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Analysis of Shell Material from Oruarangi, N49/28

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ABSTRACT

The analysis of a column sample from Oruarangi indicates that quarry material is a major constituent of the shell build-up of the mound. A species change through the deposit may indicate an environmental change in the area during the period of construction of the mound.
Keywords NEW ZEALAND, HAURAKI PLAINS, ORUARANGI, SHELL ANALYSIS, ARTIFICIAL MOUND, SPECIES CHANGE.

INTRODUCTION

Excavations have been carried out at Oruarangi *pa* (N49/28, often linked with Paterangi, N49/17), on several occasions since the 1930s – see Best (this volume) for a summary. Apart from providing one of the important assemblages of "Classic" artefacts (Golson 1959, Best this volume), the site has been revealed as a mound about two hectares in area, composed largely of shell, with deposits up to 1.5 m thick. Allowing for a natural core, the volume of imported material is probably about 20,000 m^3. Crushed shell has a density of about 2.2 tonne/m^3; so something over 40,000 tonnes of material have been brought to the site from at least a little distance. However, the mode of accumulation of the mound has not been settled by earlier excavations there.

Teviotdale noted signs of deliberate construction, involving brushwood and matting, when the site was being dug over by Hovell: "No doubt some of this deposit is the result of accumulation after occupation of the pa but there is evidence that much of it is the result of definite reclamation by the inhabitants" (Teviotdale and Skinner 1947: 341). On the other hand, it has been assumed that the shell material encountered during Golson's excavation was from food wastes (Green and Green 1963:29-33, Green pers. comm.: 1979).

During Best's excavation at Oruarangi in 1976, I removed a column sample from the mound for detailed analysis, and these samples help to solve the problem. This paper is written to report the results.

PROCEDURE AND RESULTS

The column sample analysed was removed from the west wall of Square 3 (Best this volume: Fig. 4), as a series of 45 spits. In the laboratory the samples were wet-sieved using a 2 mm screen, the material retained being searched for shells or identifiable pieces of shell, particularly hinges of bivalves and columellae and whorls of gastropods. Three species were found to form the major part of the material – *pipi (Paphies australe)*, cockle *(Chione stutchburyi)* and trough shell *(Mactra ovata)*. In Figure 1 the relative frequencies of these three species in each of the spits is shown. These frequencies are based on counts of valves, plus half the number of half hinges. Other mollusc species are present in very minor amounts, and their occurrence is as shown in Figure 2. Figure 2 also indicates the occurrence of some significant features of the shells of the three important bivalves.

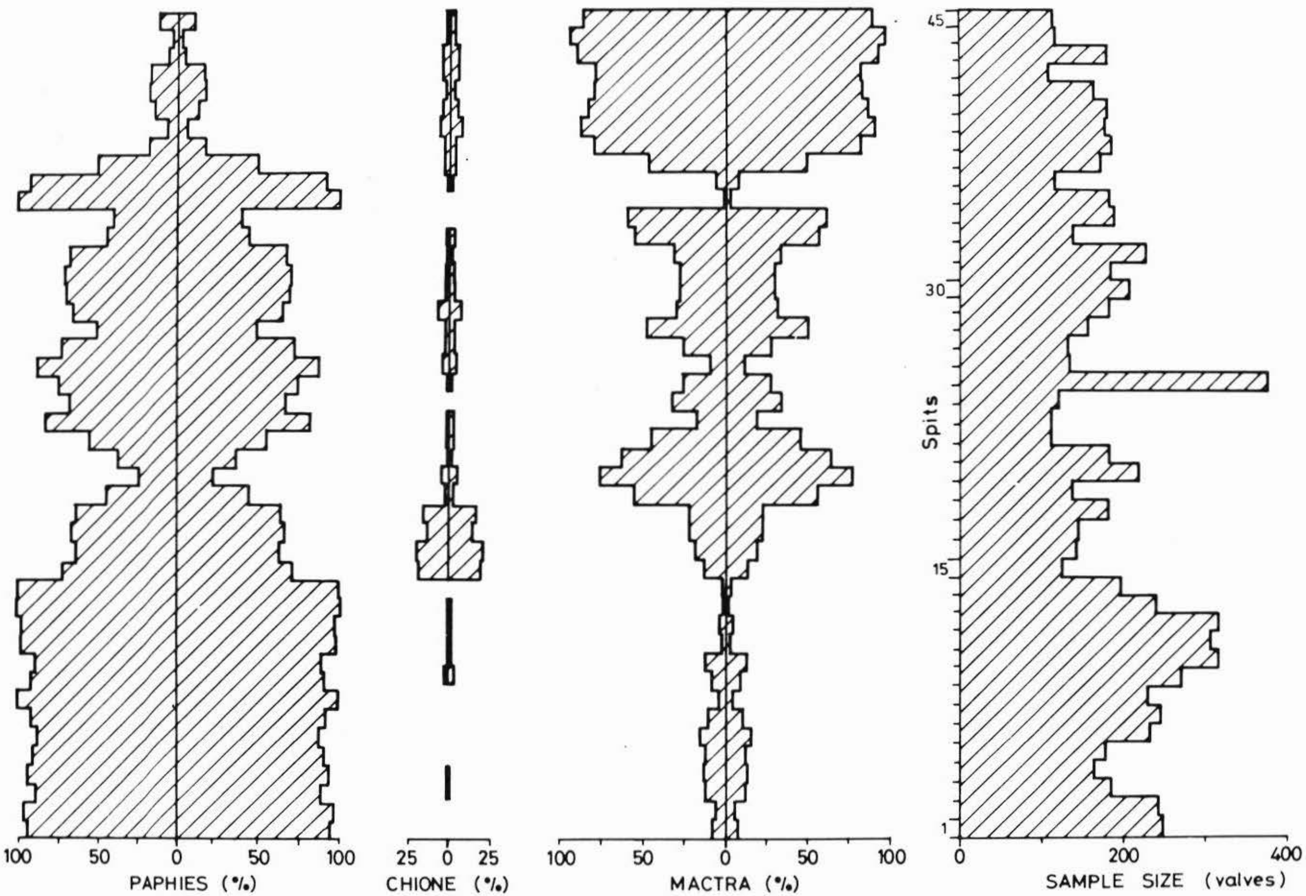

Figure 1: Results of analysis – the three major bivalve species.

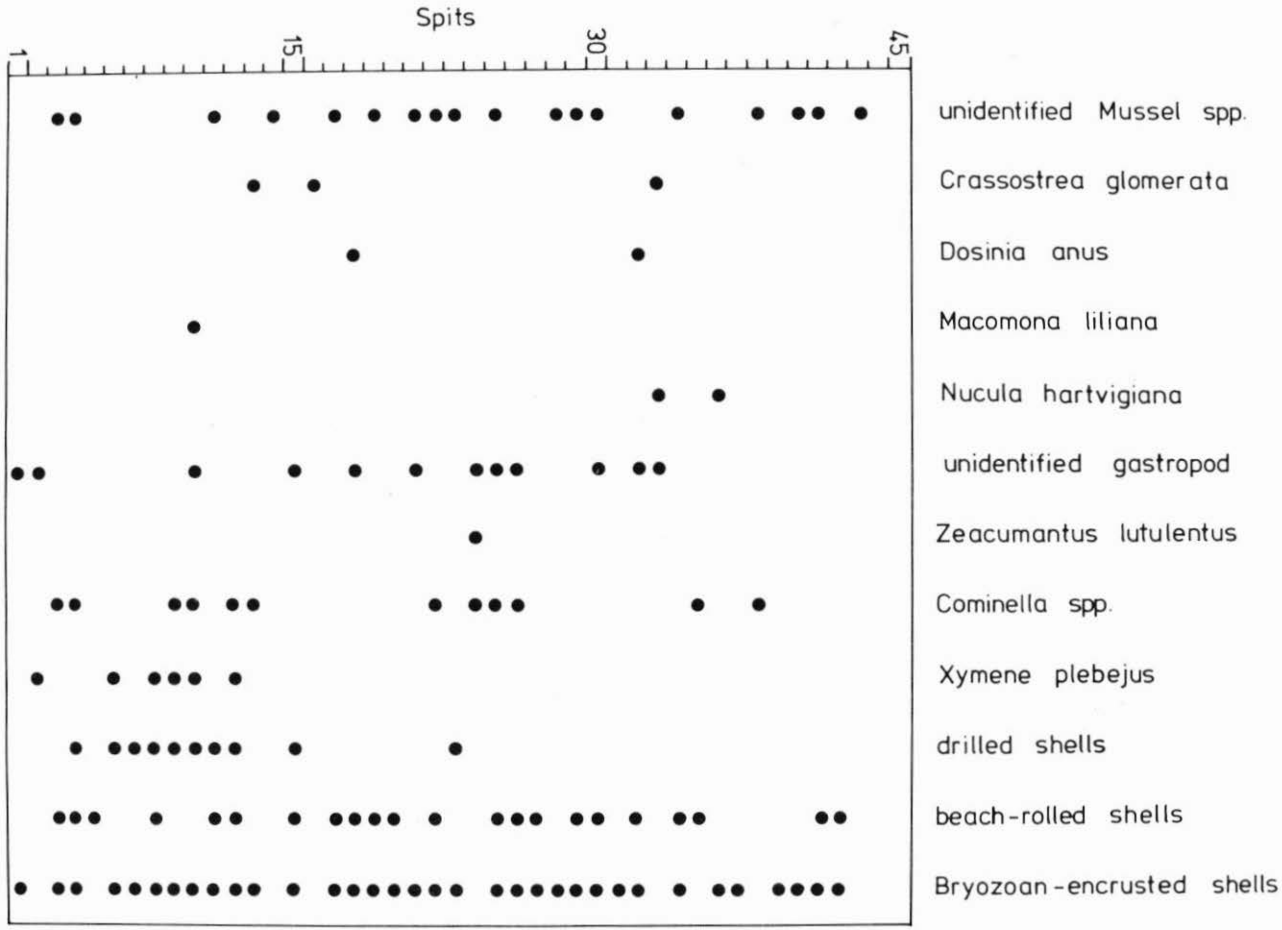

Figure 2: Results of analysis – minor constituents.

THE NATURE OF THE MOUND

Charcoal and burned shells appear throughout the deposit and food debris may well be a component of the material, but at least four separate pieces of evidence indicate that much of the shell was not gathered as food. First, some species present are unlikely to be used as food; *Nucula* and *Macomona* are deposit feeders and so full of sand, and the size of *Xymene, Cominella, Nucula, Zeacumantus,* and the very smallest *Paphies* and *Mactra* suggests that they will not have been a useful food source. Secondly, there are numerous shells that have been drilled (and eaten) by a carnivorous gastropod, probably *Xymene plebejus* (Willen pers. comm.:1979), and the correlation between the occurrence of these drilled shells and the presence of specimens of *Xymene* in the bottom dozen samples should be noted (Fig. 2). Thirdly, numbers of shells have been heavily rolled, as on a beach. And fourthly, a great many shells have encrusting skeletons of a bryozoan on the inside surface, which can only happen after the molluscs have died.

The presence of barnacles growing on the inside surface of shells allowed Bailey (1975:51) to eliminate some oysters from a calculation of the food value of midden material, and, in general, beach-rolled shells should be detectable, as Shackleton (1969:409) suggests. Unfortunately it is not possible to recognise all the non-food shells among the Oruarangi material. First, none of the 30 or so drilled *pipis* that I examined had the encrusting bryozoan on their inner surface. Many dead shells are therefore escaping this encrustation, so it cannot be used to identify all of the non-food shells, and of course Bailey cannot be sure he found all the non-food oysters. Secondly, most of the drilled *pipis* still had intact periostraca, so not all dead shells are being rolled before collection. The shell has also been crushed, and most is now very fragmentary. Signs of rolling which are clear on intact shells might therefore be rather elusive on small pieces with freshly broken edges. The identification of food shells is also uncertain because many of the burnt pieces of shell do have the encrusting bryozoan.

Non-food shells are frequently found in middens (Davidson 1964:186; 1970:113; Rowland 1975:45-47; Nichol n.d.) and the odd specimen of *Nucula* or *Zeacumantus* or the like in a site could be the result of gathering methods, for if people were to scoop sand and shells from beds of food species into flax kits, then wash away the sand in water, shells such as these are quite likely to appear in the material retained by the kit. However, I am convinced that much of the non-food material found in this column sample is not simply due to a failure to discard inedible items from the shells collected during food gathering. Such material is just too abundant, and a much better explanation is that the mound at Oruarangi is mainly composed of shell deliberately quarried from drift deposits on the coast.

A single column is clearly a very small sample on which to base inferences about a mound two hectares in area, but this sample does demonstrate that quarry material is of great importance throughout the depth of the mound in at least this portion of the site.

SPECIES COMPOSITION

Another interesting feature of the results is the change in the composition of the material over the sequence of spits; *Paphies* makes up about 90% of the shell in the lowest spits, and *Mactra* about 85% of the highest. The trend between the two is marked though not smooth, as there is a local concentration of *Chione* in spits 15-18, and a lens of almost pure *Paphies* in spits 35 and 36.

Paphies is found on "protected" beaches, on coarse sand to muddy sand; *Chione* on "stable protected" to "enclosed" beaches, on sand to soft mud; and *Mactra* on "enclosed" beaches, tolerant of silt and clay and deep liquid mud (Morton and Miller 1968:443, 445, 488, 516).

The possibility of changed human food preferences can be eliminated as the explanation of the faunal change, simply because the majority of the material is not food debris. It would, therefore, appear that the change in bivalve species indicates a change from sandy to muddy conditions in the area of Uruarangi in the past. However, the significance of this change for New Zealand prehistory is unclear.

The area of Oruarangi is one of a generally prograding coastline, and fossil shellbanks up to 2200 years old are known to exist 3-5 km inland from the head of the Firth of Thames (Best pers. comm.: 1979). The species change in the mound might, therefore, be the result of the builders of the mound quarrying shellbanks already ancient, and so be of less importance for the site itself.

The sheer quantity of deposit at the site makes this seem rather unlikely as the explanation. Water transport would be almost essential when dealing with the very large amount of material involved, but ancient shellbanks will generally be some distance from rivers or the sea. The coast adjacent to the mouth of the Waihou River is, therefore, a more likely source, and material gathered there will generally be recently dead. Also, though the material dated was gathered because it was thought to be food-debris, a radiocarbon date of 310 ± 50 (NZ4178B, Best 1977:320) on shell from the bottom of the cultural material in Square 3 is consistent with the quarry shell being fresh at the time of deposition at the site. Samples of certain quarry material will be submitted for radiocarbon dating to test this possibility, but for the moment the alternative explanation of the species change is preferred – that human activities are involved.

Green (1970:35) suggests that population pressure was a factor in the settlement of the swampy plains. Forest clearance, associated with man throughout New Zealand's prehistory (McGlone 1978), would be of particular importance in times of stress, and a greater load of sediments in the river is a likely outcome. The species change in the column sample is, therefore, in line with what might have been expected in the area of Oruarangi late in prehistory.

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