

More from ecologists to support natural history museums

Darren F. Ward^{1,2}, Richard A.B. Leschen¹, and Thomas R. Buckley^{1,2}

¹ New Zealand Arthropod Collection, Landcare Research, Auckland, PB 92170, New Zealand

² School of Biological Sciences, University of Auckland, Auckland, PB 92019, New Zealand

Schilthuizen *et al.* [1] recently discussed the important issue of **specimens as primary data sources**, and the need for ecologists, taxonomists, and natural history museum curators to secure baseline ecological data over the long-term. While we agree with many of the points raised, we argue that Schilthuizen *et al.* place too much emphasis on taxonomists and museum curators to solve the underlying issues. We argue that far more is needed from ecologists, especially community ecologists studying hyperdiverse groups with projects that result in large quantities of specimens. The solution lies in ecologists and taxonomists working together from the outset of an ecological project to ensure appropriate archiving of specimens and associated data [2].

For the discipline of taxonomy, collections of any number of specimens have always been of fundamental importance for adequate morphological description and DNA extraction. However, this is less often the case with ecology, where the focus is on large-scale patterns across treatments or habitats (typically involving many specimens and species) rather than on the exact identification of specimens to formalised species. This disparity between ecologists and taxonomists has been an issue for many decades. Ehrlich [3] stated ‘ecologists are often ill informed of both the value and the problems of systematics’.

Schilthuizen *et al.* argue ‘that by adhering only to their traditional role, natural history museums are missing an opportunity to expand their scientific reach and relevance’. However, natural history museums are well aware of their new role in 21st century biodiversity to safeguard baseline ecological data and to maintain the relevance of museums to biology [4–6]. We point to the rapid shifts that taxonomy and natural history museums have already undertaken in the past decade, for example: genetic sampling from collections, **mass digitisation of specimens**, online informatics and global databases, and online-only publications and mega-journals [7–9]. All these shifts have been aimed at increasing accessibility to, and relevance of, museums. Shifts that we suggest are far more transformational than has occurred in ecology.

Schilthuizen *et al.* also suggested that ‘it become accepted policy in ecological research that full, unadulterated

collections of all specimens from a study be deposited in a natural history museum’. We agree that ecological samples should ideally not be discarded, and also that museums are the best place for the safe-keeping of long-term ecological specimens. However, it is likely to be unworkable to include all specimens from all ecological projects, even with a large increase in resources for natural history museums. Currently the problem of bulk ecological samples ‘stops at the door’ of taxonomists and museum curators. If material is not taken, taxonomists and museum curators are regarded as unhelpful and obstructive, but, as rightly pointed out by Schilthuizen *et al.*, the reluctance to take bulk material is essentially the result of space limitations, limited funding, and a lack of staff to curate and maintain large ecological collections.

Ultimately, stored ecological specimens in collections will largely be used as datasets by ecologists in the future. Thus, it is primarily up to ecologists, while working with taxonomists, to find solutions to the problem of long-term storage of ecological specimens. At present there is little in the way of an incentive for ecologists to deposit specimens in museums. Changing this current standpoint represents an enormous shift in ecological practice, far more than is required to change museum practices. A simple ‘change in ecological policy’, as suggested Schilthuizen *et al.*, is insufficient because that change must be accompanied by a change in the way museums are funded and specimens housed. Otherwise museums will simply be even more overwhelmed with material.

We hope that ecologists, taxonomists, and natural history museum curators can continue to discuss this issue. The issue of ‘specimens as primary data’ is an excellent opportunity to enhance the collaboration between ecologists and taxonomists; in fact, it is a key link between the two disciplines. However, it is our view that ecologists need to better understand the value of museums, and to lobby for increased resourcing for them. More is needed from ecologists, and in a fundamentally different way.

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Corresponding author: Ward, D.F. (wardda@landcareresearch.co.nz).

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