

# ENGINEERING AND SCIENCE

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## The Month in Focus

SEVERAL items of Caltech news, recently released, may have more significance than is apparent at first glance. They are, the unveiling of the war record of the jet propulsion laboratories, the award to Dr. Linus Pauling of the Willard Gibbs medal of chemistry, and the announcement from Dr. Theodore von Karman of the building of a model of the world's first hypersonic wind tunnel.

Mankind has progressed through various stages of development in his endeavor to be monarch of all he surveys. He has tried to fulfill his desires by means of individual conquest, and has failed. As Charles Morgan, in his book, *Reflections in a Mirror*, points out, even by the close of the Renaissance men of genius in that age were compelled to admit that knowledge had outgrown man's power to assimilate it. More recently, man has tried to achieve supremacy by specialization. In a measure, he has been successful, as the results of World War II testify, but he has also created confusion and indecision among his contemporaries, who have been bombarded on all sides by attacks of seemingly unrelated knowledge.

Sane men, endowed with a reasonable amount of intelligence, refuse to believe, however, that there is not a solution to the chaos with which the world seems confronted today. They likewise refuse to concede that the world will be consumed by the evil which inevitably accompanies every promised good—as, for example, atomic energy. Undaunted by those who seem certain an impasse has been reached, they continue their search for the right road.

### PATTERN OF INTEGRATION

The work of the jet propulsion laboratories of the Guggenheim laboratory is more than an unveiling of a part of the Institute's war record. It is the story of research, undertaken in cooperation with the military, which produced results directly instrumental in achieving victory, and leading to peacetime applications of benefit to civilization. In the words of General Eisenhower, "The military effort required for victory threw upon the Army an unprecedented range of responsibilities, many of which were effectively discharged only through the invaluable assistance supplied by our cumulative resources in the natural and social sciences and the talent and experience furnished by management and labor. The armed forces could not have won the war alone. Scientists and business men contributed techniques and

weapons which enabled us to outwit and overwhelm the enemy. Their understanding of the Army's needs made possible the highest degree of cooperation. This pattern of integration must be translated into a peacetime counterpart which will not merely familiarize the Army with the progress made in science and industry, but draw into our planning for national security all the civilian resources which can contribute to the defense of the country."

### BASIC RESEARCH

If the work of the jet propulsion laboratories at Caltech reveal the possibilities of practical integration of scientific knowledge for the betterment of civilization, the award of the Willard Gibbs medal of the Chicago Section of the American Chemical Society to Dr. Linus Pauling, director of the Gates and Crellin Laboratories of Chemistry at C.I.T., is indicative of the unflinching importance of the advancement of pure science, regardless of its practical applications. "The further progress of industrial development would eventually stagnate," wrote Dr. Vannevar Bush in his book, *Science the Endless Frontier*, "if basic research were long neglected." Dr. Pauling is considered one of the world's leading chemists. The 1946 Willard Gibbs medal went to him in recognition of his research achievements not only in chemistry, but also in physics and biology. It is the second distinction to be conferred upon Dr. Pauling by fellow chemists this year. He was chosen by the Rochester Section of the American Chemical Society last February to present the first Harrison Howe Lecture, established as a memorial to the late Dr. Harrison E. Howe, editor, author and lecturer who helped found that section.

### DESIGN FOR THE FUTURE

The announcement of the development of the small scale model of the new hypersonic wind tunnel, and authority granted C.I.T. to build a \$150,000 addition to the Guggenheim laboratory, are indicative of the continuing cooperation with industry and government for community and scientific service, undertaken by Caltech during the war years. The hypersonic wind tunnel, when fully developed, will provide data in a completely unexplored range of air speeds. Such information is of paramount military importance in the development of extremely high speed aircraft and military rockets and guided missiles. A few supersonic wind tunnels generat-

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part in extra-curricular activities. He was a member of Tau Beta Pi and Sigma Xi, as well as an energetic worker on the Tech staff and the Big-T staff.

Dr. Ernest O. Lawrence, Nobel prize winner and head of the University of California's radiation laboratory, said that the new synchotron is as important a development in atom-smashing as was the cyclotron. With the aid of the new equipment scientists hope to study the fundamental forces which hold matter together. The announcement said that the new atom-smasher may produce energy equal to that of the cosmic rays, which are the most powerful forces yet encountered by science.

The synchotron will accelerate electrons to energies of 300,000,000 electron volts, thus converting them into cosmic rays. At that velocity, Lawrence said, atom smashing "will mount a new threshold."

### THE MONTH IN FOCUS

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ing speed up to four times the velocity of sound now exist, one of them at C.I.T. However, the Caltech experiment is the first involving hypersonic speeds where air velocities up to seven times the speed of sound are produced.

The new president of C.I.T., Dr. Lee DuBridge, who supervised a staff of 3,900 to develop radar during the war, declared on his recent visit to the campus that the most important duty ahead for Caltech and similar institutions is that of supplying the nation with research engineers. Looking toward a future where man will at least have realized some of his cherished dreams of peace and security, Dr. DuBridge said, "The world is not going to disappear in a cloud of atomic dust, nor will an atomic bomb ignite the nitrogen in the atmosphere to give birth to another blazing sun." This danger, often expressed, he declared, has been scientifically disproved. But atomic energy is one million times greater than any form of energy yet known to man, and to determine how intelligently this will be used is the job of the research engineers and the research scientists of England and Russia and the United States, and of all other countries, working together with industries and governments.

Careful integration of all existing specialized knowledge with the avowed purpose of making it best serve the needs of civilization, plus unflagging concentration on basic research, would seem to be the scientific approach to disentangling the confusion and indecision among our contemporaries. For it is only by such a controlled method that we shall be able to avert the inherent dangers of too much specialized knowledge.

### COLLECTIVE BARGAINING

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sonal friction, irritations, and misunderstandings are bound to develop. The professional employee is no exception. Prompt, intelligent, and impartial handling of complaints and grievances is essential to the development of loyalty and morale. Other non-financial considerations include a clear statement of duties and responsibilities as well as the engineering standards that are to be attained, adequate information concerning company policies, programs, and other matters of concern to engineers, working conditions and treatment on the job which measure up with the job's importance and which will buttress the engineers' desire to be regarded as an essential part of management.

In closing, the writer would stress the fact that a majority of American engineers still believe that they can count on management to help them to achieve their basic wants. They still prefer to "go it alone." How long they will continue to feel that way about it depends on a number of factors. Perhaps the most important single factor is management itself. Will management have the foresight to create working relationships which will make for understanding, confidence in each other's honesty of purpose and fair dealing, a will to cooperate, and mutual accommodation when conflicts of interests arise? Such a relationship may not forestall unionization. Engineers may still find it necessary or advisable to establish or join labor organizations. In that event, however, the relationship described above would be no mean asset and should help to make collective bargaining a constructive force within the company.

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