



*Herbert L Voss*

## HERBERT L. TOOR

1927–2011

Elected in 1990

*“For research contributions in mass transfer and chemical reaction and for advancing the study of innovative design processes in engineering education.”*

BY IGNACIO E. GROSSMANN AND ARTHUR W. WESTERBERG

HERBERT LAWRENCE TOOR, affectionately known as “Herb” and recognized as one of the top academic leaders in chemical engineering, died of Alzheimer’s disease in Middlebury, Vermont, on July 15, 2011. He was born on June 22, 1927, in Philadelphia to Matthew and Jean Mogul Toor. He grew up in Philadelphia and enlisted in the U.S. Navy when he was 17. He was discharged as a seaman first class shortly after the end of World War II. He then obtained a B.S. degree in chemical engineering from Drexel University in 1948 and an M.S. and a Ph.D. at Northwestern University, finishing in 1952. In 1950, while at Northwestern, he married fellow graduate student of chemistry Elizabeth M. Weir (“Beth”) of Edmonton, Alberta, Canada.

Herb Toor became an assistant professor of chemical engineering at the Carnegie Institute of Technology (now Carnegie Mellon University) in Pittsburgh in 1953. He was promoted to associate professor in 1957 and to full professor in 1961. In 1962 he and his family spent a sabbatical year in Madras, India, sponsored by the United Nations Educational, Scientific and Cultural Organization, to help establish a graduate program at what is now the prestigious IIT Chennai. He became head of the Department of Chemical Engineering at Carnegie Tech in 1967 and was appointed dean of the

Carnegie Institute of Technology in 1970, a position he held until 1979. In 1980 he became the first Mobay Professor of Chemical Engineering (today the Bayer Professorship). In 1991 he and his wife Beth spent another sabbatical at the University of Sydney in Australia.

Herb Toor was a leader in the area of transport phenomena, in which he modeled complex processes involving mass transfer and chemical reactions. In particular, he addressed problems of mass transfer at interfaces, multicomponent mass transfer, chemical reactions in turbulent flow, and heat transfer in particulate systems. He and his students wrote over 60 publications for various chemical engineering journals.

In recognition of his research work, the American Institute of Chemical Engineers (AIChE) awarded Herb the Alan B. Colburn Award in 1964. He was the first faculty member at Carnegie Mellon to receive this prestigious award, which is presented to a member of AIChE less than 36 years of age for significant contributions through chemical engineering publications. In 1990, Herb Toor was elected to the National Academy of Engineering “for research contributions in mass transfer and chemical reaction and for advancing the study of innovative design processes in engineering education.” On the occasion of the centenary of the AIChE in 2008, he was named one of the “One Hundred Engineers of the Modern Era” for his outstanding contributions in chemical engineering.

As a teacher Herb Toor was legendary in the classroom. In one famous anecdote he used his cigarette rather than chalk to write on the board. Quotes from some of his former students are as follows:

I remember Herb could say to a few graduate students in the hall . . . “Let me show you something” and an impromptu 20 to 40 minute mini-lecture would follow. These were always riveting, and I remember some of them to this day. He was a true leader and communicator.”  
—Dale Schruben, Ph.D., chemical engineering, 1973

Having been a chemical engineering student during Dr. Toor’s tenure as Head of the Chem E Department, I

have many fond memories of him. I especially remember his response when asked how long it took him to work through the four problems on a three hour final in Transport Processes. Dr. Toor admitted that it took him around six hours to work through the problems. When then asked why he would give such a difficult exam, he said that occasionally he would have a student who could actually have finished the exam. He wanted to be able to identify brilliance at that level. To a certain extent, that is what the old Carnegie Tech was about. Identifying brilliance. —F. Denis d’Ambrosi, chemical engineering, 1969

At Carnegie Tech, Herb Toor was one of the most influential deans of engineering. He had a huge impact through two major outstanding contributions. The first was establishment of the Department of Engineering and Public Policy in 1976, a truly unique multidisciplinary educational research program in the United States. This program combined elements of engineering analysis and design with issues related to public policy, today offering double-major degrees to all engineering students. Inspired by the work on the “sciences of the artificial” by the late Nobel Prize winner Herbert Simon, Herb’s second major contribution was the establishment of the Design Research Center, also in 1976. This was also a unique research program aimed at developing systematic and computational multidisciplinary approaches to engineering design, which at the time was still very much regarded as an art. Herb hired Steve Director from Florida, Steve Fenves from Illinois, Gary Powers from the Massachusetts Institute of Technology, and Art Westerberg from Florida, all recognized giants in their fields, who initiated groundbreaking research in this field, setting a new research direction in engineering that continues to this day. This pioneering effort also led to the establishment by the National Science Foundation of the Engineering Design Research Center in 1986. After 11 years of NSF funding, that center became the very successful Institute of Complex Engineered Systems. As dean, Herb Toor was

particularly proud of increasing the numbers of women and minority students in the engineering school.

Herb's main interests were his work, his family, and his garden. He also had a keen interest in history, politics, and energy problems. As for gardening, he often said that perhaps the most useful thing he had done in his life was "turning a Pittsburgh clay backyard into great soil for growing vegetables through forty years of composting." Some of Herb's happiest times were family camping and backpacking trips in the United States and the Canadian Rockies and sailing and snorkeling trips over spring break in the Caribbean or the Yucatan.

Herb is survived by his wife of 60 years, Beth Toor, of Middlebury; his sister, Marlene Wenograd, of West Hartford, Connecticut; his daughter, Helen Toor, of Charlotte, Vermont; his sons and daughters-in-law, John and Margaret Kiernan Toor of Palo Alto, California, and Will Toor and Mariella Colvin of Boulder, Colorado; his grandchildren—Milo, Maren, Nicky, and Tera Toor and Cead Kiernan; and many cousins, nieces, nephews, great-nieces, and great-nephews.

Herb Toor, a true giant in the field of chemical engineering, will be sorely missed by his family and colleagues.

