NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

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PREHISTORIC VEGETATION AT LONG BEACH, OTAGO

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During late 1977 an exploratory excavation was carried out in part of the extensive Long Beach site (S164/20) just north of Dunedin (Hamel and Leach, 1977). Two prehistoric occupation levels were uncovered. Dates for the earliest layer were A.D. 1474 ± 57, A.D. 1238 ± 57 and A.D. 1082 ± 80 with the later dates being preferred (Hamel and Leach, 1979). Dates for the later occupation were A.D. 1639 ± 86 and A.D. 1510 ± 57 (ibid.).

The first occupation layer was deposited directly onto the boulders and shelly grit of a boulder beach ridge formation. The midden material indicated the exploitation of an open coastal environment. The first occupation layer was thinly mantled by a layer of fine wind blown sand on top of which was deposited the second cultural layer. This second occupation involved both houses and midden indicating the exploitation of an estuarine environment. The modern shoreline is 700 m away and is an open sandy beach. Neither a boulder beach nor an estuary is adjacent to the site at present and discussions during the excavation often centered on the subject of environmental changes during prehistoric times. Due to this interest the author decided to make a study of the land snail shells buried in the site's layers in order to try to throw light on the question of the local vegetation during various times in the prehistoric period.

Location and stratigraphy

The 10 x 5 m area excavated in 1977 lay at the base of a steep slope on top of a now fossil boulder beach. This is fronted by an extensive area of semi-swamp pasture which extends to the modern beach some 700 m from the site (see Fig. 1).

The first occupation layer (Layer 4) was deposited on the top of the old boulder beach ridge (Layer 5). At the seaward side of the excavated area, on the crest of the boulder beach ridge, Layer 4 had been redeposited, having been washed free of charcoal and churned up with the underlying beach material. Layer 4 was covered by a thin layer of wind blown sand (Layer 3) on which was deposited the second cultural layer (Layer 2). The stratigraphy of the site is shown on Figure 2.

Land snail shells

Samples of land snails were extracted from all layers except Layer 1, the modern soil. The underlying boulder beach material yielded

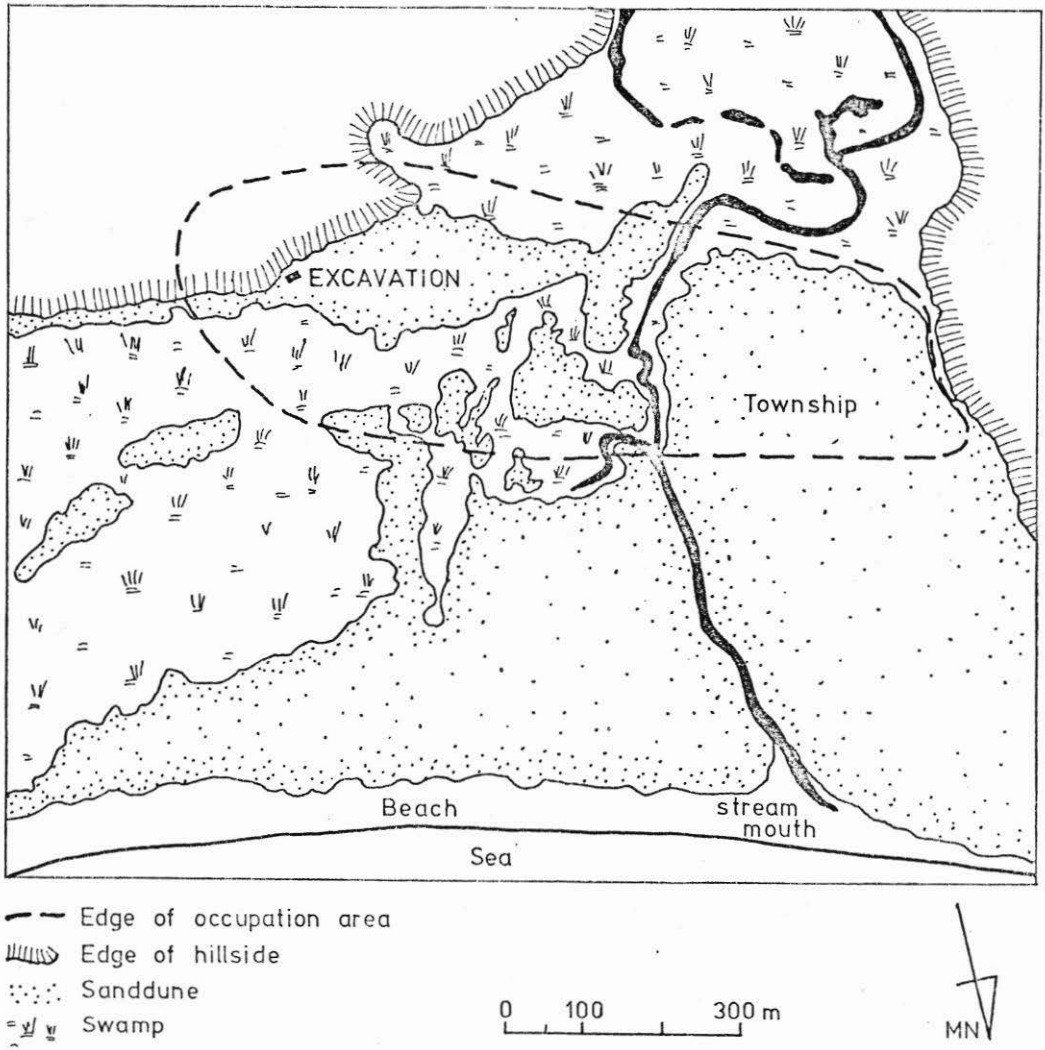
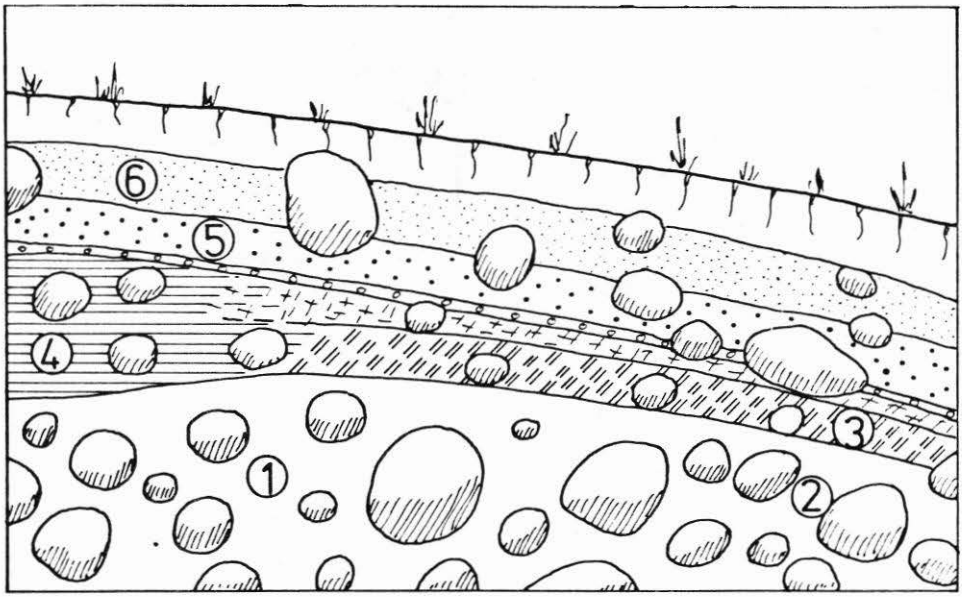


FIGURE 1. Long Beach showing location of excavation.



Turf and topsoil

Second occupation layer

Windblown sand layer (sterile)

Lenses of pipi and tuatua midden

Thick layer of fishbone and shell

Thin windblown lenses of midden

Redeposited midden

Natural boulder bank material

5 Sampling station

Vertical exaggeration approx 2x

FIGURE 2. Long Beach stratigraphy showing location of samples.

two samples (Samples 1 and 2) from the seaward and landward sides of the excavated area respectively. Layer 4 was also sampled in two places, Sample 3 from the undisturbed landward edge of the excavation and Sample 4 from the disturbed seaward side. Samples were taken from Layer 3 (Sample 5) and Layer 2 (Sample 6). These sampling positions are shown in Figure 2.

The land snail shells were extracted by passing bulk samples of site contents through a 4 mm mesh sieve retaining the smaller fraction. This was then swirled up in a bucket of water and the buoyant fraction 'decanted' off into a 0.5 mm mesh sieve. Wet sieving removed the finer material and the remaining material was dried and the land snail shells removed with a moistened paint brush. Enough material was processed to yield 100 - 500 shells per sample where possible. These samples were sent to Dr Frank Climo of the National Museum, Wellington, for identification and comment.

Results

The identified shells were counted and their numbers shown on Table 1. The samples fall into two distinct types. The first includes Samples 1 and 4. Sample 1 was from the boulder beach material at the seaward edge of the excavation and Sample 4 from disturbed Layer 4 material immediately above it.

Both Samples 1 and 4 are dominated by one species, Laoma rakiura, which constitutes 84% of Sample 1 and 97% of Sample 4. L. rakiura has been collected live only on Stewart and Chatham Islands but has also been found in a subfossil deposit in South Otago (F. Climo, pers. comm.) in circumstances indicating a local origin for the shells (Murdock and Findlay, 1921). On Stewart Island L. rakiura, though found in scrub habitats along with many other species, is more typical of open grassy environments (F. Climo, pers. comm.). Given the numerical dominance of this species in Samples 1 and 4 an open grassy vegetation inferred for the immediate vicinity at the time of their deposition.

The other four samples are very similar to each other but very different to Samples 1 and 4. They contain reasonable numbers of seven to nine species. The assemblages as a whole reflect the presence of well developed coastal scrub or forest vegetation (F. Climo, pers. comm.).

Species evenness and richness of samples is a valuable source of information to ecologists (Colinvaux, 1974). These aspects of samples can be measured by diversity indices. 'Shannon's H', which is used here, is

SPECIES	I	II	III	IV	V	VI
Laoma rakiura (Dell)	366 84%	70 62%	40 59%	369 97.5%	110 28%	314 59%
Laoma celia Hutton	55 22.5%	6 5.5%	11 16.5%	9 2.5%	19 5.0%	99 18.5%
Laoma pumila (Hutton)		1 .9%			176 45%	22 4%
Charopa maculata (Suter)		12 10.5%				
Charopa tapirina (Hutton)	4 0.9%	8 7%	5 7.5%			2 0.4%
Charopa mutabilis (Suter)		3 2.5%				1 0.2%
Charopa suteri (Murdock and Findlay)			3 4.5%	1 0.3%	81 20.5%	76 14.5%
Aeschodomas barbatula Reeve	4 0.9%	6 5.5%	3 4.5%			4 0.7%
Allodiscus adriana (Hutton)			2 3%			6 1%
Therasia igniflua (Reeve)	6 1.5%	6 5.3%	3 4.5%		6 1.5%	8 1.5%
Phenacohelix pilula (Rue)		1 0.9%				
Omphalorissa purchasi (Pfeiffer)					1 0.2%	
TOTAL INDIVIDUALS	435	113	67	379	393	532
NO. OF SPECIES	5	10	7	3	6	9
DIVERSITY INDEX VALUE	0.55	1.37	1.32	0.13	1.27	1.22

TABLE 1. Long Beach land snail samples.

one of these. The diversity values of the samples were calculated and the results are shown at the base of Table 1. Samples 1 and 4 have very low values suggesting a highly specialized environment as far as land snails are concerned. The other four samples have much higher values reflecting more complex and structured environments.

Conclusions

The land snail evidence suggests that coastal forest or scrub existed close to the excavated area all through the sequence. Prior to and during the first occupation of the spot by man, the seaward edge was open with, at most, grassy vegetation. The landward edge of the excavation however, was adjacent to coastal scrub or forest.

During subsequent phases of sand deposition and reoccupation by man the forest occupied the whole of the area concerned. This is not to say that man did not clear forest during his occupation, but that land snails suggest that this was not a persistent feature as the land snail shells are likely to have accumulated both during and after the deposition of the layers.

In summary:
1. Prior to and during the first occupation by man of the excavated area of the Long Beach site it was in a forest margin location.
2. During later periods the forest extended to cover all the excavated area.
3. Lasting modification of the forest cover by prehistoric man is not indicated by the land snail evidence.

References

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