EARL RANDALL PARKER

1912-1998

BY DOUGLAS FUERSTENAU AND GARETH THOMAS

EARL RANDALL PARKER, one of the truly great members of the engineering faculty of the University of California, Berkeley, died on May 9, 1999, at the age of eighty-five. He was born in Denver, Colorado, on November 12, 1912.

After earning the degree of metallurgical engineer from the Colorado School of Mines in 1935 he took a position with the General Electric Research Laboratory (GE) in Schenectady, New York. While at GE Earl Parker did pioneering research on the mechanical properties of metals and alloys. His experiments on steel, copper, copper alloys, and silver resulted in some early insights into how variables such as impurity content, alloying elements, strain rate, and grain structure influenced the mechanical properties of metals. As a result of this work, in 1944 he was invited to join a group in the Civil Engineering Department at Berkeley trying to understand the unexpected breaking in half of welded steel Liberty ships often without warning or for any apparent reason. At Berkeley there was a three-million-pound tensile testing machine for testing of full-size steel structures, but this problem seemed to be more related to the properties of the materials than to the design of the structures. The group needed a metallurgical engineer with a basic understanding of the mechanisms of plastic deformation, fracture nucleation and crack propagation. Earl Parker joined the group and after about a year's work, the causes of the catastrophic failures were identified as poor welding technology, residual stresses, inferior steels of inappropriate composition, and some unfavorable design details.

In 1944 he became a University of California faculty member in what is now the Department of Materials Science and Mineral Engineering. During the next thirty-three years, Earl Parker made truly outstanding contributions to teaching, to the university, and to the scientific community of the world.

Science, technology, and engineering have been enriched by his contributions and the inspiration he gave to his students and colleagues. The Parker philosophy for selecting and guiding research projects was always to determine first what fundamental principles are involved by study and research, and then to apply these principles to the solution of a perplexing technological problem—the solution of which would be of benefit to mankind. Recognition of this philosophy and the benefits that have accrued therefrom have been well stated in a number of the citations of his numerous honors. He and his graduate student, Jack Washburn, were the first to demonstrate the existence of dislocations by the etch-pit technique, an achievement for which they were awarded the Champion H. Mathewson Gold Medal Award of the American Institute of Mining, Metallurgical and Petroleum Engineers (AIME). In 1969 Earl Parker was elected to the National Academy of Engineering. His many awards included the Albert Sauveur Award of the American Society for Metals (ASM), the ASM Gold Medal Award, the Vincent Bendix Award with gold medal of the American Society for Engineering Education. He was an honorary member of AIME (there can be only fifty such persons at any time), honorary member of ASM, and also Legion of Honor Member of AIME. In 1970 he was named California Scientist of the Year, and in 1979 he received the National Medal of Science. Upon his retirement as professor of metallurgy in 1978, he received the Berkeley Citation, the highest honor bestowed by the Berkeley campus of the University of California.

His enthusiasm for science and his leadership of the scientific community led to many professional society appointments that included member of the board of trustees, ASM, 1958-1960;

vice-president, ASM, 1966-1967; president, ASM, 1967; chairman, National Materials Advisory Board, 1975.

Earl Parker's active participation in the national and international scientific community was a direct benefit to research at the University of California, Berkeley. It was through his efforts that the Department of Energy established a research program in materials science and chemistry as a new division of Lawrence Berkeley National Laboratory now called the Materials Science Division, which has become one of the most prominent centers of materials science and engineering research in the world.

In spite of all these outside activities, Professor Parker always put supervision of graduate students and teaching of classes first. In 1972 he received the Distinguished Teaching Award from the University of California, Berkeley, and that same year was the faculty research lecturer at Berkeley. During his time as a faculty member he served as chairman of the Department of Materials Science and Mineral Engineering from 1953 to 1957 and 1965 to 1966 and as director of the Institute of Engineering Research, UC Berkeley from 1957 to 1964. He was the thesis research supervisor for more than a hundred Ph.D. and M.S. students, and he along with his students published more than 150 technical papers in scientific journals.

In the period from 1946 to 1961, Earl Parker, his students, and associates made major contributions to experimental verifications of the rapidly developing dislocation theory. Fundamental understandings of the mechanisms of yield strength strain hardening, fracture, creep, and fatigue of crystalline materials were significantly advanced by understanding the behavior of dislocations. A wide variety of materials were used for these fundamental investigations including refractory metals, zinc single crystals, ionic crystals such as magnesium oxide, and other engineering ceramics.

From 1962 to 1965, the research emphasis of Earl Parker and his group shifted to superconductivity in metals and ceramics and back to his earlier field of interest in mechanical properties of iron-based alloys. In both these fields, his research led to new fundamental understandings of the relationships between crys tal structure, defect structure, microstructure, and properties. His study of superconductivity in ceramic compounds of the NaCl structure predicted that superconducting critical temperatures higher than 17.8 Kelvin were not likely to be found in this class of materials, a conclusion that twenty years later is still valid. New methods were developed allowing practical applications for brittle superconductors.

During this same period, and extending to 1979, the science and technology of ferrous metallurgy (steels) again became the cornerstone of Earl Parker's interest. The importance of this work was that it demonstrated that adequate toughness could be retained in ultrahigh-strength steels by microstructural control. Much of the understanding and knowledge gleaned from his early years of fundamental metallurgical research, and with the improvement of techniques for study of complex microstructures (such as advanced transmission electron microscopy), allowed Earl Parker and his collaborators to make major contributions to the development of new processes and steels with improved properties, such as “TRIP” steels, steels that became tougher as they underwent phase transformations while undergoing deformation.

Earl Parker's enthusiasm for new basic understanding of properties of materials, his consistent translation of these new understandings into improved materials or processes, the encouragement given to his students and collaborators, and his outstanding service to the University of California and the worldwide scientific community will long be remembered.

Earl Parker was predeceased by his first wife, Mary Larkin Parker, whom he married in 1935, and his eldest son, Robert. He is survived by his son, William, daughter, Peggy Sullivan, and his second wife, Agnes.