

Memorial Resolution of the Faculty of the University of Wisconsin-Madison On the Death of Professor Emeritus Edwin N. Lightfoot

Hilldale Professor Emeritus Edwin (Ed) Lightfoot died in Madison on October 2, 2017, at the age of 92. He is preceded in death by his wife of 67 years, Lila (Smith), and is survived by their five children: Theodora (Enrique Rueda), Edwin J. (Sue Dempsey), Nancy (Nick McGill), Robert (Karin Hunsicker) and David (Barry Burciul), and their granddaughter Kate.

Ed Lightfoot was born on September 25, 1925 in Milwaukee County and received B.S. (1947) and Ph.D. (1950) degrees, both in Chemical Engineering, from Cornell University. He worked for three years at Pfizer, where he received a patent on vitamin B12 purification. This experience convinced Ed of the myriad untapped opportunities for chemical engineers to contribute to the biological and medical sciences.

Ed was invited to join the faculty in Chemical Engineering at the University of Wisconsin-Madison in 1953 by Olaf A. Hougen, and charged with the development of a biochemical engineering research and education program. Wisconsin was a world leader in biochemistry at that time, and Prof. Hougen was prescient in recognizing the opportunities for chemical engineers. Ed worked closely with Richard Burgess and others to establish the Biotechnology Center, a facility that brought together faculty and students from diverse disciplines who shared common interests in finding applications for exciting advances in the basic biological sciences.

Ed was an extraordinarily insightful writer and seminal thinker. With his young colleagues R. Byron Bird and Warren Stewart, he co-authored *Transport Phenomena*, published in 1960. This text was the first of its kind to unify the subjects of mass, heat and momentum transfer into an intellectually rigorous and cohesive form, and fundamentally transformed chemical engineering curricula worldwide. The book was translated into 5 languages. A second edition, by the same authors, was released 41 years later. In 1974, Ed published *Transport Phenomena and Living Systems*, a textbook that illustrated how momentum and mass transport concepts could be applied to design of biomedical devices, drug delivery and understanding of biological systems. This remarkable forward-thinking book foretold the burgeoning role of chemical engineering in the life and medical sciences.

At UW-Madison, Ed established a world-renowned research program in biological applications of mass transport, working on such diverse topics such as hemodialysis, extracorporeal perfusion in heart-lung machines, improved decompression schedules for divers, and kinetics of biological oxidation of organic wastes. He became particularly well known for his work in applying mass transfer concepts to the recovery and purification of therapeutic proteins. In his later career, his interests turned to systems aspects of biological processes, evolution, and physiological adaptation. Ed was also a tireless and dedicated teacher, bringing his unique insights and energy into the classroom, and a devoted mentor to his many graduate students. He retired in 1996, but remained actively engaged in the profession and in department life for another 20 years. The department celebrated his 90th birthday in 2016 with a symposium on quantitative biology, attended by many of his 49 Ph.D. students as well as numerous other friends and alumni.

Ed's legendary accomplishments won him scores of awards and accolades. He was elected to the National Academy of Engineering in 1979 and the National Academy of Sciences in 1995. For his dedication to chemical engineering education, he won the AIChE Warren K Lewis Award in 1991. He was awarded honorary doctorates from University of Trondheim in Norway and from the Danish Technical University. A particular highlight of his career was his receipt of the National Medal of Science in 2004, from President George W. Bush, for 'his innovative research and leadership in transport phenomena focusing on biochemical and biomedical engineering with application to blood oxygenation, bioseparation techniques, and diabetic responses.'

Ed was a prolific reader who seemed to know something about everything. As his former PhD student Bramie Lenhoff described his experience as a graduate student: “(Ed’s) meetings ranged well beyond the technical to encompass politics, religion, culture and more.” His creativity and enthusiasm infected all around him; as a colleague once noted humorously: “Ed is a fountain of ideas, and some of them are really good!” In his quieter moments, Ed enjoyed the Wisconsin outdoors at his Sauk County farm with his much-loved dogs. He spent many happy hours canoeing in summers, cross-country skiing in winters, and watching for cranes and eagles. His love for and devotion to his family, and his second family in the Chemical Engineering department, was unquestioned. He will be deeply missed.

Submitted by the Memorial Resolution Committee

Regina Murphy

Brian Pfleger

R. Byron Bird

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