

THE MONTH AT CALTECH

Commencement

A TOTAL OF 344 students received degrees from the Institute at the 58th annual Commencement on June 6. Bachelor of Science degrees went to 126 men. Fifty-four men received the B.S. in Science—9 of them with honors; and 72 men received the B.S. in Engineering—14 with honors.

Of the 23 men graduating with honor, 4 coupled this distinction with “exceptionally effective participation in extracurricular activities,” for which they were awarded Student Body Honor Keys. They are John Boppart, Philip Orville, Albert Snider, and Jesse Weil. Honor Keys were awarded to 12 men in all.

Master of Science degrees went to 133 men. Sixty-nine men were given the M.S. in Science—1 in Astronomy, 2 in Chemistry, 6 in Chemical Engineering, 3 in the Geological Sciences, 1 in Geophysics, 1 in Mathematics, 44 in Meteorology, and 11 in Physics. The men receiving the M.S. in Meteorology completed requirements for that degree elsewhere, after they were given certificates in meteorology in special wartime courses at Caltech. Instruction in meteorology was discontinued several years ago at Caltech and this Commencement was set as the deadline for conversion of the certificates by those qualifying for the M.S.

The M.S. in Engineering went to 64 men—21 in Aeronautics, 8 in Civil Engineering, 13 in Electrical Engineering, and 22 in Mechanical Engineering.

Twenty men were awarded Engineer's degrees—15 of these graduates being officers in the armed forces who were assigned to Caltech for advanced work in physics or aeronautics.

Sixty-five men received the Ph.D. degree. Among these was Helmut Abt of Evanston, Illinois, who received the first Ph.D. in Astronomy to be awarded by Caltech since it began offering a complete course of instruction in this field in 1948, after the opening of the Palomar Observatory.

James R. Page, Chairman of the Board of Trustees, presided at the Commencement ceremonies. The Reverend Ganse Little, pastor of the Pasadena Presbyterian Church, delivered the Invocation and the Benediction. Degrees were conferred by President DuBridge, who also delivered the charge to the graduating class.

The Commencement speaker was Dr. John E. Pomfret, Director of the Henry E. Huntington Library and Art Gallery. Dr. Pomfret came to the Huntington Library last November from the College of William and Mary, where he had been president since 1942. Previously he had served as dean of the senior college and graduate school at Vanderbilt University and as a member of the history department at Princeton University.

Hinrichs and Morgan Awards

DAVID L. HANNA of San Diego and Richard Y. Karasawa of Los Angeles were named joint winners of the Frederic W. Hinrichs, Jr., Memorial Award at the commencement ceremonies.

The award is made annually to the senior or seniors who, in the judgment of the undergraduate Deans, have made the greatest contribution to student body welfare and who have shown outstanding qualities of character, leadership and responsibility. It was established by the

CONTINUED ON PAGE 22



Dr. Pomfret, Dr. Millikan, Dr. DuBridge and James Page



It takes collaboration to get into academic costume



The academic procession starts down the aisle

THE MONTH . . . CONTINUED

Caltech Board of Trustees in memory of Professor Hinrichs, faculty member and Dean of Upperclassmen from 1921 until his death in 1944.

This was the first time in the five-year history of the Hinrichs award that it went to two students. Hanna and Karasawa each received \$50, a certificate and a desk pen.

Hanna served as 1951-52 president of the student body after a year as its athletic manager. He received two honor keys for participation in extracurricular activities and three varsity letters in football and golf. He also was a member of the Beavers, campus honor and service organization.

Karasawa was 1951-52 student body athletic manager and had served as vice-president of the junior class as well as secretary of the Varsity Club. He was a three year letterman in varsity football and baseball. In 1950 and 1952 he was captain of the baseball team; he was twice co-winner of the Alumni Baseball Trophy and was awarded an honor key.

Dan L. Lindsley, Jr. of Pasadena was announced as the winner of the \$100 Thomas Hunt Morgan Award at this year's Commencement. This award, established in 1951 by friends of the late Dr. Morgan, who founded the Caltech Division of Biology, is made annually to an outstanding student in biology receiving the Ph.D.

Lindsley, who is 26, came to Caltech in 1949 as an Atomic Energy Commission Fellow, for graduate work in genetics, after receiving his M.A. from the University of Missouri.

P.H.T. Degrees

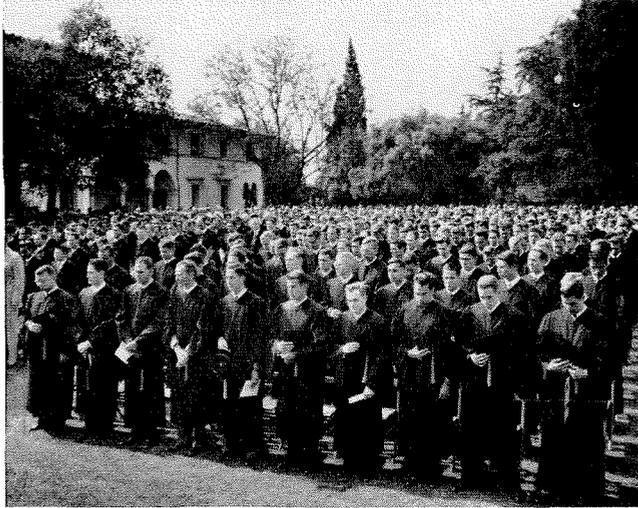
SOMETHING NEW was added to the 1952 Commencement—a diploma for the wives of students who were getting their degrees this year. The new diploma is not an official Institute document, though you'd never know that from looking at it. It's the same size as the Caltech diploma, comes in the same kind of case, and has very much the same kind of wording:

"California Institute of Technology Graduating Class, upon recommendation, has conferred on MARY SMITH the degree of P.H.T.—Put Husband Through—together with all the rights and privileges thereunto appertaining, in recognition of proficiency in accredited courses of Economic Management, Household Mechanics, Culinary Engineering, plus beneficial cooperation, and guiding inspiration. In witness whereof a seal and signatures are hereunto affixed at the City of Pasadena in the State of California this sixth day of June in the year nineteen hundred and fifty-two."

The document is signed by the Recommending Husband and by the First Lady of the Institute, Doris M. DuBridge.

Though similar degrees have appeared at various other institutions in the past, this is the first year the P.H.T. has been available at Caltech. The diploma is

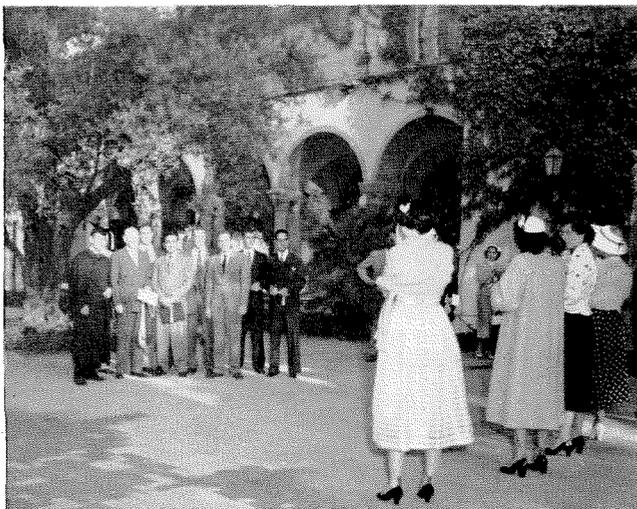
CONTINUED ON PAGE 24



Invocation



Celebration



Documentation

largely the work of Forrest William Davis and Edgar Wong, both of the Class of '52, who put in so much time perfecting the document this year that they are making sure it doesn't lose its value by falling into the hands of jokers. The diplomas will be sold exclusively by the Caltech Bookstore (\$1 apiece) at Commencement time each year, and you can't buy one until your name is checked against an exclusive list of legitimately married men who are actually going to receive degrees from Caltech.

Science Advisory Chairman

PRESIDENT TRUMAN has named Caltech's President L. A. DuBridge as Chairman of the Science Advisory Committee of the Office of Defense Mobilization. The purpose of the Committee is to keep in touch with scientific work related to problems of national defense and to advise the executive branch of the government on such problems. It was established a year ago with Dr. Oliver Buckley of the Bell Telephone Laboratories as Chairman. Dr. Buckley has resigned the chairmanship, effective June 1, because of poor health, and Dr. DuBridge was nominated by his fellow members on the committee to succeed Buckley. The post will require Dr. DuBridge's presence at meetings in Washington about three or four times a year.

Animal Virus Research

IN A PAPER DELIVERED at the annual spring meeting of the National Academy of Sciences in Washington this April, Dr. Renato Dulbecco, Senior Research Fellow in Biology, described a new technique developed at the Institute which greatly simplifies research on animal viruses. These are the viruses which cause such diseases as influenza, poliomyelitis, shingles, and smallpox.

CONTINUED ON PAGE 26

California Institute of Technology
 Graduating Class, upon Recommendation, has conferred on

Mary Smith
 the degree of
B. H. T.
 Put Husband Through

together with all the rights and privileges thereunto appertaining,
 in recognition of proficiency in accredited courses of Economic
 Management, Household Mechanics, Culinary Engineering, plus
 beneficial cooperation, and guiding inspiration.

In witness whereof a seal and signatures are hereunto affixed at the City
 of Pasadena in the State of California this sixth day of
 June in the year nineteen hundred and fifty-two



John Smith
 Recommending Husband

David M. DuBridge
 First Lady

Diploma for wives

The Dulbecco technique, which resembles that developed three decades ago for the study of bacterial viruses, appears to provide an animal virus assay superior to any other now in use. It affords an enormous saving in time, labor and materials.

Dr. Dulbecco plans to use the technique as a means of studying the growth of a virus on animal tissue. Relatively little is known about the basic properties of animal viruses because of the technical difficulties involved in their study.

Research on these viruses has been done primarily with animals or chicken embryos as experimental subjects. The virus is lost from the moment it is introduced into the animal and the effects are observed on the animal as a whole—rather than on a specific type of cell—only when a radical change has taken place after the virus multiplies perhaps a million-fold. Tissue cultures have also been used, but here again infectivity is determined by some final effect which is produced on the whole culture.

In Dulbecco's technique, localized effects are produced for the western equine encephalomyelitis virus. The technique permits the use of a uniform type of host cell and provides an accurate method of determining virus activity. With it Dr. Dulbecco hopes also to be able to isolate the progeny of a single virus particle, which might pave the way toward development of special virus strains useful as vaccines. Ability to isolate progeny also would make it possible to study the factors influencing hereditary changes in virus characteristics.

Dr. Dulbecco's technique involves the formation of a continuous layer of chicken embryo fibroblast (connective tissue) cells on the bottom of a round, flat glass flask, according to a method devised by Dr. W. R. Earle of the National Institutes of Health at Bethesda, Maryland.

The layer grows in two days of incubation and the virus is applied on it. The virus particles attack the fibroblasts, multiply and continue destroying fibroblasts in the immediate vicinity until—after two or three days of incubation—small islands of destroyed tissue (plaques) are formed.

About one hundred plaques visible under a microscope, and sometimes to the naked eye, may form in a single flask. They provide information superior to that which would be obtained with an equal number of experimental animals or embryos, according to Dr. Dulbecco.

By statistical analysis Dr. Dulbecco has shown that each plaque represents an area of destruction initiated originally by only one virus particle. He has also introduced the virus in the same concentration directly into chicken embryos and found that the number of plaque-producing particles and infecting particles is virtually identical. This establishes that infection in the animal can be produced by one virus particle, he reported.

Passport

BECAUSE IT WAS "not in the best interests of the United States," the State Department refused to issue a passport to Dr. Linus Pauling to visit Great Britain last month. Dr. Pauling, head of Caltech's Division of Chemistry and Chemical Engineering, had planned to take part in a conference of the Royal Society of London on the structure of proteins.

The passport was denied Dr. Pauling in February. He promptly appealed the State Department decision in a letter to President Truman. The President, however, referred the matter back to the State Department, and in April Dr. Pauling went to Washington to make a direct appeal. State Department officials informed him that their decision had been made because of suspicion that Dr. Pauling was a Communist and because his anti-Communist statements had not been "sufficiently strong." It was suggested to Dr. Pauling that he provide the Department with more evidence. Although he then submitted a statement, made under oath at a California State Senate Un-American Activities Committee hearing, that he was not now and never had been a member of the Communist Party, Dr. Pauling was told that the original decision not to issue him a passport would be upheld.

"It is my opinion," he said, "that my proposed travel, solely for the purpose of taking part in scientific discussions in Great Britain, would in fact be in the best interests of the United States. On the other hand, I believe that the refusal of a passport to me is not in the best interests of the United States, and that it involves the unjustified interference by the government with the freedom of action of a citizen of the United States.

"I am a foreign member of the Royal Society of London, and an honorary member of the Royal Institution of Great Britain. One year ago Prof. Robert B. Corey and I announced that we had discovered the structure of some proteins. The Royal Society of London arranged for a conference to be held on this subject. Because I was unable to attend at the time originally set, which conflicted with a meeting of the American Philosophical Society in Philadelphia, of which I am a vice-president, the date of the Royal Society conference was changed to May 1. I also accepted an invitation from the director of the Royal Institution of Great Britain to speak before the Royal Institution on May 16 on the subject of the structure of proteins.

"Aside from this, my wife and I had planned to visit universities in London, Oxford, Cambridge, and Leeds, in order to talk with scientists there about the structure of proteins and other scientific problems, and I had accepted an invitation to be guest of honor at a reception to be held in London by the Society for Visiting Scientists.

"During recent years my work on the theory of resonance in chemistry has been under attack in Russia. Russian chemists have been forbidden to make use of this theory in their scientific work. The action of the

CONTINUED ON PAGE 28

THE MONTH . . . CONTINUED

State Department in refusing me a passport represents a different way of interfering with the progress of science and restricting the freedom of the individual citizen. In my opinion it reflects a dangerous trend away from our fundamental democratic principles, upon which our Nation is based."

Albert Merrill

ALBERT A. MERRILL, aviation pioneer and Instructor in Aeronautics at the Institute, died on June 1, in Pasadena, following a long illness. He was 77 years old.

Mr. Merrill's illness had prevented his direct participation in work at the Institute for several years, but he had followed with interest reports on tests conducted with the 200-mile-an-hour wind tunnel named in his honor (*E&S*—October, 1950).

In tribute to him, Dr. Clark B. Millikan, Director of the Guggenheim Aeronautical Laboratory at Caltech, said: "He was one of the true pioneers in aeronautics in this country. He made a number of practical inventions, but I think the most characteristic element in his long life was a passion for the truth. This led him to develop a number of ingenious and powerful techniques for getting accurate and precise experimental data with inexpensive, simple tools."

Mr. Merrill came to Throop College in 1918 as an instructor in accounting and aeronautics, and was given supervision of the design, construction and operation of a small wind tunnel on the campus. This was the first wind tunnel on the West Coast and it continued operating until it was destroyed by fire in the 1930's. Mr. Merrill left the Caltech staff in 1930 to engage privately in aircraft design, but returned as an instructor in 1940.

One of his numerous projects was the development of a small wind tunnel which one man could operate by himself and so produce scientific data inexpensively and quickly. In the late 1930's and early 1940's two such tunnels were built at Pasadena Junior College and operated by Mr. Merrill. They were used extensively by scientists and industrial concerns and dozens of PJC and Caltech students were trained on them. A tunnel of this type was built at Caltech in the late 1940's and was dedicated to Mr. Merrill in August, 1950. It has been used primarily for instruction, for various research projects and for the testing of new ideas still too much in the pioneer stage to warrant use of one of the bigger tunnels.

Stuart Mackeown

DR. SAMUEL STUART MACKEOWN, Professor of Electrical Engineering at the Institute, died in Pasadena on May 29. He was 57 years old.

Dr. Mackeown had been at Caltech since 1923. After graduation from Cornell University in 1917 he served

as a Second Lieutenant in the U.S. Army Signal Corps, working in the Bureau of Standards, during World War I. In 1918 he married Littie B. Uhrland. He became a research engineer for Western Electric in 1919, and in 1920 returned to Cornell to teach physics. He received his Ph.D. there in 1923, and came to Caltech as a National Research Fellow in Physics that same year. He was made Professor of Electrical Engineering in 1942.

Dr. Mackeown served as a Navy Lieutenant Commander in the Institute's Radio Development Section during World War II. At various times he was a consulting engineer and patent expert for such companies as General Electric, American Telephone and Telegraph, Standard Oil and Metro-Goldwyn-Mayer. He was a member of Sigma Xi, Tau Beta Pi, the American Physical Society, A.I.E.E., I.R.E., and the American Association for the Advancement of Science.

Success Stories

CALTECH MAKES an excellent showing in two recent magazine articles which provide data on the relative success in life of the graduates of various colleges and universities.

The first article, in *School and Society*, presents figures on the number of college graduates who are listed in *Who's Who in the West*. By dividing the total number listed from each college by the total number of living graduates of that college, the following figures are obtained:

Institution	Number listed per 1000 living graduates
California Institute of Technology	26
Stanford University	15.6
University of California (Berkeley)	11.5
Pomona College	9.1
University of Redlands	8.3

The second article appears in the *American Journal of Physics* and lists the undergraduate sources of American physicists who have attained sufficient prominence to be listed in *American Men of Science*. In this case, the number of listed physicists from a given school is divided by the number in that school in 1935-36 (on the assumption that, in general, listing in *American Men of Science* is attained by men who are about fifteen years out of school). The figures for the first five institutions are as follows:

Institution	Number listed per 1000 enrolled
California Institute of Technology	78.3
Massachusetts Institute of Technology	53.9
Case Institute of Technology	47.6
Kalamazoo College	41.8
Clark University	39.7

If one ignores enrollment and lists institutions in order of their largest contributions to the physicists of the country Caltech ranks ninth, preceded in order by M.I.T., Harvard, California, Chicago, Michigan, Wisconsin, Cornell and City College of New York.