Editorial

Principal Scientist Dr Dennis Gordon retired in October 2015 from his position at the National Institute of Water and Atmospheric Research (NIWA). Over his career he has made very significant contributions to the understanding of biodiversity in New Zealand and globally, both through his work on fossil and modern bryozoan material and through his contributions to national and international efforts to document biodiversity. Among his many achievements, Dennis led an ambitious project to produce the comprehensive three-volume *New Zealand Inventory of Biodiversity*, published in 2009–2012, which summarises the state of knowledge for all of New Zealand's living and fossil organisms (see page 108).

In April 2016, a one-day symposium was held in Wellington to celebrate the contribution Dennis made to the field of systematics, discuss the role that taxonomy plays in biological science, and highlight the important work being carried out for the benefit of New Zealand in managing its natural heritage. The symposium brought together scientists from government departments, Crown research institutes, museums and universities, reflecting Dennis' rare ability to rally experts from a wide range of fields and backgrounds.

This issue includes articles from symposium speakers and researchers who have worked with Dennis. Topics include accounts of Dennis' contribution to the field of systematics (and bryozoology in particular), the state of taxonomic research in the national and international scene, applications of taxonomy to conservation and environmental management, and recent developments and future directions for systematics research in New Zealand.

The issue begins with Dennis, and Mark Costello, setting the record straight as to the status of bryozoans – definitely not a minor phylum! They show that perceptions have changed from the phylum being considered minor in the 1960s to it now being seen as abundant and diverse in form and function in a range of present and past habitats, proving ideal for investigating significant evolutionary questions.

Professor Abby Smith with Philip Bock and Peter Batson summarise the full range of Dennis' achievements in taxonomy generally and the bryozoans in particular. He has produced more than 170 publications, described nearly 700 new taxa, and, with his colleagues, named over 500 living and fossil species – a phenomenal record.

Ashley Rowden provides three examples of his work with Dennis showing how his understanding of taxonomy and systematics has enabled insights into the regeneration of biogenic reef habitat impacted by fishing, the factors that influence the distribution of bryozoan assemblages and thickets in New Zealand, and where they require protection.

The symposium followed a report released in late 2015 on the state of taxonomy in New Zealand which expressed serious concern for the future of the science. The Royal Society of New Zealand report was the work of an expert panel on National Taxonomic Collections chaired by NIWA principal scientist Wendy Nelson, and identified declining support for nationally important collections at a time when demand for their services is increasing within New Zealand and overseas, particularly as growing international trade increases biosecurity risks[1].

Panel's Chair, Wendy Nelson, outlines the Panel's conclusions and reproduces as an appendix the executive summary of their report. Wendy notes that the report recognises the reliance of many sectors on the expertise and data within the taxonomy and collections community, ranging from export assurance, human health, and biosecurity to environmental protection. The panel recommended collections be recognised as national heritage assets and essential components of the New Zealand science system. It also recommended the Government urgently address the immediate investment needs of national taxonomic collections and research staff so that critical expertise was restored and services and quality not put at further risk. New investment was also needed, the report said, to support training and to ensure New Zealand has a strong and expert taxonomic workforce. The recently released report from MBIE on the Science and Innovation System Performance referred to the Royal Society report and its findings, including that New Zealand's taxonomic knowledge is undeveloped compared with other advanced economies.

[1] Nelson, W.A.; Breitwieser, I.; Fordyce, E.; Bradford-Grieve, J.; Penman, D.; Roskruge, N.; Trnski, T.; Waugh, S.; Webb, C.J. 2015. *National Taxonomic Collections in New Zealand*. Royal Society of New Zealand. 63 pp. + Appendices (66 pp.) ISBN 978-1-877317-12-5 www.royalsociety.org.nz/national-taxonomic-collections-in-new-zealand

This paper is followed by Janet Bradford-Grieve posing the question: 'Is there a taxonomic crisis?' Janet compares the situation here with that in Australia and Canada. Our taxonomic workforce is ageing and male-dominated, with very few under 40 years of age. Most were funded to spend only a small proportion of their time on research, and there is a lack of strategic connection between science funders and priority setters.

Next, Mary Livingston describes the requirements in modern fisheries management for informed and definitive species identification based on sound taxonomic expertise and well-managed and accessible voucher specimens and records, thereby reminding us that taxonomy is not an esoteric pursuit but a key tool in ensuring the sustainable use of our biological resources.

Richard Leschen and colleagues cover the significance of insects in ecosystem functioning in freshwater habitats, and describe what they call 'a grim picture emerging for the future of many aquatic organisms'. The research focus and ecological understanding of many New Zealand insects is poor or absent, with a large number considered to be 'data-deficient'. There is inadequate funding for needed taxonomic work, and there are no researchers employed specifically to revise freshwater insect groups.

I discuss the ubiquitous nature of nematodes, and show the need for understanding the diversity of small organisms in order to understand how various ecosystems work, and, more importantly, how to protect them.

The final paper in this issue, by Heidi Meudt, moves on to the systematics of vascular plants, using examples of her own work on hebes and forget-me-nots to show how an integrative approach to analysing morphological, molecular, cytological and other data sets can aid species delimitation and discovery, while giving insights into diversification, conservation of threatened species, polyploidy, and biogeography.

I first met Dennis in 2008 as I was finishing my PhD at the Portobello Marine Laboratory in Dunedin. Although I only had a vague idea of who he was, I knew that he was highly regarded by the scientific community. I was therefore more than a little nervous as I was telling him about my yet-to-be-published research on marine nematode taxonomy, but I was quickly reassured by his response – not only did he know about nematodes and just how understudied they are in this part of the world (I usually get blank stares even from biologists), but he was also genuinely interested! This ten-minute corridor conversation was enough to help me persevere in my taxonomic efforts, and luckily (and unexpectedly) for me I ended up working a few doors down from him in Wellington just a few years later.

I would like to thank all who contributed to the success of the symposium, and in particular those who found time in the busy schedules to contribute to this special issue of *New Zealand Science Review*. It is heartening to see the energy and enthusiasm with which taxonomists and environmental researchers strive to provide the best possible science for the benefit of New Zealand despite the many challenges that still need to be overcome. Dennis is a perfect example of such scientific vigour and passion, and, fortunately for us, he is staying on as emeritus scientist at NIWA, and continues to conduct much-needed taxonomic research and to mentor the next generation of taxonomists.

Daniel Leduc
Guest editor