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## The Manufacturing microbiome

Microbial ecologists have struggled for a long time with the concept of how to represent in a single comprehensive term the fact that micro-organisms apparently can grow and work together. Most often, one has referred to 'mixed cultures', 'microbial associations or communities', respectively. In that respect, the word 'biofilm' was indicative of living and working together in a structured way. Yet, the term 'microbiome' as coined for the first time in 2005, was even more striking. Indeed, it provides a connation which does not relate to carrier or surface materials and, thus, can be applicable for bio-systems operational in full scale technical installations such as drinking water supply installations, used water treatment systems, air scrubbers, composting plants, various types of anaerobic digester systems, bio-electrochemical configurations, soil biotreatment installations, etc. In all these technical systems, normally one has organized communities of microbes at work and they are present in the form of 3-dimensional coagulates, flocs, sludges, granules and deposits. Also, in various food treatment facilities and zootechnical and medical devices open to microbibal invasion, microbiomes are the central active principle. They bring forward changes in chemical or physical compostion. In addition, they are often highly desired because they exclude unwanted species and thus have a barrier function. For these technical systems, the concept of 'microbiome' as the bio-catalytic actuator has been a breakthrough because it reflects both the microbes and the collective genomes which are interacting. Clearly, the technologist dealing with the design, the optimization, the operation and the control of technical microbial systems has at last a term which reflects the very nature of his/her attention, i.e., the assemblage of micro-organisms operating as a complex self-organizing system having a level of species stability and driving particular conservation and conversion processes under open and variable conditions. The overall line of consideration with respect to the technical aspects of the microbiome in the context of the current societal challenges are described in this presentation.

### Biography

W Verstraete graduated in 1968 from the Gent University as a Bio-Engineer. He completed a summer course on Soil Microbiology at the Pasteur Institute of Paris. In 1971, he obtained a PhD degree in the field of microbiology at the Cornell University, Ithaca (USA). Since 1971, he has been working at the Gent University, first as an Assistant and since 1979 as a Professor and Head of the Laboratory of Microbial Ecology and Technology (LabMET - Faculty of Bioscience Engineering). Since October 2011, he has become Emeritus Professor. His R&D has as central theme: Microbial Resource Management, i.e., the design, operation and control of processes mediated by mixed microbial cultures. He has field experience with respect to drinking water production plants (slow sand filtration), aerobic waste-water treatment (in particular, with respect to nitrification-denitrification), anaerobic digestion of waste-waters and sludges, solid state fermentation of organic residues and bioremediation processes of soils and sediments. He has also gained experience in various aspects of pre and probiotics used in human and animal nutrition and in systems which simulate the latter. He received the National Intermediair Prize in 1975 for a review article entitled "Environmental hygiene from a microbial-ecological perspective", Belgium. In 1976, he received from the Comité of the International Association for Water Quality (IAWQ), the prize for the design of a treatment plant dealing with concentrated wastewaters. In 1982, he received the prize of the Technological Institute of the Royal Society of Flemish Engineers for his work in the field of anaerobic digestion.

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