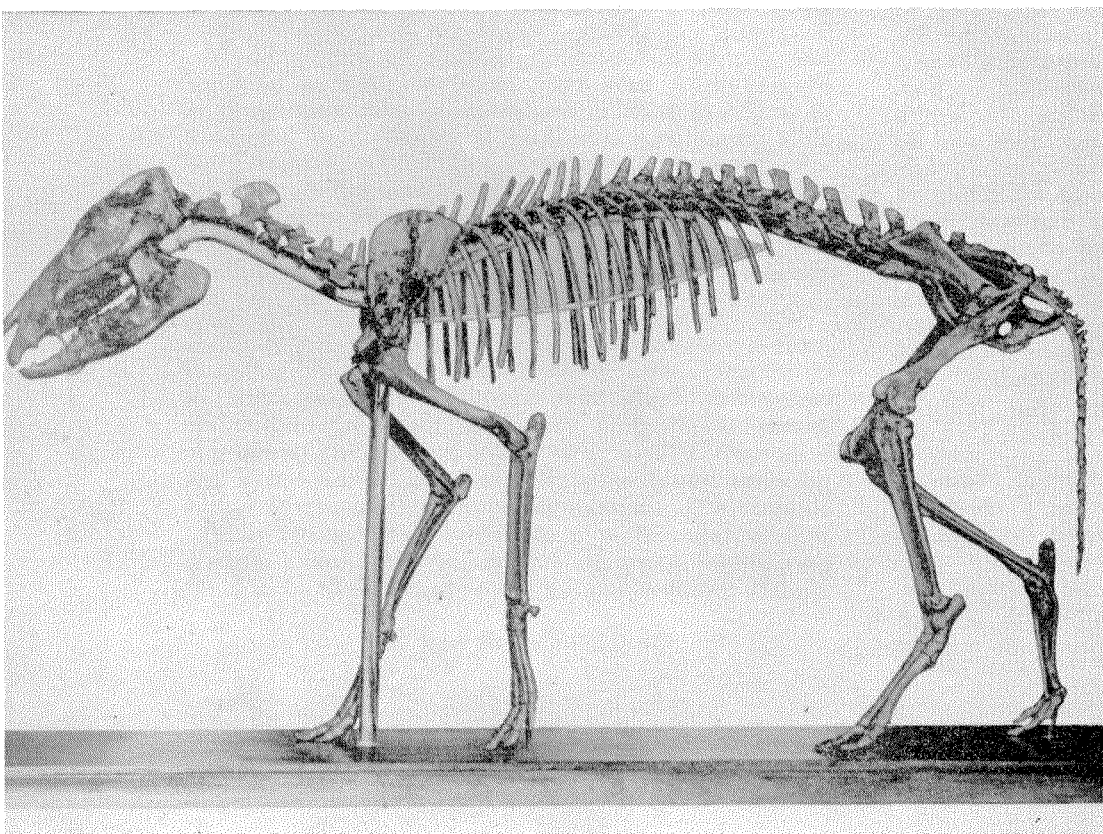
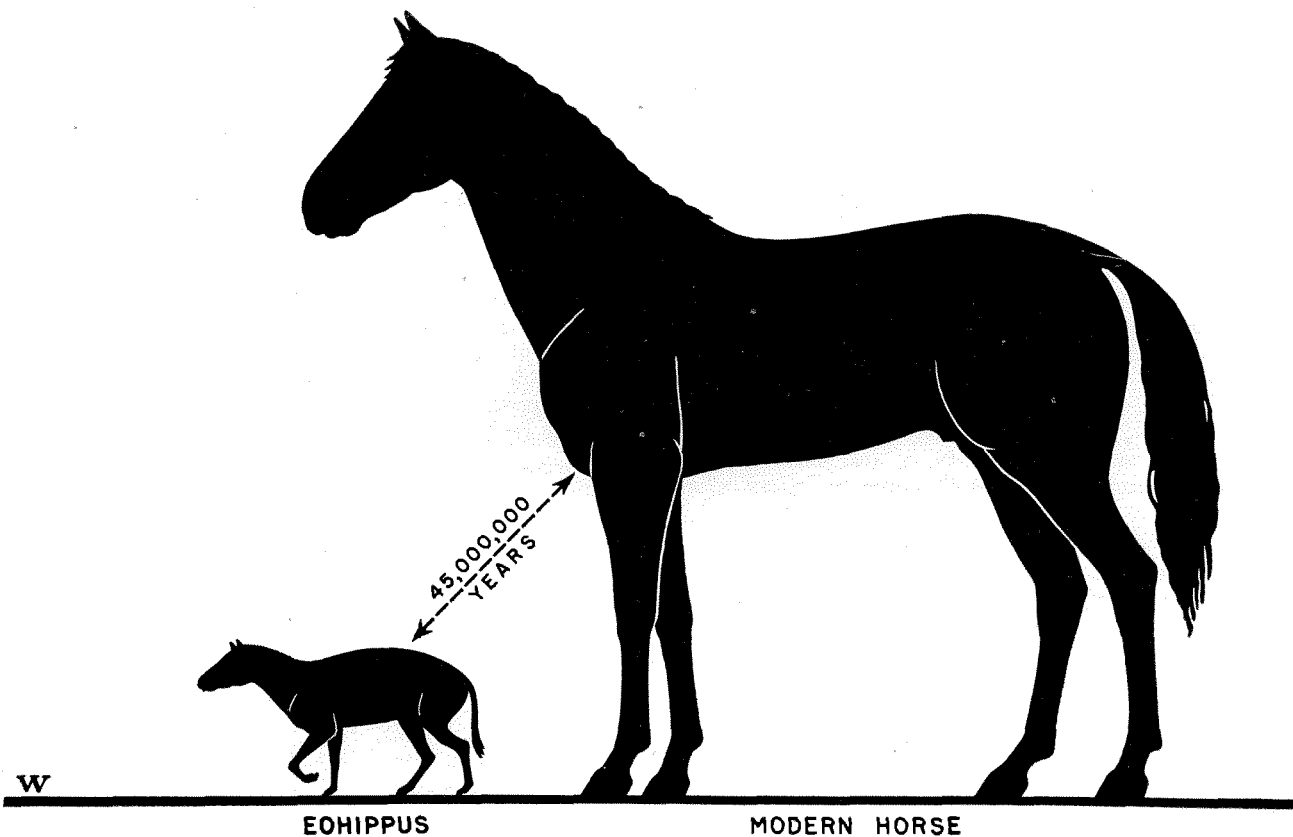


Figure 1. Skeleton of *EOHIPPIUS*, discovered in the Big Horn Basin, northeastern Wyoming, and mounted by the Division of Geology's Paleontological department. One-fifth natural size.



EVOLUTION OF THE HORSE
FROM *EOHIPPIUS* TO *EQUUS*

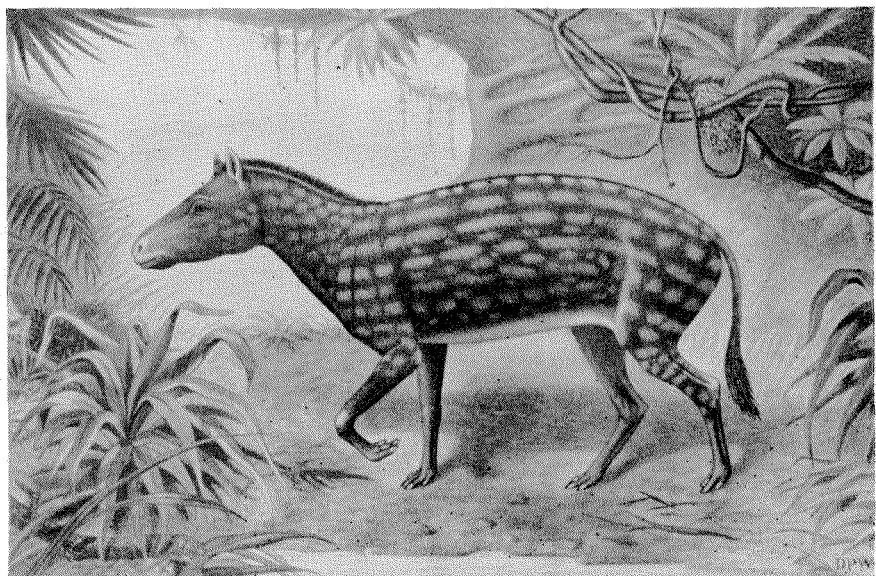
Figure 2.

grinding teeth in *Equus*. Moreover, in *Eohippus* the premolars are unlike the molars, whereas in the modern horse all these teeth are essentially alike in appearance and construction, with the exception of the first premolar which has become either greatly reduced in size or has been lost.

Judging from its dentition *Eohippus* was probably an omnivore feeding on a variety of plant foods. Ample evidence is available from a study of the fossil plants of the lower Eocene to indicate that forests

were widespread on the North American continent at the time. It seems reasonable to infer from the delicate construction of *Eohippus*, and from the characters of the teeth and feet, that the animal often sought the shelter of a wooded environment (figure 3). Moreover, this ancient member of the horse family was probably more a browsing than a grazing mammal. *Eohippus* had not yet acquired the fleetness of foot that distinguishes its larger plains dwelling descendants of later geological time.

Figure 3. Restoration of *EOHIPPIUS*. Teeth and feet of the skeleton indicate that this predecessor of the modern horse was a forest-dwelling animal.



SAGEBRUSH DIPLOMACY

By JOHN A. SCHUTZ

AMATEURS direct our foreign policy. Ever since Jackson's administration, when the political virtues of the common man were first tested, the unprofessional conduct of our foreign policy has served to bewilder and alarm the nation. New declarations of policy, startling disclosures of information, inept decisions make the history of our international policy uneven and have caused people to query whether we actually have a foreign policy. The rocky road since 1919 leaves much doubt.

The structure of the United States government for determining foreign policy is partly responsible for our curious approach. By law the president and the Senate determine the enforcement of American policy. The president negotiates; the Senate approves. As a watchdog of constitutional liberties the Senate's role has been cautious and relations with the president usually are strained.

The president has traditionally set the nation's policy—an unwritten prerogative derived from his power to send and receive envoys and negotiate with other nations. His extensive files of information, his supervision of our envoys, and his command of the military forces make possible some concentration of attention and give some continuity to our policy. But his dependence upon the Senate complicates his tasks. Its rapid turn-over of men on the foreign affairs committee, its suspicion of the executive, and its desire to increase its prestige usually cause trouble. The president must compromise, tone his treaties to senatorial sentiments, and be attentive to party politics rather than form his treaties solely for the good of the nation. President Washington wanted harmony with the Senate and tried to work with it. The Senate debated his proposed treaty, quibbled over definitions, and amended it so unmercifully *that when Washington left the Senate Chamber, he said that he would be damned if he ever went there again." Secretary of State John Hay likened a treaty passing through the Senate to a bull going into an arena. "No one could say just how or when the final blow will fall—but one thing is certain, it will never leave the arena alive."

Since 1789 the Senate has belligerently rejected more than 175 treaties, either by outright refusal, or by emasculating them through amendment, or by shelving them. President Wilson suffered one of the bitterest blows of his career from senators entrenched in the foreign affairs committee. The narrow partisan spirit of 1919 destroyed plans for international peace that took another 25 years to form. President Truman already has experienced embarrassments from a Senate scrupulous in its regard of appointments.

The Senate can be bypassed. President Roosevelt used the executive agreement during the war to speed decisions and save himself from the heated anvils of the Senate. But the crisis facing the country and his popularity protected him against rebellion in the

Senate. The executive agreement, however, proved to be a dangerous expedient for the thoughtful processes of peaceful diplomacy. President Roosevelt's own policy of carrying decisions by memoranda or by memory complicated for his successor the determined course of peace as agreed upon at Yalta.

President Truman has employed another technique—"the non-partisan foreign policy." From its very name an admission is made that the country has no policy, that politicians must share in steering the nation to peace. Its success has been limited. With international-minded legislators chosen from both branches of Congress, the plan has been used at the San Francisco Conference, in committees of the U. N. O., and in the new economic organizations. Also, men like Herbert Hoover, Bernard Baruch, John Foster Dulles, have accepted tasks under this policy, though their tenure is limited to the settlement of particular problems and their appointments serve mainly to emphasize the gravity of international issues.

Dissention already has appeared in the non-partisan policy. The withdrawal of leading senators recently from further activities in the U. N. O., the announcement of Republicans that they reserve the right to criticize foreign policy, and President Truman's decision to push his appointments on the Atom Bomb Commission illustrate significant steps away from the truce of party warfare on diplomatic issues. The president's own decision to startle the nation in the crises of Greece and Turkey heralds a return to pressure in dealing with Congress. Declarations of this kind serve to arouse the people, and through them Congress, but they often increase the tension in foreign affairs and put the United States in an uncomfortable position.

This divided responsibility has bred amateurs, for only the self-sacrificing statesman will volunteer for foreign service. Salaries are low, advancement slow, ultimate reward doubtful. Usually the service is pinched by economy-minded congressmen who know little about international practices and see little value in adequate pay for posts thousands of miles from the electorate. The career diplomat receives poverty in exchange for knowledge, and if he has luck and political connections, will reach only some second-rate ministerial post. One career diplomat recently achieved the honor of being named undersecretary of state, but a change in policy removed him and he now edits books on foreign policy.

Sons of wealthy businessmen have been attracted by the dignity of diplomatic positions in the social life of foreign countries. Though they have no desire at first to become diplomats, distinguished ambassadors often have arisen from this group. Mr. Hugh Gibson, however, caustically denounced these wealthy men as the "white spats, tea drinkers, cookie-pushers" brigade.

Since the chief posts in the diplomatic service are usually reserved for party workers, men who have

* Graham H. Stuart, *American Diplomatic and Consular Practice* (New York, 1936), p. 53.

influence with members of the Senate, the tradition of having amateurs is renewed at each election. Retired manufacturers, wealthy industrialists, and defeated legislators are given posts abroad as rewards for campaign contributions. Their service has usually been mediocre, but sometimes a Charles Francis Adams turns up. More often, however, the nation is bewildered by its diplomats. Sudden disclosures from them regarding the behavior of subordinates keep the State Department on its toes, but are not conducive to a well disciplined administration. Recently the abrupt report of subversive actions of Americans in China excited the nation; the Ambassador's accusations found a hearing in Congress; the only result of his report and the investigations thus far has been the Ambassador's nomination as a candidate for the United States senatorship of New Mexico. Thoughts of politics at home too often dominate the actions of diplomats abroad. Too many quit their posts in fits of anger in order to patch political fences at home. Another phenomenon recently has disturbed the nation. Ex-diplomats have been prophets of doom.

But the amateur diplomat is not alone in keeping the nation embarrassed. His wife and children lend color to our international relations. The wife of Norval Richardson, secretary of our embassy in Rome, reportedly waved the American flag, threw kisses, and offered roses to Italian soldiers during the period of our neutrality in World War I. When warned of her actions, she replied: "The United States may be neutral, but I want the whole world to know that I am not. Viva Italia."

The demand for better administration of foreign affairs brought the Rogers Act in 1924 and the Moses-Linthicum Act of 1931. These laws set up civil service requirements and automatic salary advances, and included benefits of annual leaves and retirement. But the staffs of our legations remained inadequate, and for years we had an average of two people at each of our 318 posts. Since the beginning of the war, college professors, industrial experts, and scientists have been added to the staffs to permit expert observation. Information services in particular were helpful in bringing accurate news. The legation in Copenhagen even arranged for expense-free trips of Danish journalists to this country in order that their news reports might reflect a truer picture of American principles. The Department of State also has invited experts from universities and industries to staff its divisions. However, both in the field and at home these experts have been leaving their posts for more rewarding and non-political positions in education or industry.

President Truman recently has attempted to reform the foreign service. He would have Congress pay salaries commensurate with the value of intelligent diplomacy to the nation—taking the service out of the luxury class of industrial magnates and putting it into the hands of the professionals. He advocates a university, or training center, for people interested in foreign affairs, where special instruction in foreign policy and international law could be offered so as to qualify them for diplomatic service. The president made no recommendation for improving the Senate. The workings of this cumbersome body obviously need serious consideration. Some reformers believe that a straight majority vote on all questions concerning treaties and foreign agreements would be

a satisfactory solution. This would prevent at least a minority from tying up foreign decisions.

Obviously, a national center for the study of American foreign policy would make the Senate more responsive and enable the president to secure better appointments. This metamorphosis certainly should reflect also in our international outlook. Its present immaturity might give way to thoughtful understanding. Eventually attention to the formulation of international policy also should bring stability, the desire to think in terms of principles, and a willingness to measure crises in the light of international policy.

The Professional Engineers' Registration Act

(Continued from page 3)

quirement or the benefits of hiring registered engineers became established, the chance of placing incompetent persons in responsible positions decreases and the hazard to persons and property decreases. Any injury to persons or property resulting from technical incompetence after the proposed act becomes law will emphasize to the public and employers in California the benefits of hiring engineers whose competence is established by registration. In a corresponding field, we would not tolerate an unlicensed person's practicing medicine or surgery.

In rebuttal of the argument by opponents that technical competence might be used against the public interest it can be said that an engineer who has a record of such action would not be registered and therefore would not be permitted or asked to approve engineering projects of consequence. This and the fact that all present safeguards against misuse of technical competence could be continued indicate that passage of the bill into law would decrease the misuse of technical competence.

The proposed act, although holding no promise of putting a sudden end to misuse of technical competence, does hold promise of reducing hazards resulting from technical incompetence.

As the greater competence of registered engineers becomes recognized through operation of the act, the standing in the community and in industry of the registered professional engineer will be improved. This effect ultimately will be reflected in greater community leadership and in greater remuneration for professional engineers.

The proposed act has been prepared jointly by the Los Angeles Engineering Council of Founder Societies and the San Francisco Engineering Council after a number of years of study of the questions involved. This action has been sufficient to warrant its support by many engineers. Other engineers who have not wished to support it on this basis have, through careful study, become convinced that they should support it.

It is recommended that all alumni now engaged in engineering either support the proposed act because of their faith in the engineers who have secured its preparation or that they study it carefully to determine whether they individually favor or oppose the proposed act.

H. K. F.

C. I. T. NEWS

PUBLIC RELATIONS OFFICE IN OPERATION

ESTABLISHMENT of a Public Relations office has been completed at the Institute and is now functioning under the direction of George H. Hall, Administrative Assistant. The office is temporarily located in 361 Arms building.

The office was established to give the Institute a central clearing point for dissemination of all information concerning CalTech to the public; to handle requests from the press, radio, magazines, etc., for information or stories; to work closely with the faculty in preparation of material for release to the public and to develop and suggest methods and procedures whereby a closer relationship between the Institute and the public can not only be established but maintained.

The public relations office will also work closely with Alumni groups in assisting them in obtaining information they may wish and giving any other assistance requested.

Plans are now in the formative stage for publication of bulletins and other booklets to supplement other publications and which will be designed to give broader coverage of what the Institute is doing and what its future plans are.

Procurement of speakers for civic and other groups is also being handled by this office along with the campus student guide service which is again functioning.

Hall came to the Institute from the North American Aviation, Inc. Public Relations department and prior to that was Resident Director of Public Relations for Consolidated Vultee Aircraft Corporation at its Tucson, Arizona, modification center at which time he was employed by the New York public relations firm of Hill and Knowlton. Prior to that he did newspaper and public relations work in both New York and Arizona. He is a native of Indiana and a graduate of the University of Arizona.

INSTITUTE BIOCHEMISTS GET FIVE-YEAR GRANT FOR POLIO RESEARCH

SCIENTISTS at the California Institute will study the fundamental structure and organization of proteins and related compounds as a basis for further knowledge of how the virus of poliomyelitis destroys nerve cells. The five-year study financed with \$300,000 March of Dimes funds from the National Foundation for Infantile Paralysis was announced recently by Basil O'Connor, president of the Foundation and Dr. Lee A. DuBridge, CalTech president.

It is the plan of the Institute's biologists and chemists, under the direction of Drs. Linus Pauling and G. W. Beadle, chairmen of the chemistry and biology divisions, respectively, to determine the complex structure and organization of the polio virus and how it produces its characteristic effects by studying first the physical, chemical and biological properties of proteins, amino acids and nucleoproteins.

There is reason to believe that these compounds, often referred to as the "building blocks" of the body, may also be the building blocks of the polio virus, important in its reproduction, or have many structural characteristics common with the polio virus itself. Knowledge gained from the protein studies may lead to understanding the characteristics of the virus, how it reproduces and how it causes injury.

"Modern medicine," said Drs. Pauling and Beadle in setting forth their aims, "is not and cannot be content with cures that are not based on an understanding of the nature of both the agent which produces the disease and the subject which it attacks."

The Institute researchers will bring to bear on this problem, which lies in a comparatively new field of investigation, many of science's latest weapons and techniques—electron microscopy, electrophoresis, ultracentrifugation and chemical and X-ray diffraction analyses.

BATEMAN FELLOW NAMED

DR. SAMUEL KARLEN of Princeton University has been appointed to the Harry Bateman Research Fellowship in pure mathematics by the Board of Trustees, President Lee A. DuBridge announced recently.

The Bateman Fellowship, established this year by the Institute in honor of the late Harry Bateman, professor of mathematics, physics and aeronautics, is made for one year but may be renewed for a second year. Dr. Karlen is the first to receive the appointment.

A native of Chicago, Dr. Karlen obtained his B.S. and M.S. degrees at Illinois Institute of Technology in 1944 and 1945 respectively, and his Ph.D. at Princeton this year, all in the general field of mathematics.

He will join the CalTech mathematics department as a research fellow in September of this year, and in addition to research work will teach one upper class course in mathematics.

Dr. Karlen is a member of Sigma Xi, national scientific honorary society.

FOUR SENIORS WIN METALS AWARD

THE FEDERATED METALS Division of the American Smelting and Refining Company has made awards to four senior students. These are known as the Federated Metals Non-ferrous awards. The recipients of the awards were selected by Professor D. S. Clark, director of placement, upon recommendation by heads of the departments of chemical engineering, electrical engineering, and mechanical engineering.

The award consists of an inspection trip of the Los Angeles and San Francisco plants of the Federated Metals Division, with all expenses paid. The inspection trip started on Monday, March 24, with a two-day visit to the Los Angeles plant and consultations with technical personnel of that organization. The following two days were devoted to a visit to operations of the Federated Metals Division in San Francisco.

Selected on the basis of combined scholarship attainment and personality were:

C. B. Crumly—senior in electrical engineering
S. G. Stiles—senior in mechanical engineering
P. A. Linam—senior in applied chemistry
H. J. Lawrence—senior in applied chemistry

The Federated Metals Division of the American Smelting and Refining Company is a large producer of secondary non-ferrous metals and alloys, operating plants throughout the United States. The company purchases all kinds of non-ferrous scrap metals of commercial quality suitable for the metal fabricating industry. The general headquarters of the company is located in New York City.

FACULTY NOTES

Additions

Dr. Max Delbrück, associate professor of physics at Vanderbilt University, has accepted an appointment, effective 1 July 1947, as professor of biology at the Institute. Dr. Delbrück is a native of Germany, having received his Ph.D. from the University of Göttingen in 1930. Subsequently he was a Rockefeller Foundation fellow in physics at Copenhagen and Zurich, and an assistant in the Kaiser Wilhelm Institute for Chemistry. From 1937 to 1939 he was a Rockefeller Foundation fellow in biology at the California Institute. Since 1940 Dr. Delbrück has been with the physics department at Vanderbilt.

Professor Delbrück's research in recent years has been on bacterial viruses. In this field he has made outstanding contributions and is without doubt one of the world's outstanding workers in this field. Dr. Delbrück should do a great deal to strengthen the field of biophysics at the Institute.

Dr. C. K. Gloyd of Occidental College is here as visiting lecturer in philosophy for the spring term.

Dr. D. F. Jones, Connecticut Agricultural Experiment station associate, is now a visiting lecturer in biology.

Dr. Ralph W. Lewis, on leave of absence from Michigan State College, has been appointed research fellow in biology.

Dr. Arthur C. Giese, now of Stanford University, has accepted an appointment as visiting professor of biology for the school year 1947-48.

Dr. J. S. Webb of the University of Minnesota has been appointed research fellow in electrical engineering.

Two new Trustees have been added to the board, James G. Boswell and John A. McCone.

Resignations

Dr. J. J. Lund, director of the Institute Libraries, will resign as of 1 July to enter the foreign service. Dr. Lund came to the Institute from Duke University in 1945.

Philip S. Fogg, associate professor of business economics and former registrar, now on leave of absence, has resigned from the Institute staff. Mr. Fogg is now president of the Consolidated Engineering Company of Pasadena.

Promotions

President Lee A. DuBridge has replaced Dr. Richard C. Tolman on the executive committee. Dr. Tolman has resigned from the committee in order to devote more time to research and new duties as technical adviser on the United Nations Atomic

Energy Commission. Dr. Tolman, former dean of the graduate school, remains as professor of physical chemistry and mathematical physics at the Institute.

Leaves of Absence

Dr. J. E. Wallace Sterling, Edward S. Harkness Professor of History and Government and member of the Executive Committee, has been granted leave of absence for the school year 1947-48.

DUBRIDGE SPOKE AT RICE INSTITUTE

PRESIDENT LEE A. DuBridge was one of the speakers at the April inauguration of Dr. William V. Houston as president of Rice Institute in Houston, Texas. Dr. Houston was professor of physics at Cal-Tech before accepting the presidency of the Texas Institute.

Dr. DuBridge was accompanied to Houston by Dr. Karl T. Compton, president of M.I.T., another participant in the program, who had just returned from a trip to Honolulu.

Speaking on "Men Wanted," President DuBridge dealt with problems faced by this country because it does not have the scientific manpower to push forward adequately on such vital fronts as national defense and security, national health and welfare, industrial development and basic science and education.

GOLDSWORTHY RECEIVES LEGION OF MERIT AWARD

L. T. COL. E. C. Goldsworthy, assistant professor of mathematics and master of student houses, has received the Legion of Merit award for his wartime service with the Army Air Forces.

Col. Goldsworthy, now on retired status, was unable to receive the award at ceremonies held at Hamilton Field, but it was subsequently delivered to him at this home. The decoration was for his work as director of training at the Air Forces School of Applied Tactics at Orlando, Florida, from November 1942 to December 1945.

AERONAUTICS MEN WRITE TEXTBOOK

TWO members of the Aeronautical Engineering staff, Hans W. Liepmann and Allen E. Puckett, have collaborated on a textbook, *Introduction to Aerodynamics of a Compressible Fluid*. This volume, out early this year, covers compressibility phenomena under simplified and actual conditions. It is divided into two parts, the first giving fundamentals and mathematical background. The second part discusses two and three dimensional equations and some of the approximate methods of solving them. A few exact solutions are also given. Some features covered are Schlieren, shadowgraph and interferometer techniques; theory of limiting lines; linear perturbation theory; method of characteristics; shock-wave theories; hodograph equations; Karman-Tsien theory; and most of the classical elementary problems in compressible fluids.

Associate Professor Liepmann received his Ph.D. from the University of Zurich in 1938. Since 1939 he has been at the California Institute.

Allen E. Puckett, instructor in aeronautics and

chief of the Wind Tunnel Section of the Jet Propulsion Laboratory, has been connected with the Institute since 1941. He received his B.S. and M.S. degrees from Harvard University in 1939 and 1941. During the war he directed the design of the supersonic wind tunnel at the Army Ordnance Department's Aberdeen Proving Grounds.

GEOLOGY PROFESSOR APPOINTED

DR. JAMES A. Noble has been appointed professor of metalliferous geology at the Institute for the coming year. Dr. Noble is chief geologist of the Homestake Mining Corporation at Lead, South Dakota, and has been granted a nine month leave of absence by his company to fill the post left vacant here by the resignation of Dr. H. J. Fraser, now general manager of the Falconbridge Nickel Mining Company in Ontario.

Dr. Noble received a B.S. degree in mining engineering at Harvard in 1922 and his Ph.D. in economic geology from the same university in 1937. From 1922 to 1924 Dr. Noble served as geologist with the American Zinc Corporation, Mascot, Tennessee; from 1924 to 1931 he was geologist for the Cerro de Pasco Copper Company, Oroya, Peru; since 1931 he has been chief geologist for the Homestake Mining Corporation. The Homestake mine is the ranking gold mine in the Western Hemisphere. Since its discovery in the late seventies, it has been credited with the production of more than \$375,000,000. Furthermore, unlike most mines, its reserves have been steadily increased as a result of intensive work by the Corporation's geological and engineering departments.

He is a member of the American Institute of Mining and Metallurgical Engineers and a fellow of the Mineralogical Society and the Geological Society of America. Dr. Noble is also a member of the Advisory Council on Geological Engineering for Princeton University.

GEOLOGY MEETING HERE NEXT YEAR

THE CORDILLERAN Section of the Geological Society of America and associated societies, of which Dr. Ian Campbell, associate chairman of the division of geology, was recently elected vice-president, will hold its 1948 meeting in Pasadena. This will be the first postwar meeting of the society to be held in Southern California.

SCHOLARSHIPS AND FELLOWSHIPS ANNOUNCED New Fund Established

THE establishment of the David Lindley Murray Education Fund, which, it is estimated, will provide scholarships for approximately 15 students, was announced recently by President DuBridge. This fund will be available from a \$500,000 endowment made to the California Institute by the late Mrs. Katherine Murray, who with her husband for whom the fund is named had been a visitor to Pasadena from Illinois for many years prior to her death in 1944.

U. S. Rubber Company Offers Chemistry Fellowships

The United States Rubber Company has established several graduate fellowships in chemistry at the In-

stitute, the University of California at Berkeley, and U.C.L.A. These fellowships will provide \$1200 per year to single men and \$1800 for married students. The educational institution at which the studies are taken will receive \$1000 to cover each student's tuition and other costs. Students will be accepted for fellowships by the school at which they plan their graduate work, and will be unrestricted in choice of position after completion of their studies under the fellowship.

CAMPBELL OF GEOLOGY ELECTED TO SOCIETY OFFICE

DR. IAN CAMPBELL, professor of petrology at CalTech, was elected vice-chairman of the Industrial Minerals division of the American Institute of Mining Engineers at its 75th anniversary meeting in New York. Chairman of the division is Dr. J. L. Gillson, chief geologist for the E. I. DuPont de Nemours Company.

CONVERSE OF CIVIL ENGINEERING WILL GO TO HOLLAND IN 1948

FREDERICK J. CONVERSE, now professor of civil engineering, has accepted appointment to a National Committee on Soil Mechanics to represent the United States at the Second International Conference on Soil Mechanics and Foundation Engineering in Holland next year. Professor Converse is an authority on foundation problems and has been widely sought as a consultant throughout the western states. Large projects in this area on which he served as a consultant include the Navy Dry Dock at Terminal Island and the Kaiser Ship Yards at Richmond, California.

INSTITUTE RESEARCH MEN RECEIVE JEWETT FELLOWSHIPS

TWO OF seven Frank B. Jewett fellowships for research in the physical sciences were awarded to Institute research men by the American Telephone and Telegraph Company which founded the grants three years ago upon the retirement of the Company's eminent vice-president in charge of development and research. Dr. Jewett graduated from Throop Polytechnic Institute, C.I.T.'s predecessor in 1898. Two of the 1947-48 fellowships have been awarded to scientists holding similar grants for 1946-47 to enable them to continue their current research projects.

Among recipients of this year's awards are: Dr. M. G. Ettlenger of the Institute and Austin, Texas, who is also a 1946-47 Fellow, and Wallace D. Hayes, teaching fellow from Palo Alto.

Dr. Martin Ettlenger, 21, is at present investigating the chemistry of cyclopropane and dicyclobutane derivatives as a Jewett Fellow for 1946-47. He received his bachelor's degree from the University of Texas in 1942 and his master's from the same university in 1943. In 1946 he received his doctorate in chemistry from Harvard University. Dr. Ettlenger plans to continue his present research studies.

Wallace D. Hayes, 28, is a graduate student at

the Institute and plans to receive his doctorate in physics this June. In 1941 he received his bachelor's degree and in 1943 his degree as an aeronautical engineer from Caltech. Mr. Hayes plans to carry on an investigation into problems of transonic and supersonic fluid flow.

COLORADO RIVER WATER DISCUSSED BY HYDROLOGY SECTION

PROBLEMS of the division of Colorado River water in the Lower Basin, the quality of water in the Upper Basin and other studies and problems concerned with water, were presented at a meeting of the Hydrology Section of the American Geophysical Union, National Research Council, at the California Institute of Technology in February.

The one-day meeting at which a number of papers were presented concluded with a visit to the Apra, Guam, Harbor Model at Azusa.

At the morning session, Munson J. Dowd '18 of the Imperial Irrigation District discussed problems of division of the Colorado River Lower Basin water, and Charles S. Howard '23, of the United States Geological Survey, discussed the quality of water in the upper Colorado River basin. The "Design of Current Meters" was considered by Robert G. Folsom '28 and M. P. O'Brien of the University of California.

The afternoon session included "New Developments in the Study of Sediment Transportation" by Dr. Hans Albert Einstein, Institute research assistant and member of the Department of Agriculture's Soil Conservation Service, and "Presentation of Problems of Harbor Protection" by Dr. R. T. Knapp '29, associate professor of hydraulic engineering.

Professor of Civil Engineering Franklin Thomas is program chairman of the Hydrology Section.

THE SPORTS PICTURE

Track

C.I.T. TRACK MEN have been winning a fair proportion of events, but not of track meets. In a triangular meet against U.C.L.A. and Santa Barbara, the Beavers came out on the low end of a 115¼-27¼-20 score. Two first places were annexed by Shauer in the 440 in 49.3s. and the relay team in 3:27.6. Don Tillman, most consistent winner in Tech's field crew, took third in the shot put. Computed as dual meets, the Beavers lost to U.C.L.A. 109 2/3 - 21 1/2, and to Santa Barbara 79 - 51.

A close one was the loss to Whittier the next week with the Beavers on the short side of a 67 2/3 - 63 1/3 score. Responsible for this was Whittier's performance in field events, the Poets having a better than two to one superiority in this department. Brightest spot in Tech's afternoon was the clean sweep of the 880, led by Stan Barnes, son of Manton M. Barnes '21, winning in 1:59.5.

At the close of the season CalTech nosed out Redlands for third place in the Conference Meet, below Occidental and Pomona.

Baseball

Having three league losses and one practice win—

against Chapman, the baseball players are improving with every game. Two of the misfortunes besetting the team were very close.

The game against the Tigers was within one strike of being a Beaver victory. In Oxy's last ups, pitcher Hedrick had two men on base, two outs, and two strikes on the batter with a score of 7-6 in the Engineers' favor. A right field fly, missed, accounted for a triple, bringing in the winning run. Demoralized, the Techmen found themselves, after another hit and numerous errors, on the short side of a 12-7 score.

Against Redlands, the Beavers lost a 10-inning game 6-5.

BASEBALL SCHEDULE

Saturday	3 May	2:15 p.m.	*Caltech	at Redlands
Tuesday	6 May	4:15 p.m.	Pepperdine	at Caltech
Saturday	10 May	2:15 p.m.	*Pomona	at Caltech
Tuesday	13 May	4:15 p.m.	Cal Poly	at Caltech
Saturday	17 May	2:15 p.m.	*Whittier	at Caltech
Saturday	24 May	2:15 p.m.	*Caltech	at Occidental

*. Conference Games

Tennis

The tennis team has also had its share of bad luck, losing to Redlands 5-9, Occidental 6-2, and Whittier 9-0. Players John Holmgren and Ray Palmer entered the Intercollegiate Division of the Ojai Valley Tournament late in April, representing CalTech in Southern California's biggest school tourney.

VARSIITY TENNIS MATCHES

Saturday	3 May	Pomona	at Caltech
Wednesday	7 May	Occidental	at Caltech
Saturday	10 May	Caltech	at Redlands
Tuesday	13 May	Whittier	at Caltech
Saturday	17 May	Caltech	at Pomona
Friday	23 May		
&	&	Conference	at Caltech
Saturday	24 May	Meet	

Swimming

Beaver swimmers have also been dropping close ones, losing to Redlands 43-32, Occidental 46-29, and Pomona 40-35.

VARSIITY SWIMMING SCHEDULE

Friday	2 May	4:00 p.m.	Caltech	at Pomona
Wednesday	7 May	4:00 p.m.	Caltech	at Occidental
Friday	10 May	4:00 p.m.	Caltech	at Redlands
Saturday	17 May	1:30 p.m.	Conference	at Occidental

Meet

Golf

The golfers, on the other hand, have been giving a good account of themselves, taking Whittier 14-4, and Redlands 14½ - 3½. Jerry Harrington, number one man on the squad, paced both matches with a 70 against Whittier and a 74 against Redlands. A strong Pomona squad subdued the Beavers 14-4, but a rematch early in May will give Beaver golfers a chance for revenge.

VARSIITY GOLF SCHEDULE

Friday	2 May	1:30 p.m.	Caltech	at Redlands
Friday	9 May	1:30 p.m.	Caltech	at Pomona
Saturday	17 May	9:00 a.m.	Caltech	at U.C.L.A.
Saturday	24 May	9:00 a.m.	Conference	at Pomona

Tournament

BOOK REVIEW

Aircraft Carburetion, by Robert H. Thorner
(John Wiley & Sons, New York, 1946
393 pages, 196 illustrations, 5 $\frac{3}{8}$ x 8 $\frac{3}{8}$, \$3.50)

THE BOOK has developed from a series of lectures given by the author under the E.M.S.W.T. at the University of Michigan. Leading manufacturers of aircraft carbureters and aircraft engines cooperated in the compilation and selection of material presented.

The book fills a long-felt need for a specialized treatment of the principles of carburetion as applied to aircraft engines.

The carbureters of aircraft engines have become rather intricate devices and their proper care and operation requires insight into the working principles. Unlike the ignition system which functions completely automatically and without control from pilot or flight engineer, the carbureter requires skillful manipulation. The book is, therefore, written for pilots, flight engineers, mechanics, development engineers and supervisory personnel.

Pilots and flight engineers are mainly concerned with the problem of mixture control and its effect on engine power, fuel consumption and cooling. The mechanic and field engineer are interested in the function of the components of the carbureter and control system.

Emphasis is on the general and fundamental principles underlying the functioning of all carbureters. Discussion of specific types is intended as illustration of these general principles. The book does not deal with servicing and overhaul of carbureters since these operations are adequately covered by manufacturers' manuals.

In presenting fundamental principles the problem arises as to how far back to start in explaining the basic physical concepts. The author is wise in not taking too much for granted. He starts by defining important terms such as: volume, specific gravity, density, illustrating them with a few numerical examples each. Engineers will not be altogether happy about some details of these definitions (e.g. that of "mass"), but this reviewer feels that they will do the job.

Measurement of pressure and pressure conversions are treated in great detail, again making generous use of numerical examples and simple diagrams.

The section on "fluid flow" deals with flow through orifices and jets in various combinations. The material presented here is what was particularly lacking in treatises on carbureters before this book.

A mixture ratio chart coordinates fuel-air ratio, air-fuel ratio and operating condition.

Chapter II treats the basic requirements for a carbureter: to provide proper mixture under all operating conditions. Then follows a discussion of the main components: main metering system, idling system, etc. In discussing the action of these components, many simple but well chosen plots, such as venturi suction vs. air-flow, showing idle, cruise and power range, are presented.

The chapter ends with discussions of air induction systems and fuel systems.

Chapter III takes up the Stromberg injection carbureter, followed by a description of the Chandler-Evans pressure carbureter (Chapter VI). Each one of these chapters on carbureter types is illustrated by photographs, exploded views and diagrams pertaining to the particular mechanism.

Chapter VII presents a comparison of float and pressure carbureters. It serves as a summary of the preceding chapters and emphasizes briefly (18 pages) common features and differences.

Chapter VIII deals with the principles of carbureter testing and also shows how carbureter specifications are arrived at by carbureter and engine manufacturers.

Chapter IX discusses flight operation and is especially intended for pilots and flight engineers. As would be expected, fuel economy is given very careful consideration and takes up most of the chapter.

This reviewer feels that, somewhere in the book, the question of fuel injection, both into the manifold and into the cylinder should have been discussed. If restrictions made it impossible to treat the subject in detail, it would have been well to point out why this form of carburetion may be needed in the future.

Throughout, the book is carefully prepared and shows a background of sound teaching experience. The pages are well subdivided and headings, bold type and italics are generously used. Thus important items stand out. Another detail shows good teaching practice; where items are enumerated, they are actually numbered. For example:

The fuel pump has several functions

- (1) It maintains a continuous supply etc.
- (2) It maintains the pressure etc.
- (3) It transfers fuel etc.

This technique make important items stand out and facilitates reading.

The reviewer is gratified to find no gremlins, Donald Ducks and other cartoons which have become popular in technical manuals.

Reviewed by Peter Kyropoulos

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ALUMNI NEWS

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The San Francisco Chapter meets weekly for lunch at the Fraternity Club, 345 Bush Street, on Mondays.

SOUTHERN CALIFORNIA'S INDUSTRIAL FUTURE TOLD AT MARCH MEETING

EMPHASIZING his statements by citing several actual cases, Mr. Paul K. Yost, vice-president of the Security-First National Bank, declared that the rapid industrial growth now occurring in Southern California is indicative of the future of this region. Speaking before a meeting of alumni at the Pasadena Athletic Club on March 20, Mr. Yost reviewed the reasons for the increasing business and industrial importance of Southern California and gave several reasons for believing that the characteristics now developing will be come permanent in spite of cyclic variations in business activity.

The prime prerequisite for business and industrial growth is, of course, the presence of sufficient population to provide employees and users of the resulting product. Climate has caused the population density to increase to the point where, with other favorable factors, production of many articles here has become economical. The war accelerated both industrial development and population growth. The limitation which water supply places on population is recognized, but at the same time it must be acknowledged that before existing water supply capacity is reached, means may be found to utilize water from the ocean. For this reason it would be wrong to

state now that the population must forever be limited to that which existing water supplies will support.

In closing, Mr. Yost warned of the sociological problems which normally increase with rising population density. It is possible to avoid serious results from these problems if provision is made now to meet them through adequate civic planning and support of humanitarian agencies.

Following Mr. Yost's talk there was considerable discussion as the result of several questions from the floor. Mr. Yost's direct answers, based on considerable experience in Los Angeles and on-the-spot observation in all large industrial cities in the nation did much to give his listeners a clear view of the future.

Mr. Yost was introduced by George Hawley of the class of '21, manager of industrial sales of the Southern California Edison Company.

JAMES BOYD '27 GETS GOVERNMENT POST

DR. JAMES BOYD, dean of the graduate school of the Colorado School of Mines, who obtained his B.S. degree in 1927, was recently appointed director of the U. S. Bureau of Mines.

J. R. PIERCE '33 WINS I.R.E. AWARD

THE Institute of Radio Engineers awarded the Morris Liebmann Memorial Prize for 1947 to Dr. J. R. Pierce '33, at the annual banquet of the I.R.E. 5 March in New York.

Dr. Pierce received his bachelor's degree in electrical engineering and continued at the Institute until 1936 when he obtained the Ph.D. degree. He then joined the staff of Bell Telephone Laboratories and has been with this organization since. During the war his efforts were devoted almost exclusively to the development of electronic devices for the Armed Forces. Since then he has been carrying on research in high frequency tubes and it was for his specific development of the traveling wave type of tube that he received the 1947 Liebmann Memorial Prize.

DR. ROBERT P. SHARP '34 NAMED PROFESSOR HERE

THE appointment of Dr. Robert P. Sharp as professor of Geomorphology in the Division of the Geological Sciences, effective 1 September 1947 was announced early in March. Dr. Sharp is currently professor of Geomorphology at the University of Minnesota.

Dr. Sharp received his bachelor's degree in 1934 and his master's degree in 1935 in geology at the California Institute. He was a three-year letterman—quarterback of the football team—and in his senior year was captain of the football team, as well as student body president. He was a member of Tau Beta Pi, and was awarded the honor key on graduation.

In the fall of 1935 he went to Harvard on a scholarship and in 1936-37 was holder of the Woodworth Traveling Fellowship, awarded by Harvard University. His Ph.D. degree was obtained at Harvard in 1937, for a thesis involving structural and physiographic study of the Ruby Mountains in Nevada.

On completing his graduate studies at Harvard,

Dr. Sharp joined the faculty of the University of Illinois where he remained until after the outbreak of the war, when he was commissioned in the Arctic, Desert, and Tropic Information Center of the Army Air Forces. His work there was largely with the Arctic Section. After discharge from war service he went to the University of Minnesota.

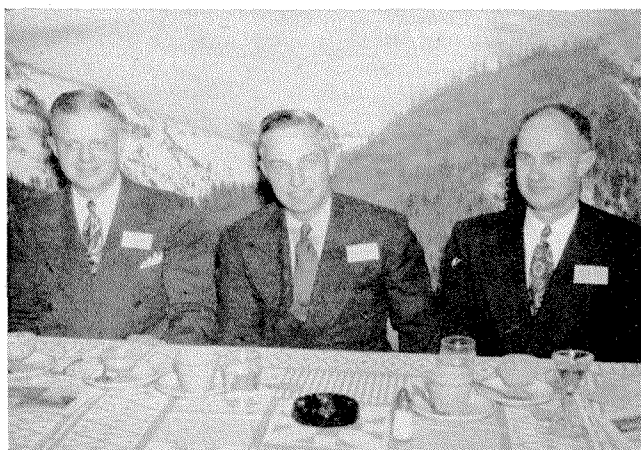
Dr. Sharp has had additional teaching experience in the geology summer field camp faculties of Stanford University and the University of Michigan. He is the author of many scientific papers, the majority dealing with problems of geomorphology. Opportunities for study in this field in Southern California are excellent, and it is anticipated by the Division of Geology that the addition of Dr. Sharp to its faculty will bring new contributions to our knowledge of the land forms of Southern California.

FORMER BIOLOGY RESEARCH FELLOW WINS STANFORD APPOINTMENT

DR. C. STACY FRENCH, associate professor of plant physiology at the University of Minnesota, who was a research fellow at CalTech in 1935, has been appointed director of the Division of Plant Biology of the Carnegie Institute of Washington at Stanford University. He will assume his new duties on July 1.

TWO 1929 GRADUATES DEVELOP METALLIC ANALYZER

CLASSMATES Maurice Hasler and Roland W. Lindhurst '29 demonstrated late in February a device called a "quantometer" which permits immediate visual analysis of metallic elements in any given metallic sample.



Howard Vesper '22, Lee A. DuBridge, president of the California Institute, and Maurice Jones '26, president of the San Francisco Chapter.

Showing the proportions of as many as 11 elements in a given sample as dial readings, the quantometer may save the steel industry millions of dollars annually in blast furnace time, the inventors believe. The result of three years of research and development, the tool is already in use by the laboratories of several large metal producers.

Physicist Hasler, M.S. '30, Ph.D. '33, and his partner Lindhurst, B.S. in electrical engineering '29, produced the quantometer at their Applied Research Laboratories in Glendale. This analyzer represents the latest step in the present chemical technique of reading alloy contents. Delayed by the war, during which they made analytical equipment for defense industries, the Army, and theanford and Oak Ridge projects, the first instrument was finished several months ago.

The average test requires 45 seconds, more than 10 times faster than previous spectrophotographic methods, and hours faster than the traditional "wet chemical" process. Twelve multiplier phototubes register the proportions of up to 11 elements in respect to a 12th or basic known element on a console.

DUBRIDGE SPEAKS TO SAN FRANCISCO CHAPTER

ROBERT P. JONES '35, secretary-treasurer of the San Francisco Chapter, writes: On March 7 the San Francisco Chapter of the CalTech Alumni Association had the most outstanding meeting in its history. Ninety-one alumni attended to meet and hear Dr. DuBridge. It was a pleasure that this chapter will long remember.

Dr. DuBridge's talk was entitled "CalTech, Past, Present and Future." For all present a more interesting subject could not have been chosen. Most of the alumni have been out of touch with Institute doings for some time. We were glad to hear about CalTech's part in World War II in the development of rocket propulsion and other projects. Of the present, we were enlightened on the size of the student body, type of student, the financial condition and sources of income. Best of all was the progress made towards acquiring Tournament Park*. The future of the 200-inch telescope, plans for expansion, coming research projects and some discussion of the future graduate completed the talk of the evening.

For all those present the evening was altogether too short. We extend our sincere thanks to Dr. DuBridge and wish him well in his new position.

Among those present were, H. L. Albright '23, E. M. Atchison '45, H. E. Baker '30, M. A. Baldwin '27, S. F. Bamberger '33, W. W. Baustian '29, J. Y.

* This meeting was held before the three-to-one approval of Pasadena voters was given to the abandonment of Tournament Park and its sale to the Institute.

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Special Tools and Machinery

Assembled before dinner are most of the 91 who gathered to hear President DuBridge speak to the San Francisco Chapter of the Association, March 7.



Beach '36, R. H. Bishop '39, R. B. Bowman '26, P. H. Brown '39, W. E. Brown '40, A. C. Buxton '37, L. T. Carleton '33, P. H. Cate, G. C. Coffee '28, R. S. Custer, J. D. Davis '34, Louis Davy '45, T. J. Deahl '35, H. H. Deardorff '30, J. Detweiler '31, Ed Dorresten '24, Bruce Dunbar '37, G. L. Edwards '41, J. S. Edwards '37, Manley Edwards '26, L. H. Erb '22, H. D. Estes '35, G. W. Ewald '41, G. M. Farley '26, E. H. Fisher '27, R. G. Folsom '28, L. D. Fowler '23, W. R. Frampton Jr. '39, M. E. Ford Jr. '44, Jepson Garland '45, T. O. Gerlish '15, T. S. Gilman '46, N. L. Hallanger '34, R. J. Hallanger '35, J. T. Harlen '41, D. G. Harries Jr. '23, A. J. Hazzard '30, L. P. Henderson '25, J. C. Huggins '44, W. S. Johnson '35, M. T. Jones '26, R. C. Jones '37, R. P. Jones '35,

P. J. Jurach '46, A. E. Jurs Jr. '38, P. H. Kaftiz '42, D. W. Keech '26, Jerome Kohl '40, H. E. Larson '27, R. M. Lemmon '43, Robert Leo '45, W. E. Lockwood Jr. '44, F. J. McClain '34, Archie McKaig '24, E. M. McMillian '28, J. F. Mayer '40, W. W. Moore '34, D. S. Nichols '28, H. M. O'Neil '34, John Otvos '43, C. R. Owens '23, K. J. Palmer '38, N. T. Partch '41, C. W. Patrick '35, K. S. Pitzer '35, Andor Polgar, D. J. Pompeo '26, C. H. Prescott Jr. '26, W. G. Reynard '31, D. R. Rooke '34, J. R. Rossum '35, R. Rosencranz, T. R. Sandbery '37, E. E. Smith '24, W. T. Stewart '41, F. B. Stitt '36, L. P. Stoker '24, T. Vermeulen '36, H. G. Vesper '22, R. W. Wallace '41, J. H. Wilson '44, J. N. Wilson '39, H. M. Winegarden '24.

PERSONALS

1917

FRED L. POOLE is working for the Naval Ordnance Test Station in Pasadena as a physicist.

1921

GEORGE N. HAWLEY is manager of industrial sales for the Southern California Edison Company in Los Angeles.

1922

DONALD F. SHUGART, recently released from the Army Air Forces, is back in business for himself. He is living in Culver City.

1924

EDWARD DORRESTEN is vice-president of the Ralph M. Parsons Company of San Francisco.

H. H. FARNHAM has recently moved to Arcadia.

CHARLES W. PUNTON, ex '24, is now living in Pittsburgh, where he is works manager for the Mine Safety Appliance Company.

CEDRIC L. SCOTT is vice-president and treasurer of Scott & Company, Los Angeles.

1925

MICHAEL C. BRUNNER is now living in Hobbs, New Mexico.

HENRY R. FREEMAN, treasurer of the Alumni Association, has been named a partner in the Los Angeles firm of Richard Miller and Company, Certified Public Accountants.

1926

BORIS N. SAMMER is employed with Erle P. Halliburton, Inc., of Los Angeles as general manager in the manufacturing division.

1927

LT. COL. VERNON P. JAEGER, Army Chaplain, expects to leave his present duty in Korea for return to the United States early in June. He does not yet know the location of his next Army assignment. He plans a short visit to Pasadena before proceeding to his next post.

W. A. MINKLER is assistant manager, Air Conditioning and Refrigeration Department, of the Sturdevant Division of the Westinghouse Electric Corporation in Boston.

1929

ANDREW V. HAEFF, "lost" to the Alumni Association for a time, is working for the Naval Research Laboratories, in Washington, D. C.

ENGLE F. RANDOLPH is associated with J. H. Davies of Long Beach, California, designing lighting, power and distribution installations for buildings.

EUGENE H. RIGGS has been named city manager of El Monte. He recently served with the military government in Japan.

RALPH M. WATSON is assistant to the vice-president in charge of engineering of the Worthington Pump and Machinery Corporation of Harrison, New Jersey.

1931

JOHN S. DETWEILER is now residing in Colma, California.

ROBERT MARTIN OAKS is now living in Long Beach, California.

1932

GORDON E. BOWLER is employed with the Atlantic Oil Company, in Dallas, Texas.

HOWARD W. FINNEY recently moved to Los Angeles, California.

1934

DUNCAN MCNAUGHTON is with the Department of Geology at the University of Southern California.

1935

JAMES N. SMITH has moved to Laguna Beach, California.

1936

SYDNEY U. BARNES, ex '36, expects to return to the United States in June from duty with the U.S.F.A. overseas, and will make his home with his mother in St. Catherines, Ontario, Canada.

ROBERT H. MARSH has recently accepted a position as manager of the Carbide Tool Division of the Union Twist Drill Company of Athol, Massachusetts, and will be in charge of carbide tool manufacturing, engineering, and sales for that division. Bob recently purchased a 162 acre farm in Barre, Massachusetts, near Athol.

DONALD L. YOUNG is now living in Indio, California.

1937

HAROLD J. ALWART is employed with Clayton Mark & Company of Evanston, Illinois, as assistant chief engineer.

RICHARD T. BRICE has moved to East Orange, New Jersey.

DONALD K. COLES, M.S. '37, is working for the Westinghouse Research Laboratories in East Pittsburgh, Pennsylvania, as a physicist.

JOHN S. EDWARDS recently moved to Millbrae, California.

JACK W. GEORGE was recently transferred to the Henderson, Nevada, plant of the U. S. Vanadium Corporation. Jack has worked at their mines in Bishop, California, since his discharge from the Army in February, 1946.

DORR KIMBALL is employed with the Alhambra Branch of the Southern California Edison Company as a technician in the Standards Laboratory.

J. RIDGELY LEGGETT is associated with the California Research Corporation at Whittier, California, as associate research engineer.

WILLIAM C. PUTNAM is associate professor of geology at U.C.L.A.

ALBERT HERMAN ZIMMERMAN has been with the Southwest Welding and Manufacturing Company of Alhambra, California, since last September.

1938

EDWARD N. FRISIUS is now living in Lomita, California.

HENRY T. NAGAMATSU has moved to Pasadena.

1939

A. M. EICHELBERGER, formerly of the United Geophysical Company of Pasadena, has joined the staff of the Field Research Laboratories of the Magnolia Petroleum Company of Dallas, Texas, as senior physicist.

MICHAEL E. HIEHLE is now working for General Electric at their new Electronics Park in Syracuse, New York, on television antennas. He was married in 1942 and is now the father of three children: Patsy, 3½, Mike, 2, and Sonje, one month. Mike senior will soon have an amateur station on the air under call W2SO. He writes that he would like to hear from other members of the class.

DONALD G. LAWRIE has been released from the Army and plans to return to Southern California in April or May. Prior to his service in the Army Don was employed at the San Diego plants of Consolidated-Vultee Aircraft Corporation and the Ryan Aeronautical Company. He obtained his master's degree in Business Administration at Stanford University in 1941.

WILLARD M. SNYDER, who has been with the Bureau of Reclamation at Sacramento since his return from service with the Naval Air Forces, has recently been transferred to the Billings, Montana, office of the U.S.B.R. with increased responsibility.

1940

JAMES B. GLASSCO is living in Los Angeles.

ALBERT P. GREEN, recently with the Navy Department in Washington, D. C., has moved to Hollywood, California.

HARLOWE J. LONGFELDER is now living in Seattle, Washington.

DAVID W. WHITTLESEY is living in Dayton, Ohio, where his present position is aeronautical engineer (propeller) at Headquarters, Air Materiel Command, Wright Field, Dayton, Ohio.

1941

ARDEN H. FREDERICK recently moved to Pleasantville, N. Y.

JOHN H. MAIN has moved to Cumberland, Maryland, where he is employed with the Hercules Powder Company.

STANLEY SOHLER is an associate of the John Yates Agency of the Massachusetts Mutual Life Insurance Company, specializing in estate planning and business insurance. Stan is now located in Los Angeles.

EBENEZER VEY has moved to Baltimore, Maryland.

1942

ALBERT P. ALBRECHT is the father of a baby girl, Ann Frances, born March 18.

WILBUR D. CRATER has moved to Long Beach, California.

SYDNEY K. GOLD is now living in New York.

FRANCIS V. LYLE has moved to Los Angeles, where he is employed with the Gardena branch of the Dow Chemical Company.

CARL H. SAVIT, mathematics teaching fellow at the Institute, has moved to Los Angeles.

LEROY A. WELLER is now residing in Palo Alto, California.

1943

ROBERT H. BASHOR is back home in Los Angeles, California, after serving with the Navy. He is now employed with the Worthington Pump Company.

ROBERT M. BRAGG is now residing in Fowler, California.

1944

GEORGE S. BUDNEY has taken a job as stress analyst with the Warren MacArthur Corporation of Bantam, Connecticut.

L. G. DAMESON has recently moved to Laurence Park, Erie, Pennsylvania, where he is employed at the Erie Works of the General Electric Company.

RICHARD E. KUHN is now living in Los Angeles.

JOHN NELSON married Miss Penny Stowell in Oswego, New York, early in February. DEANE MORRIS '43 was best man. John expects to receive his master's degree in mechanical engineering from M.I.T. in June.

THOMAS W. NORSWORTHY is employed with the Dallas, Texas, branch of the Los Angeles advertising firm, the McCarty Company.

ARTHUR W. SCHNACKE is now living in Schenectady, N. Y.

FLOYD E. WEAVER has accepted a position with the Latiteel Corporation of Los Angeles, California.

DOYLE E. WILCOX has moved to Inglewood.

PAUL H. WINTER will marry Miss Ruth Elizabeth Brooks of Altadena, California, early in May.

1945

LOUIS H. DAVY is now an instructor at San Francisco Junior College. He plans to take graduate work in electrical engineering at the University of California in the near future. Louis was separated from the Navy last October.

JOHN B. LYON has recently moved to South Pasadena.

ROBERT C. POOLMAN is living in Reno, Nevada, where he is associated with the University of Nevada.

K. MARTIN STEVENSON is now living in Schenectady, New York.

ROBERT W. TAYLOR is taking graduate work at Stanford University.

MERLE C. WAUGH will be separated from the Navy by the middle of May. He plans to return to the Institute in the fall to continue his studies in aeronautics.

1946

ELMORE G. BROLIN is working in the engineering department of the Standard Oil Company at San Francisco.

ANDREW B. CAMPBELL is taking graduate work at Stanford University.

KEITH DOIG has accepted a position with the Shell Oil Company. He expects to spend four months at each of the three divisions of the company, Bakersfield, Long Beach and Ventura, in preliminary training.

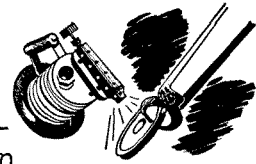
JAMES C. EVANS is employed with the North American Aviation corporation.

BYRON O. LOWERY is now living in Walla Walla, Washington.

THE MARCH OF SCIENCE

**MIRACLE
HEAT—
without fire
or furnace!**

HEATING A PIECE OF METAL BY OPEN FLAME, BLOW-TORCH OR FURNACE IS RELATIVELY SLOW—APT TO LEAVE SCALE...IT'S HARD TO HEAT ONE SPECIFIC AREA WITHOUT HEATING THE WHOLE PIECE.

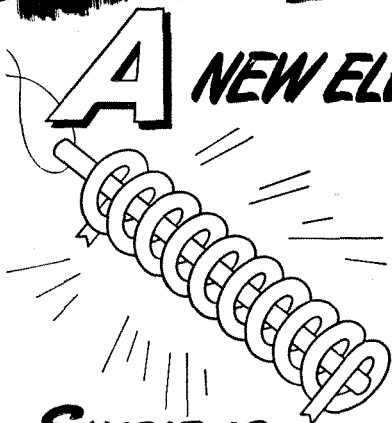


PRODUCTION MEN REALIZED HEAT-TREATING OPERATIONS SUCH AS FORGING, PRECISION BRAZING AND SURFACE HARDENING COULD BE STEPPED WAY UP IF A FASTER METHOD OF HEATING COULD BE FOUND... ONE WHICH WOULD CONCENTRATE THE HEAT AT PRE-SELECTED AREAS!




HEAT BY INDUCTION SEEMED LIKE THE ANSWER. SCIENCE HAD ALREADY DISCOVERED THAT METALS HEAT RAPIDLY WHEN INTRODUCED INTO A HIGH FREQUENCY, HIGH DENSITY MAGNETIC FIELD!

A NEW ELECTRONIC HEATER DESIGNED BY ALLIS-CHALMERS SCIENTISTS—



SIMPLE AS

- A PLACE METAL IN WORK COIL...
- B PUSH BUTTON 
- C METAL IS HOT IN SPLIT SECONDS

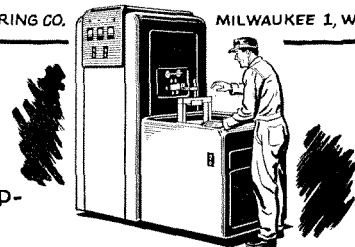
AMAZING PRODUCTION TOOL RECTIFIES ORDINARY 60-CYCLE CURRENT THEN STEPS IT UP TO 450,000 CYCLES. A MAGNETIC FIELD OF HIGH DENSITY IS SET UP IN WORK COIL AND WHEN METAL IS INTRODUCED INTO THIS FIELD, PASSAGE OF CURRENT CAUSES POWER LOSSES WHICH PRODUCE HEAT WITHIN THE METAL WITH INCREDIBLE SWIFTNES.

BIG BENEFITS: COMPLETE, SELECTIVE CONTROL OF HEAT PENETRATION... EXACT UNIFORMITY... GREATLY INCREASED PRODUCTION!

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ELECTRONIC HEATER IS ONE MORE EXAMPLE OF HOW ALLIS-CHALMERS RESEARCH AND EXPERIENCE GO TO WORK FINDING BETTER, FASTER, MORE EFFICIENT WAYS OF HANDLING PRODUCTION PROBLEMS—ANOTHER GOOD REASON WHY A-C EQUIPMENT IS IN DEMAND IN EVERY MAJOR INDUSTRY...

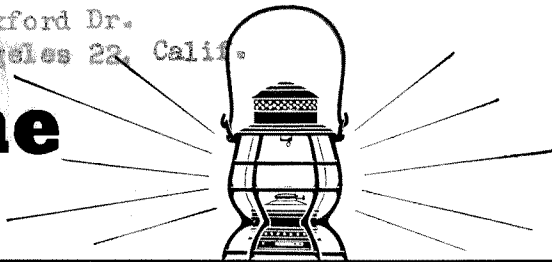


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BIGGEST OF ALL IN RANGE OF INDUSTRIAL PRODUCTS

Thomas V. Davis '36
472 Oakford Dr.
Los Angeles 22, Calif.

The Main Line



APRIL, 1947

Although it will not be inaugurated until this summer, we can now tell you something about the new *Golden Rocket*, first in Southern Pacific's post-war parade of streamliners.

The *Golden Rocket* will be operated by Southern Pacific and Rock Island over the Golden State Route between Los Angeles and Chicago, via Phoenix, Tucson and El Paso. Its running time will be 39¾ hours, and three departures a week are planned. Two *Golden Rocket* trains are being built to provide this service, but one may be completed before the other.

Will be diesel-powered

The train is custom-built from stem to stern. Its sleeping cars are all private rooms. It has a dining car, observation-lounge car, three extra-comfortable chair cars and a novel "Fiesta Car." Power is diesel-electric. The exterior will be finished in gleaming stainless steel and red.

The *Golden Rocket* will be an extra fare train, and the first post-war streamliner from Southern California and Arizona to the east.

Turquoise and Copper

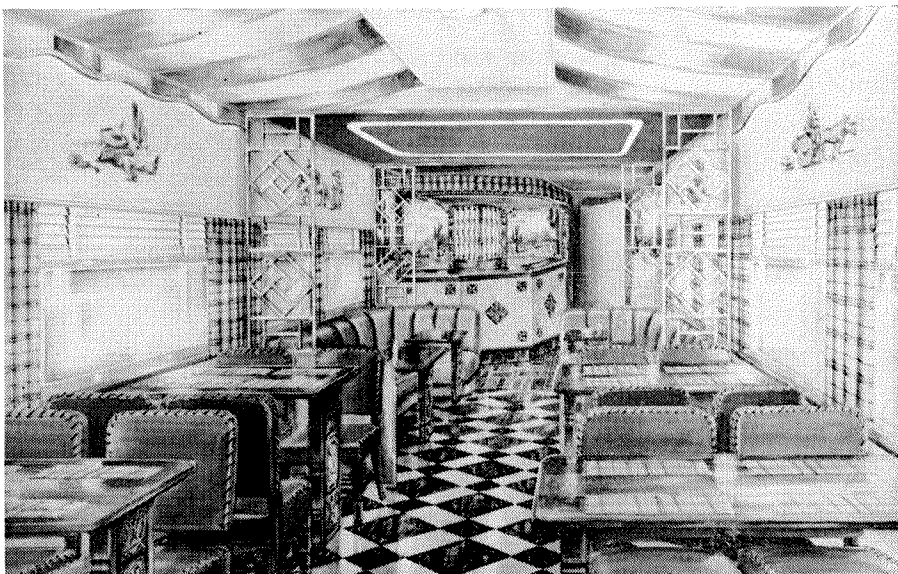
The rich coloring and exquisite handcrafts of the Southwest and Mexico inspired the design and color schemes of the *Golden Rocket*.

A good example is the dining car. The embossed copper frieze along the sides was created by the Mexican craftsman Jesus Torres. He also executed, in copper, replicas of ancient devil masks which are placed at either side of the car doors. The chairs have copper frames, and all mouldings and trim are made of the red metal.

The seat coverings and table linen are golden yellow, contrasting with turquoise floor and ceiling.

The Fiesta Car

The *Golden Rocket's* Fiesta Car is a combination lounge and coffee shop, done in the Mexican manner. Textures of adobe, tile and oak are freely used.



Designer's sketch of Fiesta Car on the *Golden Rocket*.

The bar at one end was reproduced from an unusual fountain in a quaint old Mexican patio. It is faced with tile. Over the cocktail lounge and coffee shop is a bright red and yellow canopy, enhancing the patio effect.

Tables and comfortably upholstered chairs are of oak, hand-carved by Torres.

Observation-Lounge Car

The observation end of the last car on the *Golden Rocket* departs from conventional arrangement of train furniture. Curved sofas, decorative tables and easy chairs are arranged informally. Unusually high windows give greatly increased vision.

The Sleeping Cars

Plants, minerals and general coloring of the Southwest contributed color ideas for the modern all-room sleeping cars on the *Golden Rocket*. Walls are done in the blue green of the mesquite and maguey plants, tans and browns of the palm and date

trees, yellows of the palo verde and acacia, apricot of the prickly pear.

Contrasting ceilings are the pale yellow of yucca, the pale green of the ocotillo and light tans of the desert.

Floor coverings are keyed to the rock colors in the canyons and other rich colors of the earth itself.

The Chair Cars

Two of the three chair cars on the *Golden Rocket* are done in tones of gray, blue and red. The floor covering has a Canyon red center strip, inlaid with an ancient Indian insignia taken from a priceless rug in a private collection. Draperies are also in red with the Indian design hand-embroidered in tones of blue and cream.

Mirror frames are hand-carved in oak, with a design from the arches at Mission San Xavier near Tucson.

The third chair car is done in turquoise, blue and red.

That's all for now. We'll let you know as soon as possible when the *Golden Rocket* goes into service—also the new *Shasta Daylights* between San Francisco and Portland.

—H. K. REYNOLDS