

ROBERT G.E. MURRAY, FRSC

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*Terrance James Beveridge*  
*1945-2007*



Terrance James Beveridge, a microbiologist of great ability and influence, died in Fergus, Ontario, on 10 September 2007 at age of 62 years. He had served as a Professor of Microbiology at the University of Guelph for almost thirty years of teaching, intensive research on bacteria, and the support of the forms of communication necessary to his discipline. In all these areas he gained the broad support of his University, of colleagues at home and abroad, and international appreciation of his authority, personal qualities and activities in current biological science. His work brought him many honours and awards including the Steacie Award 1984, Fellowship in the Royal Society of Canada 1988, Fellowship in the American Academy of Microbiology 1992, The Canadian Society of Microbiologists Award 1994, the Sigma Xi Award 1993, a Killam Research Fellowship 1995-97, and Fellowship in the Austrian Academy of Sciences 1997. He was fully active in his laboratory until a few weeks before his death. Most of what he has initiated is substantial and forms an important contribution to the both cytology and microbiology.

Terry Beveridge was born in Toronto 29 April 1945, the son of Fred and Doris Beveridge, a family with a business background. He attended the Ontario school system and was introduced to biology at High School. Until he discovered his calling he was, by his own admission, a rambunctious, fun-loving and only moderate student who caused his biology teacher to impose the task "of writing out chapters 5 to 12 of the textbook and handing it in", which was an effective learning process. He entered a general science program at the University of Toronto and by chance took a third year course in microbiology that interested him so much that he followed his BSc (1968) with a Diploma in Bacteriology (1969) at the School of Hygiene. This gave him extensive practical training in medical microbiology. He began graduate work on the anaerobic bacteria involved in periodontal disease for an MSc (1970) under Dr. M. Goldner in the Faculty of Dentistry. His interest in combining electron microscopy with microbiology for a doctorate arose through helping to revive an almost defunct electron microscope. Dr. Frances Doan, microscopist at the School of Hygiene, advised him to go to the Department of Microbiology and Immunology at University of Western Ontario. He was accepted there as a doctoral student. It introduced him to a wide range of studies in microbial cytology including those of his supervisor, Robert Murray, as well as Carl Robinow and Philip Fitz-James and their students, who combined electron and light microscopy with biochemical studies of bacterial structure. This was a resourceful environment that fitted his needs and he accomplished the PhD in 1974.

His doctoral studies set the stage for his working life with his work on the cell envelope structure of a group of species of *Spirillum*. This was a kind of study he would return to intermittently concentrating on the cell-wall components, membranes, and the fine structure of the attached S-layers. The latter were layers of protein on the external surface of bacterial cell walls arrayed in various symmetries and perfect objects for his application of the emerging optical and electronic techniques of image processing to gain better structural resolution. He also furthered the biochemical recognition of the sites and nature of specific components of these cells. The elaboration and addition of many more approaches to structural analysis continued throughout his career. His core of study became the dynamic behaviour of bacterial cell envelopes and their structural components in the processes of growth and division. The scope of biological interests increased to

communities of bacteria, archaea, and other biota; the range was great, from the model pathogenic species to extremophiles, and from denizens of lake sediments to life in sulfidic mine tailings. Contributions to medical microbiology included understanding how differentiation is attained in the universal application of Gram's staining test, the utilization of membrane vesicles generated by some bacteria for the delivery of agents to tissue cells, and many years (1989-2002) of research and collaboration in the Canadian Bacterial Diseases Network (a Centre of Excellence). His work has enriched bacteriology in accomplishing integrated cellular, molecular, structural and ecological studies including the roles of bacteria in their communities and in the transformations of their environments. He developed his own version of descriptive and structural biology and communicated this understanding to the benefit of microbiology, and this included the provision of fine illustrations for many of the most widely used textbooks.

He was always a perceptive observer and interpreter of images and data. He could develop concepts and run with them as he did late in his doctoral studies trying to answer the question: "Why do metal salts produce differential staining of cell components in electron microscopy?" The outcome involved him, to the end of his life, in demonstrating the importance of the uptake, retentions, and interactions of metal ions with structural components of bacteria and the polymers that they and many biota produce. He collaborated with geologists (notably with Prof. W. S. Fyfe FRS, FRSC) and established an important basis for research in geomicrobiology postulating biological mechanisms for the transport of metals and experimental approaches to understanding biological aspects of mineralization. He became a real force influencing geology with a number of doctoral and post-doctoral students, elucidating, for example, a mechanism for the accretion of placer gold or the complex reduction of metal oxides by bacteria allowing the immobilization of nickel and iron, among others. The publications and collaborations relate to the geological importance of durable metal-rich biopolymers as collectors of metals to form associations capable of diagenesis by geological circumstances, forming clay minerals and even ore bodies. An additional outcome is the professional appointment of microbiologists in departments of geology and several of them were his students.

He attended to the need for effective publication of the supportive literature of his discipline. His *curriculum vitae* exemplifies a wide range of involvements and responsibilities in national and international societies and institutions. Aside from committee work, this most often involved authorship, editing or compiling of manuals, books, and journals. Notably, he was involved over years as an Associate Editor of the most prestigious microbiological journals - *The Journal of Bacteriology* (American Society for Microbiology) and *Microbiology* (Society for General Microbiology, U.K.) - and as member of editorial boards of other first-class journals, including *Geomicrobiology*. In these ways he has been a support to science. In his working life he published near, 300 papers describing his research and was the author of 50 chapters and reviews. He had world-wide involvement in high-level scientific meetings and speaking engagements (near 10 a year) in which activities he was a "scientific ambassador" for Canada.

He was an ever-supportive friend and colleague. He managed, somehow, always to have time for social contacts and for effective time with his wife and family and their life

*MURRAY: T.J. Beveridge*

in Elora, Ontario. He married Jan Barnett in 1970 and their happy life together was blessed with two children, Braden (a chef) and Bree (an ornithologist). In all circumstances he was a charming, optimistic, open and cheerful person who gladdened the hearts of family, friends, and everyone he met.

It is clear that his character, scientific productivity, contributions to the national and international structure and dissemination of biological sciences, stimulation of new areas of study, and all-round authority constitute a distinctive contribution to the history of Canadian science.

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*(Author's title given as of the time of writing)*