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mer institutes in celestial mechanics, and in 1963 he helped establish a celestial-mechanics research center at Yale.

Brouwer was born in Rotterdam, the Netherlands, in 1902. He received his PhD from the University of Leiden in 1927 and emigrated to the United States the same year. After beginning his career at Yale in 1928 as an instructor in astronomy, he became full professor and chairman of the astronomy department in 1941. Brouwer was a member of the American Association for the Advancement of Science, the International Astronomical Union and the National Academy of Sciences, and he was a corresponding member of the Royal Netherlands Academy. In 1955 the Royal Astronomical Society of London awarded him its gold medal in recognition of his contributions to celestial mechanics.

Thomas M. Shaw

Lockheed research physicist Thomas M. Shaw died on 16 Oct. at the age of 54. He had been working at the company's Palo Alto Research Laboratory on the production and loss of electrons in afterglows and the microwave diagnosis of plasmas.

Born in Philadelphia, Shaw was educated at George Washington University where he received an MA in 1940, and at the University of California in Berkeley where he pursued further graduate studies. In 1930, while still a student, he joined the United States Department of Agriculture as a scientific aide. For nearly a quarter century he served the department as an investigator of the dielectric properties of soils, the electrical properties of biological systems and related problems. At the department's Western Regional Research Laboratory in Albany, Calif., he was project leader for the development of a program in microwave spectroscopy and nuclear magnetic resonance. He spent one of the war years (1942-43) at the Radiation Laboratory in Berkeley. In 1955 he joined the staff of the Southwest Research Institute in San Antonio and then went to the General Electric Microwave Laboratory in Palo Alto. His appointment as research scientist

with the Lockheed Missiles and Space Division came in 1960.

Shaw was a member of the American Physical Society and a senior member of the Institute of Electrical and Electronics Engineers.

Albert W. Hull

A noted inventor of electron tubes, Albert W. Hull, died in Schenectady, N.Y., on 22 Jan. after a short illness. He was 85 years old. Hull had been associated with the General Electric Research Laboratory since 1914. He became assistant director in 1928 and had served as an active consultant since his retirement in 1949.

During his career in electronics, Hull was awarded 94 patents and was the author or coauthor of 72 technical publications. One of his earliest and most far-reaching inventions was the magnetron. A curiosity until World War II, the tube proved to be an almost ideal microwave generator for radar. Hull also invented the screen-grid tube, making modern radio and television receivers possible. In 1916 he discovered a new powder method of x-ray crystal analysis, a method discovered independently in Europe and known today as the Debye-Scherrer-Hull technique.



HULL

Hull was born in Southington, Conn., and received his bachelor's and doctor's degrees from Yale University. He joined the staff of the General Electric Research Laboratory after teaching for five years at Worcester Polytechnic Institute. For his wartime contributions he was awarded a Presidential Certificate of Merit, and in 1965 the US Army gave him its Decoration for Distinguished Civilian Service. Hull was a fellow and past president of the American Physical Society, a fellow of the Institute of

Electrical and Electronics Engineers, a member and past vice president of the American Association for the Advancement of Science, and a member of the National Academy of Sciences.

Dana P. Mitchell

A veteran member of the Columbia University physics faculty, Dana P. Mitchell, was found shot to death along with his wife on the morning of 7 Feb. Mrs. Mitchell had been bedridden as a result of an automobile accident last summer. Authorities believe that Mitchell shot his wife and then killed himself.

Mitchell was born in 1899 in Fowler, Ind. He received a bachelor's degree from Tri-State College in Angola, Ind., in 1918, and taught there until 1921. Upon joining the Columbia physics faculty in 1921 he served as an assistant and as an instructor while pursuing graduate studies. He received his PhD in 1936 and was an associate professor at the time of his death.

During his 45 years at Columbia, Mitchell worked on x-ray spectroscopy, neutron interactions, nuclear physics, and antisubmarine warfare by underwater sound detection. While working for his doctorate under John Dunning, Mitchell assisted in the construction of the old Columbia cyclotron, now in the Smithsonian Institution. In 1941 he joined the staff of the undersea-warfare laboratories that Columbia operated for the Navy at New London, Conn. The following year he returned to Columbia to work on the gaseous-diffusion process for isotope separation in the production of ^{235}U at the SAM (Substitute Alloy Materials) Laboratory under Dunning and Harold C. Urey. From 1943 to 1945 he was at the Los Alamos Scientific Laboratory where he was responsible for procurement of scientific equipment. After the war he spent several years as executive director of Columbia's radiation laboratory. In recent years he had returned to undersea-warfare research at the Columbia Hudson Laboratories at Dobbs Ferry, N.Y.

Mitchell was a fellow of the American Physical Society.



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