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IN MEMORIAM

In memoriam: Wilhelmus Nicolaas Konings (1937–2014)

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On Saturday 5 July 2014, Wilhelmus Nicolaas Konings (known as Wil Konings), Emeritus Professor of Molecular Microbiology, passed away at the age of 76. He was born and grew up in Maastricht, the Netherlands. He received his Ph.D. from the University of Groningen in 1969. From 1969 until 1971 he worked at the National Institute of Health, Bethesda, as a post-doctoral fellow. In 1971, he was appointed lecturer and in 1980 promoted to professor in Microbiology at the University of Groningen; in 2002 he retired as Professor Emeritus, leaving a legacy of more than 440 scientific papers and 7 patents, and numerous students and post docs who were trained in his laboratory.

Wil Konings was an engaging and striking personality, who, from the middle of the seventies, played a prominent role in the field of microbiology and in particular the area of the membrane biology. He was a very talented researcher with an international reputation and stature that fits in the rich tradition of Dutch microbiology. In the scientific community, Wil Konings will be best remembered for his extensive work on substrate transport in bacteria and archaea.

In the sixties of the last century, Peter Mitchell developed the chemiosmotic theory for which he later on received the Nobel Prize. This theory describes the mechanism by which membrane-localized energy-generating and energy-consuming processes are linked. In the early years, Wil Konings developed methods for the isolation and functional analysis of cytoplasmic membrane vesicles of a range of microorganisms (Konings et al. 1971 and latter publications). He developed new ways of energizing membrane vesicles to drive essential transport reactions and made important contributions to the quantitative analysis of energy-coupling to substrate transport supporting the chemiosmotic theory. In 1980, he postulated a model of energy-recycling by product secretion, wherein

a transporter mediates the excretion of metabolic end products and thus conserves metabolic energy (Otto et al. 1980). Other work includes the identification of specific antiport systems that play a role in energy conservation as part of simple metabolic pathways (Driessen et al. 1987). Further hallmarks of his work are discoveries on the regulatory effects of the intracellular pH (Poolman et al. 1987) and the redox potential (Konings and Robillard 1982) on the activity of transport proteins. His research on amino acid and peptide transport processes and the proteolytic system of lactic acid bacteria (Kunji et al. 1998) initiated intense contacts with the dairy industry and the setting up a European network on lactic acid bacteria. After his retirement, Wil Konings continued to work as co-founder of the Biotechnology company IMENZ Bioengineering.

Central to the work of Wil Konings was the use of well-defined model systems, such as isolated cytoplasmic membrane vesicles, optionally fused with liposomes reconstituted with an energy-generating system such as cytochrome c oxidase (Driessen et al. 1985). These systems were used to study transport processes with membranes derived from strictly anaerobic bacteria and plasma membranes of yeasts and molds. Later, he employed liposomes in which purified transport proteins were embedded in a functional state, including the functional reconstitution of membrane proteins into liposomes composed of tetra-ether lipids isolated from extremophilic archaea (Elferink et al. 1992). In the community of extremophilic research, Wil Konings is best known for his contributions on how microbes adapt the lipid composition of the cytoplasmic membrane to extreme conditions and how cells deal with an increased ion permeability at elevated temperatures (van de Vossenberg et al. 1995; Speelmans et al. 1993).

A further highlight was his work on bacterial multi-drug resistance transporters involved in the secretion from the cell of a wide variety of unrelated toxic compounds, including antibiotics. He identified a bacterial multi-drug transporter that is a structural and functional homolog of the human P-glycoprotein that plays an important role in the resistance of cancer cells to cytotoxic drugs (van Veen et al. 1998). He discovered that lipophilic substrates of multidrug transporters are transported from the inner layer of the cytoplasmic membrane into the extracellular milieu (Bolhuis et al. 1996).

During his academic career, Wil Konings regularly spent sabbatical leaves with colleagues and friends. In 1972, he was a visiting scientist with his good friend Ron Kaback at the Roche Institute of Molecular Biology in Nutley, New Jersey. In 1977, he was a visiting professor with Frank Gibson at the Australian National University of Canberra. In 1981, he visited Peter Mitchell at the Glynn Research Institute at Bodmin in the United Kingdom. In 2001, he was a visiting scientist at the University of Stellenbosch in South Africa where he worked with Jacky Snoep. The period in South Africa inspired him to continue teaching at the University of Stellenbosch following his retirement in 2002. In 1997, Wil Konings became elected member of the Royal Dutch Academy of Art and Sciences (KNAW). In 2001, he was knighted by Queen Beatrix in the Order of the Dutch Lion. We will remember him as an important, versatile and passionate scientist who has inspired many young researchers. Wil Konings will always remain among our dearest memories of a wonderful scientist and a great colleague.

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