



NEW ZEALAND JOURNAL OF ARCHAEOLOGY



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Landsnail Analysis: Reply to Wallace

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ABSTRACT

Criticism by Wallace of McFadgen's reconstruction of Tamatean and Ohuan vegetation cover from landsnails is unfounded.

Keywords: LANDSNAILS, MIDDENS, OHUAN, TAMATEAN, WAIRARAPA COAST.

Wallace (1987) has criticised my use of landsnail assemblages from middens to reconstruct the prehistoric vegetation on Tamatean and Ohuan soils (McFadgen 1985). He questions my assumption that an absence of snails implies an absence of forest, and rejects the proposed vegetation history. He highlights apparent inconsistencies in the ecological classification of the snails adopted, and in the snail names used.

Eight middens were from the Tamatean (older) soil, six were from the Ohuan (younger) soil. The Ohuan middens sampled were at Te Awa Iti (Section 2), at Te Oro Stream (Section 4), middens 1, 3, and 4 at Flat Point (Figs 5 and 19), and one midden from the section (Fig. 16) at Cooks Cove. Had other middens been found in suitable stratigraphic contexts then they too would have been sampled, but such middens were not common. Nevertheless, those that were found, with the exception of Cooks Cove, were from the same general area (south east Wairarapa coast) and in my opinion, the results do support an interpreted vegetation history of reducing forest cover in this area during Maori times.

Landsnails were found in all of the Tamatean middens, but in only one of the Ohuan middens. The main point at issue is why landsnails were absent from the other five Ohuan middens. In reaching my conclusion that there was no forest around these middens, I made some assumptions. Because the forest floor is normally damp and therefore favourable for snails, I assumed that snails will occur in middens deposited under forest, but not necessarily in middens in more open vegetation.

Wallace has drawn attention to a lack of correlation between the abundance of snails in assemblages he has analysed, and prehistoric vegetation on the Aupouri Peninsula inferred from charcoal samples. He uses these data to argue that absence of forest does not imply absence of snails. I cannot assess this evidence because it is unpublished; I was unaware of it when I wrote my paper.

I agree that snails occur under vegetation other than forest, and that the absence of forest does not imply the absence of snails. However, the converse need not be true. Snails will not necessarily occur in middens deposited under other sorts of vegetation. On a newly stabilised sand sheet, for example, it is reasonable to expect that vegetation will colonise before snails. Unlike seeds, snails are rarely airborne and their reproduction is not enhanced by the gut of a bird. Except for the remote possibility of being stuck to a bird with a piece of dirt, snails have to crawl. Accordingly, I have further assumed that where snails are absent, so is forest.

To explain the absence of snails from the Ohuan middens, Wallace has suggested that crevices in the Ohuan middens may have become rapidly filled with sand before the snails had time to invade the middens. The middens, however, were in soils which had formed on a variety of substrates: Te Oro, silt loam; Te Awa Iti, stream gravels; Flat Point, dune sand;

Cooks Cove, shelly sand. Except for Te Oroī, the Ohuan substrate at each place was the same as the Tamatean. At Te Oroī the Tamatean was rather more gravelly. At each place the Tamatean middens contained snails and except for Te Oroī, snails were absent from the Ohuan middens. Even if sand had subsequently infiltrated the middens, if snails had originally been present in the plant litter under the middens, then some would presumably have been preserved.

Wallace's suggestion is a valuable one, and should be taken into account in the interpretation of landsnail assemblages from middens generally. However, I consider it unlikely to apply to the middens that I sampled, especially at Te Awa Iti where there was no sand to infiltrate. Except for Te Oroī, middens on different substrates show the same chronological pattern and I accordingly attribute the absence of snails in the middens to an absence of forest. The vegetation history for the southeast Wairarapa coast which I interpret from the snail analyses is therefore a forest vegetation near the coast during the Tamatean stable phase, and a forest edge well inland of the middens at Flat Point and Te Awa Iti during the Ohuan stable phase.

The significance of the snails in the Ohuan midden at Te Oroī is as a test of the validity of the inferences I have made about the vegetation. Wallace seems to have missed this significance. The Ohuan midden at Te Oroī was the only midden I sampled on Ohuan soil that contained landsnails, and these indicate a reasonable vegetation cover. It is important to note that Te Oroī in the 1840s and 1850s was one of the few places on an otherwise barren and treeless coast with a stand of bush. The landsnail evidence, positive and negative, is therefore in accord with historic records.

The inconsistencies in the snail names used in my figures occurred because the snails were collected over a period of nearly two years, at a time when some of the species represented were still being described and classified. Between the times that I submitted the first and last samples for identification, some snail names had changed. I was not aware of these changes when I prepared my figures.

The apparent inconsistencies in the ecological classifications occurred partly for the same reason, and partly for another reason. As Wallace has pointed out, the ecological classifications of snails are not hard and fast. They depend on the range of habitats snails occupy, and current knowledge about those ranges. For some species, Climo's ecological classifications are influenced by the setting of the midden in which they are found, which is one way of narrowing down the possible range of habitats for a species in any particular assemblage (F. M. Climo pers. comm. 1988).

Wallace's comments about *Paralaoma* sp. are generally correct. However, the particular example referred to in my Figure 22 was recognised by Climo as a new species, but had not been named at the time it was identified in the midden assemblage. Its informal classification is "*Paralaoma*" n. sp. 29 (Solem *et al.* 1981). Its habitat (Solem *et al.* 1981) is "slimy layers of broadleaf litter and wetter parts of other litter".

In an ideal world, each snail species would occupy a single habitat and information about snail habitats would be published. But the world is not ideal and use must be made of the best sources available. Lack of precise information about snail habitats means that inferences about vegetation are necessarily broad. The inferences drawn in my paper are supported by their agreement with other lines of evidence.

ACKNOWLEDGEMENTS

I thank Dr F. M. Climo, National Museum of New Zealand, Wellington, for discussion about the matters dealt with in this paper.

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Received 17 March 1988