

## Resolution of Respect

David Murray Gates 1921–2016



by Warren Porter

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Professor David Gates was a kind, generous, good-humored, gracious visionary with prodigious energy, focus, and love of life. He was also a marvelously clear, precise writer. Professionally, he was a physicist and ecologist, and ultimately Professor Emeritus of Biology, University of Michigan. He died at age 94 in Ann Arbor, Michigan on 4 March 2016.

David was born in Manhattan, Kansas, on 27 May 1921. He was the adopted son of Frank C. and Margaret T. Gates, and received his B.S., M.S., and Ph.D. degrees in physics from the University of Michigan. His childhood was spent in Kansas where his father was a distinguished plant ecologist with Kansas State University. Frank also taught at the University of Michigan Biological Station at Douglas Lake, Michigan, where he would take his family in the summer. All of David's boyhood summers were spent there. The family traveled all of the contiguous states during the 1920s and 1930s. As a teenager, David became an Eagle Scout with bronze, gold, and silver palms. He suspended work on his Ph.D. during the war to go to Washington and work on the war effort at Johns Hopkins. During World War II, he worked on the performance of the proximity fuse at the University of Michigan and the Johns Hopkins Applied Physics Laboratory. He married Marian Francis Penley, his childhood sweetheart, on 3 June 1944. After the war, he returned to Michigan to finish his Ph.D., which he received in 1948.

David was associate professor of physics at the University of Denver from 1947 to 1955 where he worked on the radiation properties of the atmosphere and climate, knowledge that would be important in his later work on plant and animal interactions with the physical environment. In 1955, David and Marian moved to London, UK, where he became the liaison officer and the director of the London Branch

of the Office of Naval Research, a part of the American Embassy. He exchanged scientific information with scientists throughout Western Europe. Returning to Colorado in 1957, he became a consultant to the director and assistant chief of the Upper Atmosphere and Space Physics Division, Boulder Laboratories, National Bureau of Standards. He was the head of the National Bureau of Standards International Geophysical Year Program from 1957 to 1958.

David rejoined academia in 1964 when he became the professor of natural history at University of Colorado. During this period, he met Dr. Frank Kreith, a mechanical engineer at the University of Colorado. Their interactions on heat and mass transfer principles and the processes that mechanical engineers practiced evolved into a brand-new interface between biology and engineering that came to be known as Biophysical Ecology. Their joint paper in 1964, “Radiation and Convection in Conifers,” revealed some of the new technologies they brought to bear on questions of plant–environment heat exchange. Dr. Gates’ first book on this topic, *Energy Exchange in the Biosphere*, was a “Rosetta Stone” for biologists interested in the principles and processes of this new interdisciplinary research area. It was the beginning of a lifelong fascination with the subject and the development of new ideas, theories, and the adaptation of advanced research techniques, such as Schlieren photography, to visualize boundary layers of complex geometries, such as fluttering aspen leaves, pine branches, grass, and even his daughters’ faces as they were breathing.

In 1965, he left his beloved Colorado to become director of the Missouri Botanical Garden and Professor of Botany at Washington University, St. Louis, MO. It was here that he developed remarkable fund-raising skills that began to transform the Garden and that would be important later in his career. He trained advanced students in biophysical ecology<sup>1</sup> and played daily early morning tennis with them. During these years, he became an outspoken environmentalist, becoming so influential that he received national media attention. David was among the first to be concerned about greenhouse warming. He was particularly proud of having served as an advisor to the commissioner of the U.S. Public Health Service, establishing criteria for the Clean Air Act passed by Congress. In 1971, Dr. Gates became Professor of Botany and director of the Douglas Lake Biological Station, University of Michigan, where he had spent summers as a boy with his father. He modernized the course program, raised funds for research, and generated private support for new buildings. He was particularly proud of the Andrew Mellon Foundation grant to support undergraduate, graduate, and post-doctoral students working together to receive training as naturalists and ecologists.

David was a Fellow of the American Association for the Advancement of Science, the Explorer’s Club of New York, and the Optical Society of America. He received the Gold Medal for Accomplishments in the Field of Ecology from the National Council of State Garden Clubs, the Distinguished Faculty Award from the University of Michigan, and the Henry Shaw Medal from the Missouri Botanical Gardens. During the early 1970s to 1990s, David served on the boards of the National Science Foundation, the Conservation Foundation, World Wildlife Fund, National Audubon Society, L.S.B. Leakey Foundation, and the Cranbrook Institute of Science, among others. He was the president of the American Institute of Biological Sciences. He also served on the Board of Directors of Detroit Edison Corporation and

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<sup>1</sup> A partial list of students and postdoctoral researchers who worked with David M. Gates in alphabetical order (apologies for those inadvertently not listed): Alderfer, R., Bakken, GS, Bartlett, PN, Bennett, JC, Briggs, GM, Carr, EK, Derby, RW, Harley, PC, Hill, AC, Hoffman, GR, Hunt, ER, Johnson, H, Jurik, TW, Lee, R, Lommen, PW, Morhardt, SS, Porter, WP, Schwintzer, CR, Smith, SK, Soule, OH, Spotila, JR, Taylor, SE, Tenhunen, JD and Tibbals, EC, and Weber, JA.

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Harland Bartholomew and Associates, and was the consulting corporate ecologist to General Motors Corporation. David was a Distinguished Visiting Scientist at the Jet Propulsion Laboratory, California Institute of Technology; Chairman of the Environmental Science Board, National Academy of Sciences; and a member of the Panel on Science and Technology, Committee on Science and Astronautics, U.S. House of Representatives.

Dr. Gates published more than fifty research papers and six books, including the definitive original text *Biophysical Ecology* and a broad collection of research in “*Perspectives of Biophysical Ecology*.” In the last years of his life, he was honored when a new species of diatom was named after him: *Brachysira gatesii*. David enjoyed tennis, sailing, alpine skiing, and traveling the world, including the South Pole, the far-north Arctic, all 50 states, and 55 countries. He visited the Ice Island T3 in the Arctic Ocean and the volcanic island, Surtsey, off Iceland (shortly after it erupted from the ocean). David is survived by his four loving children: Murray Penley Gates of Clio, MI; Julie Mary Gates of Pagosa Springs, CO; Heather Margaret Gates of Wilbraham, MA; and Marilyn Joan Gates of Subic Bay, Philippines. He leaves four grandchildren whom he adored: Colin and Myles Harnsgate, Sarah Elise, and Walker Field. Memorials in his name may be made to the University of Michigan Biological Station for the Marian P. and David M. Gates Scholarship for Non-Residents. A celebration of his life will be held at the University of Michigan Biological Station on 10 July 2016 in the afternoon.