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Sue Nicolson (1950–2023): Internationally recognised insect physiologist and dedicated mentor

The South African scientific community lost a biologist of rare quality with the death of Professor Sue Nicolson on 27 April 2023. Her passing is a very sad loss to her family, friends, colleagues, and the many students she mentored over a long and influential career, first at the University of Cape Town and subsequently at the University of Pretoria.

Sue was born in Dargaville, New Zealand in 1950, and completed a BSc (Hons) in Zoology, with distinction, at the University of Auckland. She was encouraged by her Auckland supervisor to study further at Cambridge University, and was one of the first women to be admitted to King's College in 1972. She completed a PhD degree in Insect Physiology, based on research on osmoregulation in several different insect species. Over time she developed an international reputation in this field of study, leading to an important review article in 1993 on the ionic basis of fluid secretion in insect malpighian tubules.

In 1975, Sue married a South African who was also at Cambridge – they were the second King's couple to marry in the centuries-long history of the college. In 1978, they moved to the University of Cape Town, where Sue held a teaching position in the Department of Zoology for a couple of years before becoming a research fellow in Professor Gideon Louw's laboratory. She later returned to the teaching staff, and her expertise and experimental skill led to her undertaking a series of studies on Namib Desert beetles that furthered scientific understanding of their adaptation to the harsh environment they inhabited.

Sue's interest in osmoregulation also stimulated her to explore the way in which nectar-feeding carpenter bees deal with excess water in their food and conserve ions. This resulted in her focusing most of her subsequent research, at the University of Cape Town and then at the University of Pretoria, on various nectar-producing plants and the insects and birds that forage on them. In later years, before and after retirement, Sue extended these studies with research on the feeding preferences of sunbirds and the metabolism of the nectar sugars on which they feed, as well as on the nutritional physiology of honeybees. Some of her work on bees was undertaken in collaboration with colleagues at universities around the world, including Oxford and leading universities in Italy, Israel, and China. Sue often said that her bee research marked a return to questions with which she had grappled in her doctoral research at the start of her career – she examined how forager bees succeeded in reducing flight energy cost, for individual bees and their colonies as a whole, by getting rid of most of the water in nectar at the flower and in flight.

Sue's bee research was timely, given the ongoing threat to the world's bee population, and she and several international colleagues used their extensive knowledge to develop and patent a feed supplement that could potentially help bees survive a considerable crisis.

Sue and her husband moved to the University of Pretoria in 2001, with the university creating a chair in Zoology for her as an inducement to leave Cape Town. At both universities she made very significant contributions to undergraduate teaching and the mentoring of postgraduate students and postdoctoral fellows. She had a profound impact on many of her postgraduate students, who acknowledge that the opportunity to work with her shaped the course of their subsequent careers. She had a particular liking for mature postgraduates who showed willingness to put in long hours in the field and the laboratory. Sue could be hard on students who did not display sufficient enthusiasm for their work, but was kind and accommodating to those who did, and made a point of visiting them at their field sites in order to offer encouragement and guidance. She published extensively in collaboration with postgraduates who showed promise, and these publications are a legacy of her influence on them.

In addition to regular funding from South Africa's National Research Foundation, she received funding from the Insect Pollinator initiative of the UK's Biotechnology and Biological Sciences Research Council (BBSRC) from 2011 to 2014, and collaborated in the BBSRC's study of the macronutrient regulation of adult worker honeybees from 2017 to 2019. She was on the national steering committee of the Global Pollinator Project, South Africa from 2009 to 2014. Sue received the Exceptional Achiever Award from the University of Pretoria each year from 2003 to 2016.

Sue was the author of some 185 scientific publications that established her as an internationally recognised research scientist (NRF B1 rating). With co-author Steven Chown, she wrote *Insect Physiological Ecology: Mechanisms and Patterns* (Oxford University Press, 2004), which won the prestigious Bill Venter/Altron Literary Award for the best book in science in 2008. The book reflected the depth of their insights into physiological ecology and their comprehensive grasp of the field. The widespread and growing interest in pollination biology prompted Sue to co-edit the book *Nectaries and Nectar* (Springer, 2007) with Massimo Nepi and Ettore Pacini, which has become a key text for researchers interested in nectar worldwide.

Sue published both books during her term as Head of the Department of Zoology and Entomology at the University of Pretoria (2003–2011), and maintained all her teaching commitments at undergraduate and postgraduate levels throughout this period. Colleagues recall that she was a brave head of department – the first woman to hold the position in the department's history – who could also be impatient and blunt if she believed others were barking up the wrong tree on important issues. Sue's years in office were ones in which Zoology and Entomology was the most research-intensive academic department in the university, and was recognised as a role model for research and teaching excellence.

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Sue was a fellow of the Royal Society of South Africa, of the Royal Entomological Society, and of the Cambridge Philosophical Society. She received the Gold Medal of the Zoological Society of Southern Africa,

as well as the Chancellor's Award for Research from the University of Pretoria in 2013.

In addition to her academic work and achievements, Sue played a major part in nurturing her two children (twins). She encouraged them through school and university, and into highly successful careers, without ever being prescriptive. She trusted their judgement from an early age, and delighted in their achievements. In her spare time, she was a gifted artist who produced many paintings on New Zealand and South African landscapes.

Sue was a warm and engaging, and at the same time a challenging, colleague who will be sorely missed in the Department of Zoology and Entomology, and in the University of Pretoria's Centre for the Advancement of Scholarship where she was a senior research fellow after her formal retirement.

Sue is survived by her husband and children, and by a granddaughter who was born shortly before she died. Knowing how advanced her illness was, Sue counted herself fortunate to have the opportunity to see her granddaughter and hold her in her arms before the end.