

## Obituary notice

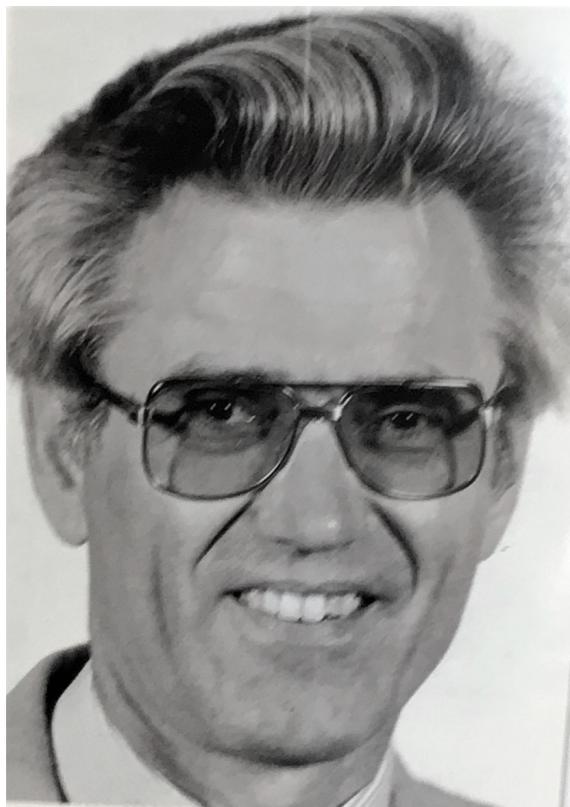
### Wilhelmus (Wim) M. Wouts (1935 - 2021)

Wilhelmus Wouts, former nematologist at Landcare Research in Auckland New Zealand, died in Perth, Western Australia, in December 2021. He was born in December 1935 in the Wieringermeer, north of Amsterdam, The Netherlands, the second youngest child in a family of seven. Wim's family had a small farm, on which they mostly grew potatoes. Wim remembered visits from inspectors checking for potato cyst nematodes (PCN) in mature potato plants, as part of the strict regulatory measures in place to control spread of the nematode. He was thus aware of PCN from an early age. Growing up, Wim enjoyed photography and singing in choirs, and helped out on the farm. His high school days were at Alkmaar, in North Holland.

After school, Wim completed two years of required military service before enrolling at the Agricultural University in Wageningen to study as an undergraduate specialising in plant pathology. In 1957, as part of his studies, he completed 6 months of practical work in Florida, under the supervision of Armen Tarjan, on management of the citrus nematode, *Radopholus similis*. He said that this confirmed his interest in nematodes, which became a lifelong passion for him. This work led to his first publication (Tarjan & Wouts, 1964). During this period, he learnt efficient extraction of sedentary cysts from soil and plant roots and took the opportunity to visit various centres of nematological research in the USA. Back in The Netherlands, work on arabanases, done in collaboration with A. Fuchs and J.A. Jobsen in the Laboratory of Phytopathology at Wageningen, led to the 1965 publication of a paper in *Nature*.

Wim graduated in September 1964, at a time when there were no jobs available for nematologists in The Netherlands. He married Alice Bartelink in 1964, and she remembers that the only jobs available at the time were in Nigeria, Singapore or New Zealand. One of Wim's brothers was living in New Zealand and so he chose to apply for the position there. Thus, Wim and Alice moved to New Zealand, where Wim took up his first professional position as a nematologist in the Entomology Division, Department of Scientific and Industrial Research (DSIR) at Nelson, a rural area in the South Island. There he found that there were plans to move the Entomology Division from Nelson to Auckland on the North Island, and he realised there was little prospect of the establishment of permanent plots for experimental nematology. Many of the entomologists were working as taxonomists, important in a country where much of the indigenous fauna was little known. Wim therefore decided to work on nematode taxonomy, specifically the morphology and systematics of cyst-forming nematodes (lumped as Heteroderidae at that time), as they were insufficiently studied and economically important, and he knew PCN from his youth.

In 1967, the University of California, Riverside, USA, one of the centres visited by Wim in 1957, offered him a scholarship to study the taxonomy of cyst-forming nematodes. He and his wife Alice and their then two children moved to California. There, supervised by Samuel 'Skip' Sher, he undertook his Ph.D. In the deserts of Southern California, Wim found Heteroderidae taxa that did not produce cysts and revealed the variability of the group. In his thesis, Wim showed that species of the group were more easily identified on the basis of their morphology than on their plant hosts. He proposed a phylogenetic system, based on the morphology of fully developed females, that included both cyst and non-cyst-forming categories and many known taxa for which the association with Heteroderidae had been doubtful. Species definitions were based on characteristics of the cyst and the



juvenile. He established *Meloidogyne*, the root-knot nematodes, as a separate family (Wouts, 1973). Until then it had been considered that they belonged to the Heteroderidae.

In 1970, Wim rejoined the DSIR research group, which had then moved to Auckland in New Zealand, and began to write up the results of his Ph.D. work. This led to the publication of three major papers revising the taxonomy of cyst-forming nematodes. In 1972, Wim attended a conference in Italy, where he presented his work. Thus, he came to the attention of German nematologists from the Institute of Nematology at Münster, Germany, who wanted to develop a classification, based on juvenile characters, of the most economically important cyst-forming nematodes of Europe. The German Government awarded Wim an Alexander von Humboldt Teaching Fellowship to develop a system for the morphological separation of the 12 most damaging cyst-forming species in German crops. This was a highly prestigious, financially generous award, which enabled Wim to move with his family to Germany for 2 years, and which led to his long association with Dieter Sturhan. The award also stipulated that additional funds could be obtained for later research in Germany. This enabled Wim to organise a trip to Germany on average once every 4 years for the rest of his life.

On his return to New Zealand, Wim changed the direction of his research and worked on entomopathogenic nematodes, then generally known as *Neoaplectana*, as potential biological control agents. He established the validity of the older name *Steinernema*, provided an updated nomenclature for the group, clarified their life cycle (as well as the life cycle of species of the recently recognised genus *Heterorhabditis*), and developed an efficient method to mass produce the nematodes (Wouts, 1981). For some of this work, he was joined by Robin Bedding, of CSIRO, which began his connection with Australia. Sadly, a lack of funding meant his planned work on liquid culture of the nematodes had to be abandoned.

Wim maintained his excellent relations with staff at the Institute at Münster resulting in several exchange visits. As a specialist in his field, Wim was also invited to Australia, Belgium, China, England, Fiji, The Netherlands, Russia and the USA to present talks, run workshops and conduct surveys. In the late 1980s, he undertook training in classification of the Criconematidae at the Institute in Münster, again made possible by generous funding from the von Humboldt Foundation. Criconematids are well represented in New Zealand, giving Wim plenty to work on from then and into his retirement., and leading to publication of his Fauna of New Zealand monograph (Wouts, 2006).

Wim's findings were communicated in ca 80 scientific publications including papers, reports and chapters. Of these, 13 were written in collaboration with his friend Dieter Sturhan, for whom Wim named a new species.

Overall, Wim described one family (Meloidogynidae), seven genera (of which *Atalodera*, *Bellodera* and *Paradolichodera* are still accepted), and ca 55 new species of plant-parasitic and soil nematodes. He could be described as working using the authority model of taxonomy, doing careful, patient and meticulous work on taxonomic issues of a broad range of nematodes. Most of these were heteroderids or criconematids. Taxonomy of the latter is still in flux, as more information on their sequences becomes available, but the great majority of Wim's species remain accepted with a few retained with recombination. Notably, he described *Globodera zelandicus* from the endemic New Zealand tree fuchsia, unusual for a genus usually thought of as associated with Solanaceae, and two species of *Heterodera* from an endemic New Zealand grass and samphire. Together with his criconematid work, these descriptions illustrate the importance for New Zealand of a curious, open-minded nematologist. Wim's work on taxonomy, particularly for root-knot nematodes (RKN) and the criconematids, has had enduring recognition, and his work on mass culture of *Heterorhabditis* continues to be cited. In 2007, with Ian Riley and Vivien Vanstone, Wim did extensive collecting in Australia, seeking new heteroderids and RKN, and was interested in the debate about *Pratylenchus* and *Radopholus* spp. in Western Australia. Several apparently new species were collected, and it is sad that while Wim wanted to work on these, it was not possible. He donated the material to the Australian National Insect Collection in Canberra, Australia, and his cyst-containing soils form part of Mike Hodda's current study of *Heterodera*. Wim was highly dedicated to the understanding of nematode evolution and phylogeny, an important process for understanding natural science.

Wim was a member of several national and international scientific societies. He travelled widely in Europe and attended meetings of the New Zealand and Australian branches of the respective von Humboldt Associations. Wim was generous of his time in editing manuscripts for European and Asian colleagues and students, and provided much encouragement and support to younger colleagues.

Wim was always a busy man. In addition to his work and his time with his family, he was active in many community groups. While living in Auckland, Wim was much involved in the Dutch community, initially in the Dutch Club where he served as secretary and organised a drama group, and later working to establish a retirement village just outside Auckland. In 2004, he and Alice moved to

Perth, Australia to be closer to family in his retirement. There Wim continued his involvement with community groups. He joined a bridge club, instigating an extension of their clubrooms; served as treasurer and president of the Probus Club, was an active member of a church choir and enjoyed lawn bowls.

Sadly, Wim was diagnosed with pancreatic cancer in late 2019, resulting in 2 years of radio- and chemotherapy. Finally, his stubborn endurance, an attribute well evidenced in his professional career, was not enough. Wim is, and will remain, sorely missed by Alice, his three boys and their families, and likewise by his valued friends and nematology colleagues. Vale Wim!

### References

Tarjan, A.C. & Wouts, W.M. (1964). Stimulative and nematicidal effects of ethion on citrus seedlings parasitized by the burrowing nematode. *Proceedings of the Florida State Horticultural Society* 77, 60-66.

Wouts, W.M. (1973). A revision of the family Heteroderidae (Nematoda: Tylenchoidea). II. The subfamily Meloidoderinae. *Nematologica* 19, 218-235. DOI:10.1163/187529273X00349

Wouts, W.M. (1981). Mass production of the entomogenous nematode *Heterorhabditis heliothidis* (Nematoda: Heterorhabditidae) on artificial media. *Journal of Nematology* 13, 467-469.

Wouts, W.M. (2006). *Criconematina* (Nematoda: Tylenchida). Lincoln, New Zealand, Landcare Research. DOI: 10.7931/J2/FNZ.55

Kerrie A. DAVIES

*Department of Agricultural Science, The University of Adelaide  
Adelaide 5000 Australia*

e-mail: kerrie.davies@adelaide.edu.au

Ian RILEY

*Department of Plant Production and Technologies, Niğde Ömer Halisdemir  
University, Niğde, Turkey*

e-mail: ian@riley.asia

Reproduced from *Nematology* (2022) with permission