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Tributes to Robert Herman

Robert Herman, a past president of ORSA and one of the founders and the first chairman of the Transportation Science Section, passed away in Austin, Texas, on February 13, 1997.

Born in New York City on August 29, 1914, Herman graduated *cum laude* with special honors in physics from the City College of New York, and earned master's and doctoral degrees in physics from Princeton University. He joined the General Motors Research Laboratories in 1956, at which time he was visiting professor of physics at the University of Maryland on leave from the Applied Physics Laboratory of The Johns Hopkins University. At General Motors he was Assistant Chairman of the Basic Science Group, Head of the Theoretical Physics Department, and then Head of the Traffic Science Department—a position he held until 1979, when he became General Motors Research Fellow. In 1979 he joined the faculty of The University of Texas at Austin as Professor of Physics in the Center for Studies in Statistical Mechanics and L. P. Gilvin Professor in Civil Engineering.

Herman is internationally recognized as the originator of traffic science. His contributions span the entire 40 years of scientific activity in this field. Drawing upon his physics background, he first described the microscopic behavior of traffic. In the late 1950s and early 1960s he collaborated with Elliott Montroll and others to develop the car-following theory of traffic flow. Subsequently he and Ilya Prigogine developed a kinetic theory of multilane traffic flow. In recent years, he was involved in elaborating a “two-fluid model of town traffic,” a description of vehicular traffic in urban networks that he formulated with Prigogine some years ago. Recently, he had also turned his attention to problems of urban infrastructure and the evolution of complex dynamic systems.

Widely known for his collaborative work with Ralph Alpher and George Gamow in developing a physical model of the evolution of the universe (the “Big Bang” theory), he and his coworkers predicted the existence of microwave background radiation as a vestige of the initial explosion years before such radiation was discovered. The author of a vast num-

ber of influential publications in physics and transportation, Herman is coauthor of *Kinetic Theory of Vehicular Traffic* (1971), and coeditor of *Cities and Their Vital Systems: Infrastructure Past, Present, and Future* (1988). Herman was an associate editor of *Reviews of Modern Physics*, and the founding editor of *Transportation Science*. In 1959 he initiated the series of International Symposia on Transportation and Traffic Theory, which has significantly contributed to the development of the field.

Herman has received numerous awards, including the Transportation Research Board Roy W. Crum Distinguished Service Award (1994), the National Academy of Sciences Henry Draper Medal (1993), the ORSA and Institute of Management Sciences John Von Neumann Theory Prize (1993) for “fundamental contributions to the theory of vehicular traffic,” the William A. Patterson Distinguished Lectureship in Transportation from Northwestern University (1993), the ORSA Transportation Science Section's First Lifetime Achievement Award (1990), the New York Academy of Sciences Award in Physical and Mathematical Sciences (1981), ORSA's George E. Kimball Medal (1976), the Magellanic Premium of the American Philosophical Society (1975), and the Lanchester Prize in Operations Research (1959). He was elected to the National Academy of Engineering in 1978 for his contributions to the science of vehicular traffic, and in 1979 he was elected a fellow in the mathematical and physical sciences of the American Academy of Arts and Sciences.

Throughout his distinguished career, he encouraged and stimulated other scientists to address critical problems facing society, including transportation problems. He was an inspiration to his students, who in his honor established the Robert Herman Endowed Civil Engineering Scholarship at The University of Texas at Austin. He continuously encouraged his students to pursue the learning of basic sciences along with the applied knowledge. He always made this important point through his favorite quote from Leonardo da Vinci, “Those who fall in love with practice without science are like a sailor

who enters a ship without a helm or a compass and does not know whither he is going.”

Robert Herman will always be a guiding compass to colleagues and students who experienced the wonderful joy of professional interactions with him. Many of us owe a profound debt to Bob, from whom we learned a great deal about science and other aspects of life.

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“**Y**ou must preserve” were among his last words to me, the night before he passed away in his home in Austin, Texas, as he gave me a manila folder with photo portraits he had taken of several attendees at one of the early International Symposia (on Traffic and Transportation Theory, a series, dear to his heart, which he started in 1959 while at General Motors Research Laboratories). Included were portraits of several influential people in our field: Martin Beckman, Gordon Newell, a very young (at the time) Carlos Daganzo, and several others. The photos were of outstanding quality, as were most photos he takes, and most things he does, whatever the domain—but particularly striking was the human quality of the pictures, in addition to their superb technical quality. The human quality came across in the smiles and expressions of the researchers at the moment he captured them. Each and every picture radiated the optimism of the early days of an exciting and rapidly advancing field, a field that Robert Herman was instrumental in pioneering and nurturing through his seminal technical contributions, far-sighted professional accomplishments (including founding the Transportation Science Section of then ORSA, and founding this very journal and taking it in a few short years to an enviable position of high scientific respectability that endures to this day), and unbounded human contributions as colleague, friend, mentor, and educator to virtually every generation that has entered the Transportation Science domain since its inception. Robert Herman believed in this community, in his many friends and colleagues, in the joy of discovery, and in the absolute moral superiority of good scientific work, to which he devoted his entire life.

I was very fortunate and truly privileged for the opportunity that I had upon completing my Ph.D. to be closely associated with Robert Herman since my first appointment as Assistant Professor at the University of Texas 15 years ago. I treasure every day and every moment I had to interact with him, for there was never a dull moment around Bob. He

always had a kind word, an interesting anecdote, a new idea or observation to share, perhaps even a complaint or frustration with one thing or another. He was a wealth of knowledge and wisdom, which he shared freely and generously with his colleagues and students. I learned a great deal from Professor Herman, about collective effects and nonlinearities, about complexity and symplectic systems, about fluctuations and stability. But mostly he provided inspiration to continue reaching for the best within us, and confidence to exult in the joy of scientific inquiry.

Celebrating Bob Herman is about celebrating youth, and youthful idealism, in the face of myriad discouraging elements from all sides. It is about reveling in the strength within, in the power of the intellect, besieged by constant assaults from the purveyors of institutionalized mediocrity, but triumphant nonetheless through unrelenting struggle. Bob Herman could never understand how anyone could get “bored”; his mind could always “go off in a corner” to think about some fascinating aspect of the world around us, or to compose his next creation, whether it be a new wood sculpture, a new measurement, or a major theory in one of the diverse fields that claimed him as their own. As he finally realized that his time on this Earth was coming to an end, there was this frantic agitation to bring closure to so many different projects, with various collaborators, ranging from cosmology, to traffic flow (of course), infrastructure systems, to modeling universities as complex systems. Bob’s work would never be completely done, for any additional minute to his life would have generated yet another new idea and fresh perspective on one of the many problems that fascinated him. Until the last minute, his mind was at work; less than one month before his death, as his struggle with cancer had already reached what was clearly its last stage, he insisted on preparing the questions for the “applied mathematics” portion of our Ph.D. qualifying examination, a subject he had actively championed as a prerequisite for any Ph.D. candidate in Transportation.

Over the years that I have known him, Bob grew increasingly concerned, even alarmed, about the state of education in the United States, the changing role of the University, the increasing encroachment of political considerations on the education and research enterprise, the constant attacks on academic freedom, and the continuing erosion of the base upon which the nation’s great achievements in science and technology were attained. This was one of the few topics that would almost surely put him in a somber mood, but the conclusion of any conversation about this topic was always the same: we must go on

struggling, we must remember what matters, and encourage students to do good work. In the past couple of years, he was busily compiling and analyzing data on all sorts of performance indicators of quality and productivity of university departments, as part of a broader effort to model universities as complex systems. I pledged to see to it that this work is brought to appropriate closure, and shared with the technical community.

Robert Herman may have passed away, but in the hearts of many, he will continue to live on. His legacy and impact on scores of young and less-young

researchers will endure, because it corresponds to the highest ideals in all of us. He stood as a model of integrity, tolerance, and modesty. First and foremost, he stood for life and the human intellect. I will miss him, and so will many others, but will always know that I am a richer person for having known him.

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