

THE SUMMER AT CALTECH

JPL

On a tour of Army Ordnance research plants last month, Brigadier General Leslie E. Simon, Assistant Chief of Ordnance, stopped over in Pasadena long enough to answer some vital questions about the Jet Propulsion Laboratory.

JPL has been under fire for a long time now by some of the citizens of Pasadena, who have complained variously that the lab makes too much noise, that it plans to expand right into the residential areas surrounding it, that it would be a bomb target in time of war, and so on.

Most of this criticism, of course, has been levelled directly at Caltech, and there has been so much of it that President DuBridge has stated that, rather than have poor relations with its neighbors, the Institute would give up management of the laboratory.

One of the first things General Simon pointed out to the lab's critics, was that the lab is not owned by Caltech. It is owned by the government, and operated by the Office of the Chief of Ordnance. Caltech merely supplies the technical staff and the management of the lab—without profit.

Under no circumstances, said the General, would the lab be abandoned (at least not until "the nations of the world begin beating their swords into ploughshares") or moved. To reproduce it would cost \$22,000,000 and it would take 15 months to duplicate its facilities.

Aside from time and money losses, the government does not want to lose its research staff. And if the lab *were* to be moved to some remote location, many scientists would have to be left behind, since they are permanently attached to Caltech—or they are graduate students here.

The lab, in other words, is here to stay. And even if Caltech should ask to be released from its contract to manage the lab, it would still be here—though there is every indication that an outside agency, either the Government itself or an industrial contractor, would be less responsive to the neighbors' welfare than Caltech has been.

About noise: The General remarked that JPL was the only lab in the nation which has been making any attempts to muffle noise. In fact, reduction of noise due to research testing has become a research project in itself at the lab. Good results have already been achieved, but the noise-abatement program is still being continued, both by suppression and by diversion of noisy tests to other locations.

About safety: Because work on guided missiles is classified, and local citizens cannot be told exactly what goes on at the lab, rumors have it that accidents and

deaths are the order of the day there. In the entire history of the lab there have only been two serious lost-time injuries. One resulted in an eight percent loss of hearing; the other consisted of serious electrical burns. There have been no fatalities. In the last five years there have been ten fires at the lab, all of them minor and most of them trash and brush fires.

About the lab being a bomb target: At the end of the recent war General Simon visited most of the German research and development establishments. The only one which had been bombed (Peenemunde, a development testing ground) was hit by a bomb which missed its target five miles away. Military strategic effort, the General noted, is generally directed against objectives that will affect the war now, such as munitions factories, oil refineries and other industrial installations—not against research institutions.

About expanding the lab: There *are* plans to acquire additional land around the lab—but only to serve as a buffer zone to prevent undue proximity to future dwellings, to improve security and to provide more parking space.

ROTC

THOUGH THE FINAL total's not in at this writing, 153 members of the freshman class (out of a total of 198) have already signed up for the Air Force Reserve Officers Training Corps program which gets under way at the Institute this fall. It's also expected that a good many sophomores will sign up too, since the program has now been opened up to them as well. Last spring it looked as though it would be open to freshmen only.



Brigadier General Leslie E. Simon, Assistant Chief of Ordnance, and Caltech President L. A. DuBridge discuss the future of the Jet Propulsion Laboratory.



Officers of Caltech's new Air Force R.O.T.C. — Lt. Col. Marvin D. Fleming, Lt. Col. Arthur Small, commanding officer of the unit, Capt. Andrew R. Stolarz and Maj. Edward J. Renth, Jr.

Students may join the unit on a voluntary basis, and during their first two years take two class hours and one drill period weekly, in addition to their regular schedules. During junior and senior years they'll have four R.O.T.C. class hours and one drill period each week. Students will be deferred from induction into the Army as long as they maintain good standing in the air unit and the Institute. At the end of the four-year course, graduates will be commissioned second lieutenants in the U. S. Air Force Reserve, and will be subject to call to duty as non-flying officers.

All students will take certain basic courses, then choose one of three fields of specialization—Communications, Aircraft Maintenance Engineering or General Technical.

Commanding officer of the Caltech unit is Lt. Col. Arthur Small. A graduate (1940) of Southeastern State College, in Durant, Oklahoma, Colonel Small was athletic director and coach at Durant High School for a year after graduation. He entered cadet school in April, 1941, and was commissioned a second lieutenant four days after the Japanese attacked Pearl Harbor. After flying West Coast submarine patrol, Colonel Small spent two years with the Third Attack Group in the Pacific Theater.

Colonel Small has had previous Air Force R.O.T.C. assignments, of a year each, at the University of Oklahoma and Notre Dame. He was transferred to the Caltech unit this summer from Bolling Field, Washington, D. C., where he was a deputy commander of the 110th Special Air Missions Group.

His administrative staff at Caltech includes Lt. Col.

Marvin D. Fleming, Major Edward J. Renth, Jr., Captain Andrew R. Stolarz, Master Sergeants Harold J. Keating, LeRoy G. Lee, Earl J. Morrison and Harold Waugh, and Technical Sergeant Lawrence E. Hansen. Colonel Fleming, a graduate of Colorado A. and M., was administrative officer and instructor with the AFROTC unit at the University of Arizona for three years. A West Point graduate, Major Renth was transferred to Caltech from Langley Air Force Base, Virginia. Captain Stolarz, a graduate of the University of California at Berkeley, came to Caltech from the AFROTC unit at Washington State.

PHS Grants

INSTITUTE BIOLOGISTS and chemists have received a total of \$89,249 from the U. S. Public Health Service to continue work on special research projects.

The largest single grant, for \$30,000, went to Drs. Dan Campbell, Linus Pauling, and Carl Niemann for their blood chemistry work. Their research in World War II turned up the blood plasma substitute, oxypolygelatin.

Dr. Henry Borsook received two grants—one for \$20,153 to study the synthesis of proteins in living organisms; the other for \$9,504 to study the synthesis of an essential amino acid.

Dr. Pauling and Dr. Robert P. Corey received \$19,980 to continue their study of the structure of proteins, which this year produced the structures of

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such proteins as red blood cells, bone and muscle (see page 7).

Dr. Niemann and Dr. Herschel K. Mitchell received \$9,612 for their study of fluorine-substituted amino acids for curing diseases.

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The U. S. Public Health Service also awarded fellowships to two students working for their doctor's degrees at the Institute. David S. Hogness, studying chemical genetics, received a \$2,000 fellowship; Otto E. Landman, studying the inheritance of a specific enzyme in *Neurospora* received a \$3,600 award.

Faculty Notes

SOME RECENT faculty promotions—

To Full Professor:

Donald S. Clark, Mechanical Engineering
R. P. Dilworth, Mathematics
R. W. Paul, History
Milton S. Plesset, Applied Mechanics

To Associate Professor:

Arthur W. Galston, Biology
C. R. De Prima, Applied Mechanics
W. Duncan Rannie, Mechanical Engineering

To Assistant Professor:

Y. C. Fung, Aerodynamics
A. C. Ingersoll, Civil Engineering
C. W. McCormick, Jr., Civil Engineering
L. C. Pray, Geology
G. K. Tanham, History
D. F. Welch, Engineering Drafting
Max L. Williams, Aerodynamics

To Professor Emeritus:

Aladar Hollander, Mechanical Engineering.

Russian Chemists on the Party Line

JUST A FEW YEARS AGO the study of genetics was proscribed in the Soviet Union. It was banned from all schools and research institutes. Soviet biologists who held to the "reactionary" theories of Mendel and Thomas Hunt Morgan were forced to "recant" or else they were "purged." In place of genetics, the Russians put their official seal of approval on the theory of one T. D. Lysenko, which, though unscientific, was a 100 per cent pure Russian product.

Having straightened out the biologists, the Russians are now moving in on the chemists. As a starter, the Chemical Sciences Division of the Soviet Academy of Sciences recently attacked the resonance theory of chemical bonds—developed by Linus Pauling, head of Caltech's Division of Chemistry and Chemical Engineering. Among other things, the Academy is of the opinion that the theory is "pseudo-scientific," "vicious," and an example of "world-outlooks hostile to the Marxist view."

The resonance theory, based on the physical theory of

quantum mechanics developed around 1925, helps to explain the chemical bond structure of various substances. It permits a greater understanding of the highly complex molecules of living cells, for instance, and enables chemists to explain satisfactorily many properties of complicated substances, such as the color of dyes. Though it is still developing, the theory has already become an accepted and valuable part of chemistry.

But not by the Russians.

At a recent conference of Russian scientific workers four Soviet chemists were singled out for criticism for applying the principles of "the harmful resonance theory" in their research, and for failing to give "a comprehensive criticism of this idealistic teaching."

"The theory of resonance," said the Soviet journal *Uspekhi Khimii* (Progress of Chemistry), "undoubtedly constitutes a brake on the further development of knowledge concerning chemical structure as it rests on a methodologically faulty basis. Consistent use of the theory leads to pseudo-scientific conclusions."

But the real basis for disagreement seems to be that Pauling and his co-workers, in their various writings on the resonance theory, consistently failed to give credit to—or even mention—the work of "the Russian scientific genius Aleksandr Mikhailovich Butlerov" or other Soviet chemists.

"Here takes place a tendentious falsification of the historical facts," says *Uspekhi Khimii*, "the essence of which consists in the belittling of the significance of Russian science."

Says Dr. Pauling: "The value of resonance theory in teaching and research is so great that any chemists who try to practice chemistry or teach it without using the theory can expect to be greatly handicapped."

"As President James Bryant Conant of Harvard said recently, if the Russians continue to attempt to force science to follow along a path determined by politics, Russia is sure to grow weaker. If Russian chemists are not allowed to use the resonance theory or are deprived of scientific freedom in any other direction, Russian science will fall behind Western science and Russian technology will also suffer."

Progress Report on Bacteriophage

AT THE SECOND International Poliomyelitis Conference, held in Copenhagen, Denmark, last month, Max Delbrück, Professor of Biology at the California Institute, reported on some recent interesting experiments with bacteriophages.

Bacteriophages (E & S—February, 1950) are the viruses which attack bacteria—as distinct from the viruses which attack animals and man (and are responsible for such afflictions as polio, influenza and the common cold), and those which attack plants (causing such diseases as tobacco mosaic). Because their action on bacteria can be easily observed, bacteriophages are being used to study how viruses reproduce within the cells they attack.

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In the case of bacteriophage, Dr. Delbruck reported, it has been possible to study what happens when one or more virus particles attack a single bacterium. When two related particles enter the same bacterium at approximately the same time, not only do both multiply within the bacterium, but new virus particles are produced which show various combinations of the characteristics of the original virus. But, if one particle enters a bacterium some three minutes later than the first, only the first virus multiplies; the second virus is completely destroyed. Moreover, there is a latent period immediately after the invasion of the cell, in which *no* infective particles can be found, and not even the original virus particle can be recovered.

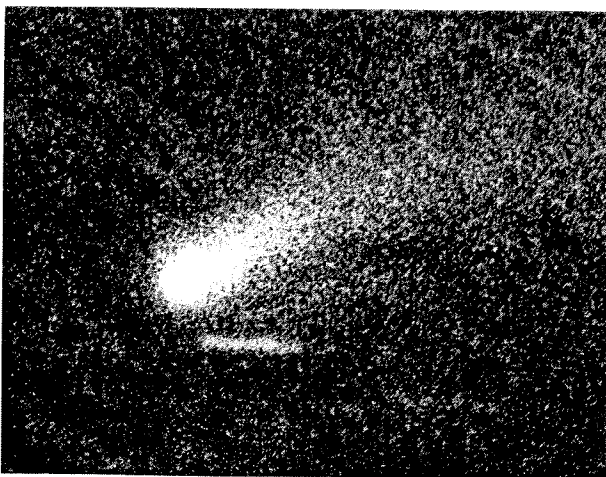
In this "eclipse period" lies the mystery of virus reproduction. And in the solution of this mystery lies the answer to the therapy of all the diseases caused by viruses.

Comets and Exploding Stars

BESIDES DR. MILTON HUMASON'S discoveries (page 15), two other interesting announcements came from the Mount Wilson and Palomar Observatories this summer.

Dr. E. H. Herzog, Research Fellow in Astronomy, and Dr. Fritz Zwicky, Professor of Astrophysics at the Institute, reported that they had discovered three exploding stars in the Milky Way last year.

For the past two centuries only about a hundred novæ, or exploding stars, have been found in the Milky Way. Besides, most of these discoveries have been more or less incidental. In the winter of 1949, therefore, Drs. Herzog and Zwicky, using the 18-inch Schmidt telescope, started on a determined hunt for more of these novæ. When



New comet discovered at Palomar Observatory. White line under comet is image of star spread out during exposure. It shows how far comet traveled in nine minutes.

general search produced exactly nothing, however, Dr. Albert G. Wilson, Senior Research Fellow in Astronomy, suggested another plan.

The two astronomers picked out 16 areas where novæ had been found most often and made spectral photos of eight areas every night and eight areas every other night for three weeks of every month, from July to October, 1950.

In examining the photographs, the astronomers put a new film slightly off center over an old one from the same area and studied the pair through low-power binoculars. Exploding stars showed up as images where no corresponding image was visible on the old film.

Three novæ were found by this method—all of them concentrated in the same general area of the Constellation of Scorpius. Oddly enough, the same three novæ were found independently, at the same time, by observers at the Astrophysical Observatory of Mexico at Tonantzintla.

Early in August Dr. Albert G. Wilson and Robert G. Harrington of the Mount Wilson and Palomar Observatories announced the discovery of a new comet—the seventh to show up this year. The astronomers described this one, which was discovered during work on the National Geographic-Palomar Observatory Sky Survey, as a diffuse comet with a nucleus and a tail. The tail was expected to become longer and brighter as the comet neared the sun—possibly even bright enough to be seen with the naked eye. When discovered, however, the comet was only one-hundredth as bright as the faintest object visible to the naked eye.

Computer Class

A SPECIAL EIGHT-WEEK COURSE designed to train personnel in the use of the analog computer was given at the Institute during the summer. Representatives of 15 aircraft companies and military installations—all of them planning to install machines similar to the Caltech computer in the near future—were students in this course. Lockheed, North American, Douglas and United Aircraft were represented in the class, as were the Inyokern Naval Ordnance Test Station and the Point Mugu Naval Air Missile Test Station.

The course of study covered design requirements and the basic principles of the computer, plus the necessary background in basic physics and applied mathematics for anyone planning to use the machine for engineering analysis. Most of the participating groups will use the computer to study problems of aircraft vibration, aeroelasticity and missile control.

Dr. Gilbert D. McCann, Professor of Electrical Engineering at the Institute, was in charge of the course. Other instructors included Dr. Charles H. Wilts, Assistant Professor of Applied Mechanics; Dr. Richard H. MacNeal, Assistant Professor of Electrical Engineering; Bart Locanthi, Electronics Engineer; and William Dixon of the William Miller Corporation.