Howard Percy Robertson, Physicist

The nation lost a distinguished mathematical physicist, educator, academician, adviser on military affairs, and humanist in the death of Howard P. Robertson on 26 August, following a traffic accident. His friends have lost a companion of unusual intellectual power, breadth of knowledge, courage, and wit, who enriched their lives in every contact with him.

Robertson was born on 27 January, 1903 in Hoquiam, Washington, receiving his education in the schools of that state through the bachelor of science and master of science degrees at the University of Washington, in 1922 and 1924. He completed his graduate studies at the California Institute of Technology, where he was a teaching fellow in mathematical physics. He received the Ph.D. degree there in 1925.

Like many of his generation, Robertson went to Germany for postgraduate study at Göttingen and Munich, on a National Research Fellowship. He returned to the California Institute of Technology as assistant professor and remained from 1927 to 1929. He then moved to Princeton, where he was a member of the faculty for 18 years, rising to the rank of full professor in 1938.

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In this period of research and teaching, Robertson's interest and work centered in mathematical physics, chiefly differential geometry, cosmology, and the theory of relativity. His first contribution was a new representation of the de Sitter universe, which brought out its physical features more clearly. He turned then to the theory of the expanding universe and made contributions to this theory which are of both mathematical and astronomical interest.

At a memorial service held at the California Institute of Technology on 30 August, Paul Epstein gave the following summary of Robertson's chief contributions to science.

> The scientific personality of H. P. Robertson was characterized by exceptional mathematical powers, coupled with a deep insight into physical processes. His chief interests lay in general relativity, in which field he will be mainly remembered for two contributions of outstanding importance.
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> (1) Early in his career he gave the solution of Einstein's cosmological equations for the case of a homogeneous and isotropic universe. This solution served ever after as the basis for most of the vast number of papers written by other authors on relativistic cosmology.
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> (2) By bringing to bear his great mathematical skill on the two-body problem in general relativity he succeeded in obtaining its solution, a task which before him had been unsuccessfully tried by almost all the best specialists.
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> Of his work on subjects other than relativity, the most important is perhaps that relating to the quantum-dynamical principle of indetermination. Instead of restricting himself to the theory of measurement of a *coordinate* and of the associated *momentum*, Robertson asked about when and to what extent *any* two physical observables whatever can be simultaneously measured, and in a simple and elegant way he set up the conditions for this. In all modern textbooks the principle of indetermination is now presented in this generalized form.

In 1947 Robertson returned to the California Institute of Technology as professor of mathematical physics and, except for certain leaves of absence, served in this position until his death. He was elected a member of the National Academy of Sciences in 1951 and its foreign secretary in 1958. He was also a member of many other scientific societies, including the American Mathematical Society, the American Philosophical Society, the American Astronomical Society, and the Edinburgh Mathematical Society.

World War II brought Robertson from the highly specialized fields of theoretical physics into the circle of those engaged in research on military problems, beginning with service with the National Defense Research Committee from 1940 to 1943 and with its successor agency, the Office of Scientific Research and Development, as scientific liaison officer in London. His scientific interest turned to problems of elasticity, hydrodynamics, and shock wave propagation, much of his work in these areas remaining unpublished.

In 1945 Robertson was chief of the Scientific Intelligence Advisory Section of Supreme Headquarters Allied Expeditionary Force in France, and a scientific adviser to the United States military government in Germany. In the following years he served as scientific director of the Weapons Systems Evaluation Group of the Department of Defense, scientific adviser to General A. M. Gruenther (supreme commander of the Allied Forces in Europe), member of the President's Science Advisory Committee, and chairman of the Defense Science Board.

For his war service he received the U.S. Medal for Merit for "solving complex technical problems in the fields of bomb ballistics, penetrations and patterns and enemy secret weapons."

Robertson was one of those scientists able to make the transition from specialized scientific problems to the broader field of scientific statesman. In a tribute to his work as military adviser, Clark Millikan has emphasized not only this breadth of interest and talent but Robertson's toughness and courage, and his failure to be intimidated by rank or position, qualities which, with his sheer intellectual power, brought widespread respect for his ability and judgment. Millikan states the belief shared by many of Robertson's friends and colleagues that his work saved countless allied lives and shortened the war.

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