## Laudatio J. William Costerton

## N. Boon



It is my privilege and pleasure to introduce the 2007-2008 Sarton

Medal recipient of the Faculty of Bioscience Engineering. J. William (Bill) Costerton is a Canadian microbiologist who has pioneered the recognition of bacterial biofilms as the dominant mode of growth of bacteria, and who first demonstrated their importance in the resistance of bacteria to antibacterial agents and the persistence of some chronic bacterial infections. Not only is Costerton a pioneer in the study of biofilms, he introduced this term in 1978 (Costerton et al., 1978, How bacteria stick. Scientific American, 238:86-95).

Costerton was born in Vernon, British Columbia. His early education was in that province. In 1955, he received a B.S. in bacteriology and immunology from the University of British Columbia, followed by a M.S. in the same discipline from UBC in 1956. He then studied in the laboratory of Dr. Robert Murray at the University of Western Ontario in London, Ontario, where he received a Ph.D. in 1960. Following post-doctoral training at Cambridge University, Costerton moved to MacDonald College of McGill University, in the Canadian province of Quebec, where he became first a Professional Associate in 1966 then an Assistant Professor in 1968. In 1970 he moved to the University of Calgary as an Associate Professor. He became a tenured Professor at Calgary in 1975. From 1985 to 1992, he held positions at Calgary as the AOSTRA Research Professor followed by the National Sciences and Engineering Research Council Industrial Research Chair. These two appointments freed him from teaching to concentrate on his burgeoning research into bacterial biofilms.

Research on biofilms has occupied Costerton since his move to Calgary. Costerton and his colleagues demonstrated the existence of biofilms and showed that biofilms are the dominant mode of growth for bacteria. The elaboration of an extensive sugar network that adheres bacteria to surfaces and subsequently buries them was revealed. Research over a decade demonstrated the importance of this exopolysaccharide in enabling the bacteria to survive doses of antibacterial agents, including antibiotics that readily killed bacteria grown in conventional lab cultures. This research was so convincing that an initially skeptical scientific community became convinced of the importance and widespread nature of biofilms.

In 1993, Costerton left Calgary to take up the post of Director of the Center for Biofilm Engineering at Montana State University, Bozeman. Since then, he and his colleagues have used techniques such as confocal microscopy to probe intact biofilms without disrupting them. These studies have revealed the complex nature of biofilm structure and the coordinated nature of the interaction between the bacterial populations in the biofilms. As well, Costerton discovered the so-called bioelectric effect, in which an application of current makes a biofilm much more susceptible to antibiotic killing. These discoveries are having profound influence on the design of strategies to combat chronic infections, such as the *Pseudomonas aeruginosa* lung infections that occur, and can ultimately kill those afflicted with cystic fibrosis.

Honors bestowed upon Costerton include the 2003-2005 Honorary Professorship in the Advanced Wastewater Management Centre at the University of Queensland, Australia; the Excellence in Surface Science Award from the Surfaces in Biomaterials Foundation (2002); Marian E. Koshland Seminar Series Lecturer at the University of California in Berkeley (2002); and an honorary degree, Doctor of Science Honoris Causa, University of Guelph in Guelph, Ontario, Canada.

In 2002, Costerton was added to the Institute for Scientific Information's Highly Cited List (www.isihighlycited.com), which lists the 250 most-cited individual researchers in 21 subject areas as a measure of their influence in research.

He is an Appointed Fellow of the American As sociation for the Advancement of Science (1997) and has received the Isaak Walton Killam Memorial Prize for Scientific Achievement (1990) and the Sir Frederick Haultain Prize for outstanding achievement in the physical sciences (1986).



Since 2004 upon today, Costerton continues his research at the USC Center for

Biofilms at the School of Dentistry, an interdisciplinary center that will study bacteria attached to surfaces.

Bill Costerton receiving the Sarton Medal from Robert Rubens, president of the Sarton committee during the "Biofilm mini-symposium", Gent, November 13<sup>th</sup> 2007 (from right to left: Bill Costerton, Robert Rubens and Nico Boon)