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PRELIMINARY REPORT ON EXCAVATIONS AT THE SUNDE SITE,  
N38/24, MOTUTAPU ISLAND

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During January and February 1981, excavations were carried out at the Sunde Site, N38/24, at West Point on Motutapu Island in the Hauraki Gulf, under my direction. Labour was provided by a group employed on the Department of Labour's S.C.S.P. scheme, and work was carried out under N.Z.H.P.T. permit 1980/48. This report describes the excavations and my interpretations of the results.

The excavation was carried out as part of the fieldwork for the Ph.D. degree in anthropology at the University of Auckland. The research focuses on the subsistence base of the early Polynesian occupation in the north of New Zealand. Horticulture has been identified at early dates in North Auckland (Groube, 1966; Peters, 1975), the Coromandel Peninsula, Hawkes Bay (Fox, 1975; McGlone, 1978), and Palliser Bay (Leach, 1979), but the problem of quantifying the relative importance of plant and animal foods is very difficult. This is of interest because of the relative difficulty of establishing horticulture in New Zealand when the tropical Polynesian staples do so badly here, while, for a short time at any rate, the animal life available would have allowed hunting to dominate the subsistence economy.

The Sunde site seemed a promising place to excavate, because the leaf impressions in the bottom of the ash suggested that a record of the vegetation of the site and its surroundings might be accessible, and because the presence of the ash itself made it probable that the site, which had clear 'early' connections, was protected from many of the hazards facing early sites, particularly later sites in the same place. It was also a very great advantage that the archaeological landscape on Motutapu is as well known as any in New Zealand, thanks to Janet Davidson and her co-workers (Davidson, 1978).

Motutapu is an island of 1516 ha, with its highest point 120 m a.s.l., in the entrance to Waitemata Harbour. The south-western edge of the island is composed of sandstone of the Waitemata series (Miocene), the remainder of Waipapa series grey-

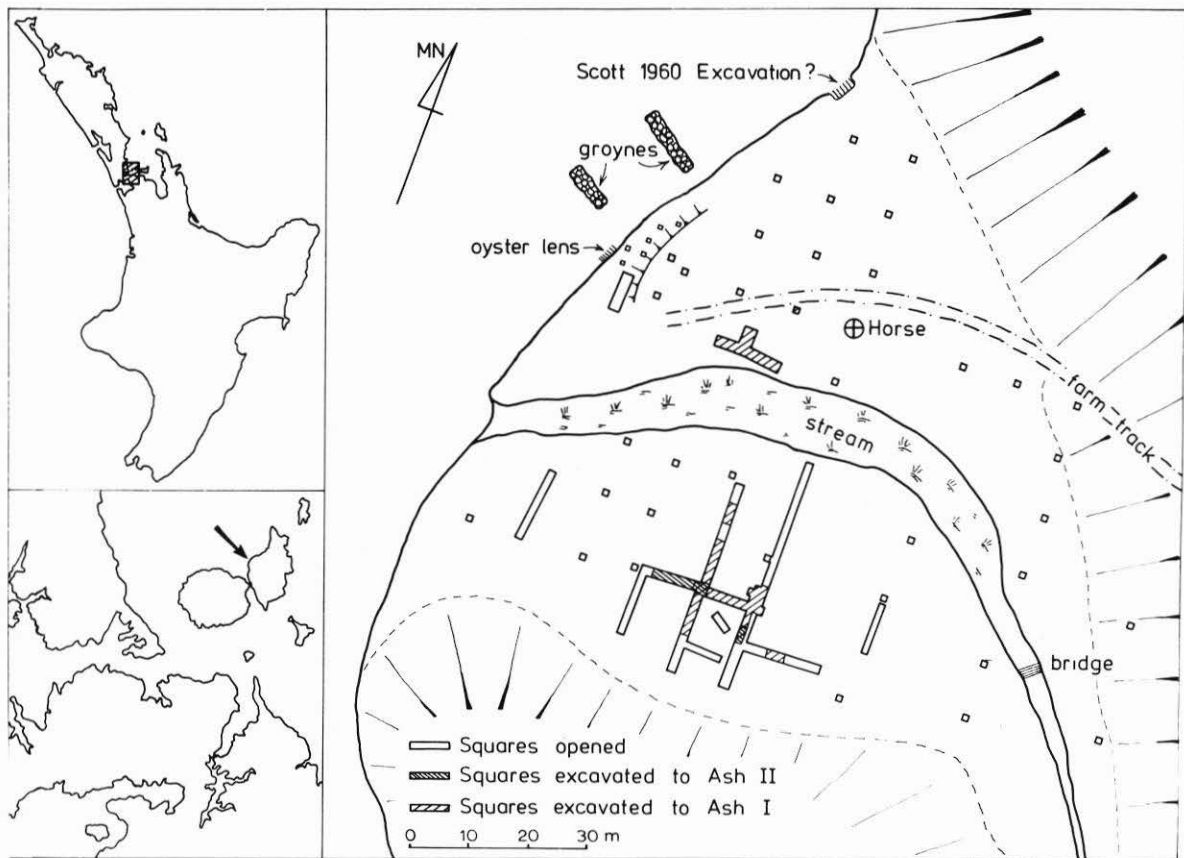


FIGURE 1. Site location and excavation layout.

wackes and cherts (Jurassic) (Mayer, 1965). Streams run down both ends of the fault line between the two, and N38/24 is situated at the mouth of the north-western stream (Fig. 1).

### Excavations

Excavation began by digging 1 m<sup>2</sup> test pits on a 10 m grid, commencing from site datum 'HORSE', a cabbage tree in the middle of the northern flats - see Figure 1. The lines magnetic north-south were labelled with letters of the alphabet, running west to east; the lines east-west were given arabic numerals, running north to south. HORSE was at H13.

An area of interest was a small patch of oyster shell, with mussels and occasional fish and bird bone, exposed in section beneath the ash about 50 m south of Scott's excavation (see Scott, 1970). In this area some 50 x 50 cm test pits were dug on a 2.5 m grid.

Twenty metres north of the oysters a 1 m wide section was cut through the ash exposed in the beachfront. This showed that there were at least four superimposed ash showers. These are numbered I-IV, from the bottom up. Each shower commenced with the fall of black glassy particles from pinhead to matchhead size. The finer material in each shower is brown, with some paler bands. Above Ash IV, and less easily distinguished, are numerous thin bands of coarse ash. Initially interpreted as the residue of ash winnowed by the wind, these are now known to be some of perhaps 20 small showers, presumably in very quick succession, that followed the large early showers. Above the ash was clean wind-blown sand.

In the grid behind the oyster lens the sand and reworked ash was quickly removed, when it was found that there were holes in the in situ ash. Two of these joined below the surface, as though they were the mould of a forked stick.

A trench was then opened facing the beach, just to the south of the oyster lens. The surface sand was removed, with a small scatter of crushed cockle shell, to expose features in the reworked ash. In the south of the trench was a large patch of dog coprolites. Around these were rows of stake-holes. A dog pen may be indicated, but the holes are so slight that a structure built on them can hardly have been secure. Perhaps they were held together at the top, when the structure would be a 'cage' rather than a 'pen' (Fig. 2).

In the north of the trench few features could be found, perhaps due to erosion, though there is an alignment of larger postholes. A feature in an adjacent test pit is notable, however, a very small rectangular basin 13 cm deep (Fig. 2). This somewhat resembles 'annexes' to pits at Kohika, N68/140 (Geoff Irwin, pers. comm.) and Taharoa, N73/12 (Lyn Williams, pers. comm.), but as the area immediately to seaward has not been excavated, the presence of a larger pit in this case is uncertain.

In the meantime holes on the main 10 m grid had been opened on several lines. Several of the squares in the north encountered shell, just below the turf. I think several discrete patches of shell are represented, but there is a major concentration around H14. Cockle dominates this material, with quantities of pipi and odd rock oysters, mussels and catseyes and bones of snapper.

The grid squares on the northern flats also produced the largest collection of stone material from the excavations. Included is chert, several varieties of obsidian and a fragment of a polished rectangular argillite adze, while greywacke dominates the assemblage. Artefacts in greywacke include a drillpoint and a small unfinished adze, as well as a great number of waste flakes. These flakes are generally small, and pieces with cortex are rare, indicating that adze making commenced elsewhere, and was only transferred to the sand flats when more or less satisfactory roughouts had been produced. Confirming this is the second group of artefacts from the site, a large number of preforms, in various degrees of finish, found among boulders on the shore platform. Some of these are illustrated in Figure 3.

As the primary interest in the site concerned material below the ash, test-pit G13 was dug through the ash to examine the prospects. It was found that all the air-fall material above the middle of the second shower had been removed, but it was interesting to discover that the upper surface of Ash I could be excavated in plan. This revealed a peculiar dimpled surface, which I attributed to the effects of wind. Ash I was then removed, and the sand below the ash was found to contain charcoal and fish scales, so it was apparent that the area of occupation below the ash was quite extensive. In this context the scatters of material on top of the ash were not particularly welcome, but the intention at this stage was to open larger

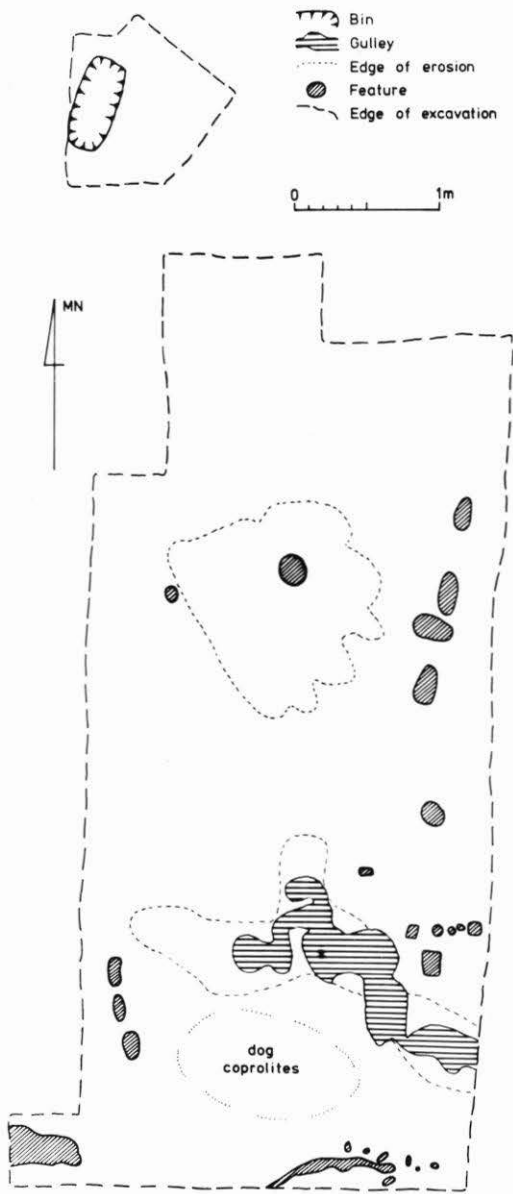


FIGURE 2. Plan of beach trench, D13-D14.

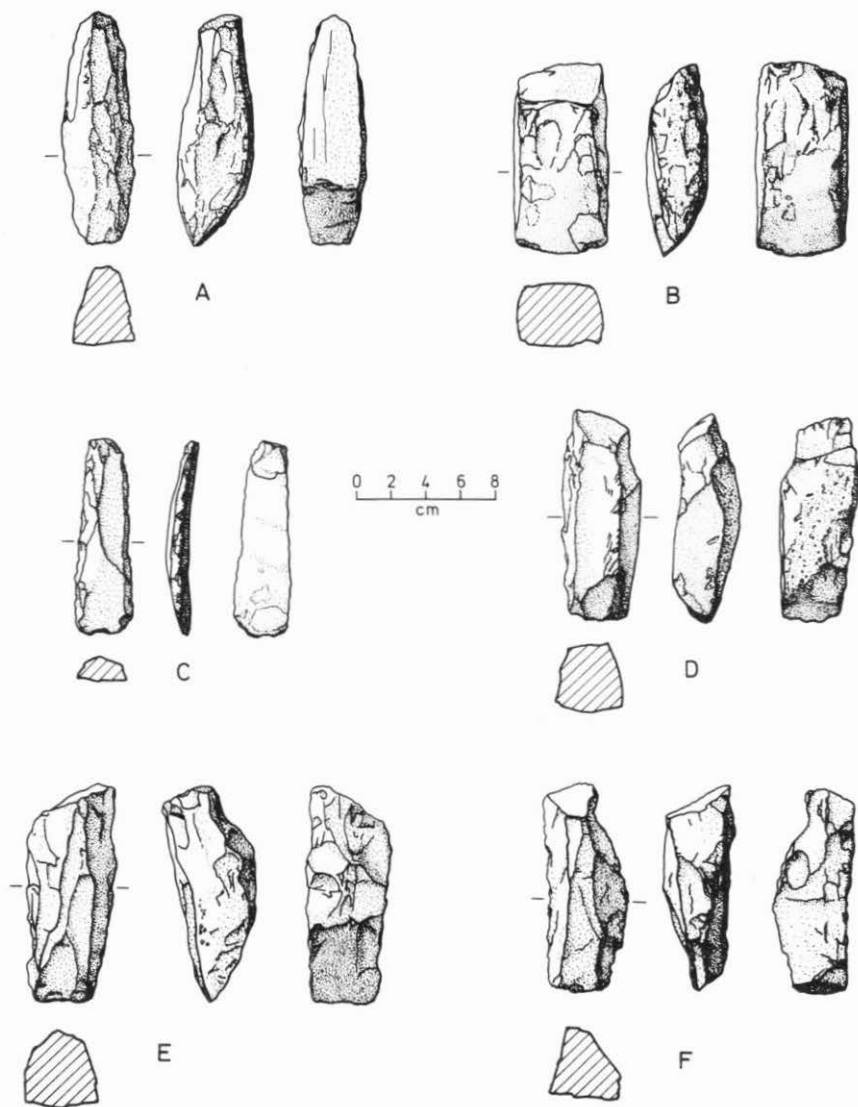


FIGURE 3. Adzes from shore platform below site.

squares in this area of the site. This is still my intention, but events on the south side of the stream intervened and the centre of interest and activity moved there, where it remained more or less throughout the remainder of the first season of excavation.

Establishing the behaviour of the stream since the ash fell was important when finding the extent of the site at that time, and pits were dug on the grid out into the flats on the south bank. Particular attention was given to line H, where a trench was dug connecting H16 to H18, and later extended north, to within a few metres of the modern stream. The flats are composed of many layers of coarse reworked ash, and are cut by at least three drains running toward the sea. One of these is a very substantial trench, 2 m deep by 1 m wide, and over 30 m long. The others are small semicircular grooves, in one of which was the remains of a broken long-handled shovel. This and the large drain both contained voids left by the decay of pieces of wood - branches, I think - and all three are likely to be historic.

Over most of the flats the original airfall ash has been washed away, but at one point it can be seen in situ on top of a drift of discoloured sand, on a lens of charcoal, resting on clean red sand and gravel. The red material appears to be reworked material from the 'basal conglomerate' of the Waitemata beds, which outcrops at the mouth of the valley and evidently somewhere upstream. North of the lens of charcoal there is a deep channel containing a tree trunk and other remains of vegetation.

To the south the bank of the stream was red sand, finer material blown out of the stream bed. Pit H had earlier been dug through the ash down to this sand. Uppermost was clean windblown sand, then the characteristic gravel laden profiles of two 'made' soils, the upper dark brown, the lower pale yellow. Below that, tan reworked ash then ash in situ (Figs 4 and 6).

Beneath the ash in situ a dark feature was noticed, which for some time was believed to be a structure predating the ash, but which has been found to be the edge of a round storage bin cut into the ash. This is the first of four encountered in Trench H - see Figures 4-7.



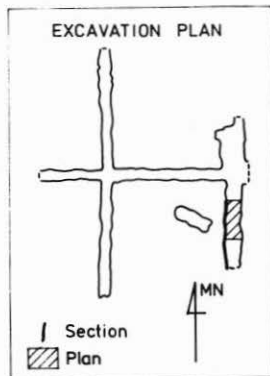
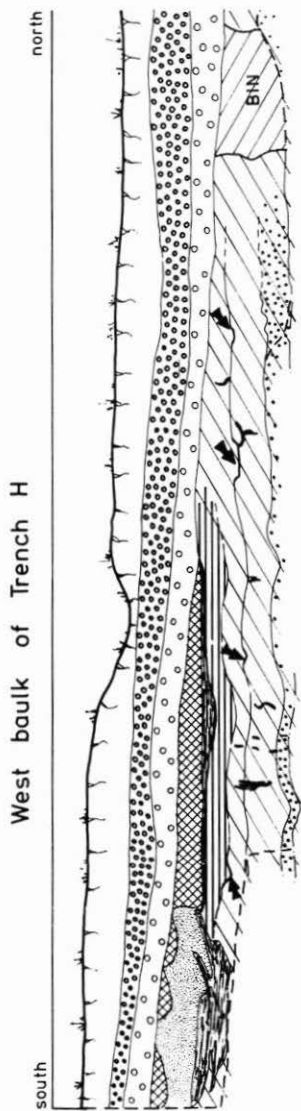


FIGURE 4. Section, Trench H.

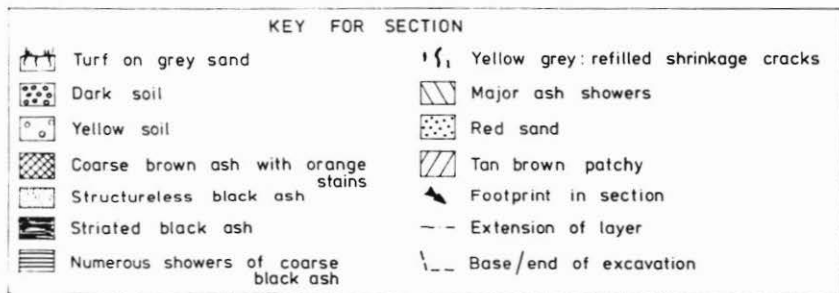


FIGURE 5. Features on footprint surface, Trench H.

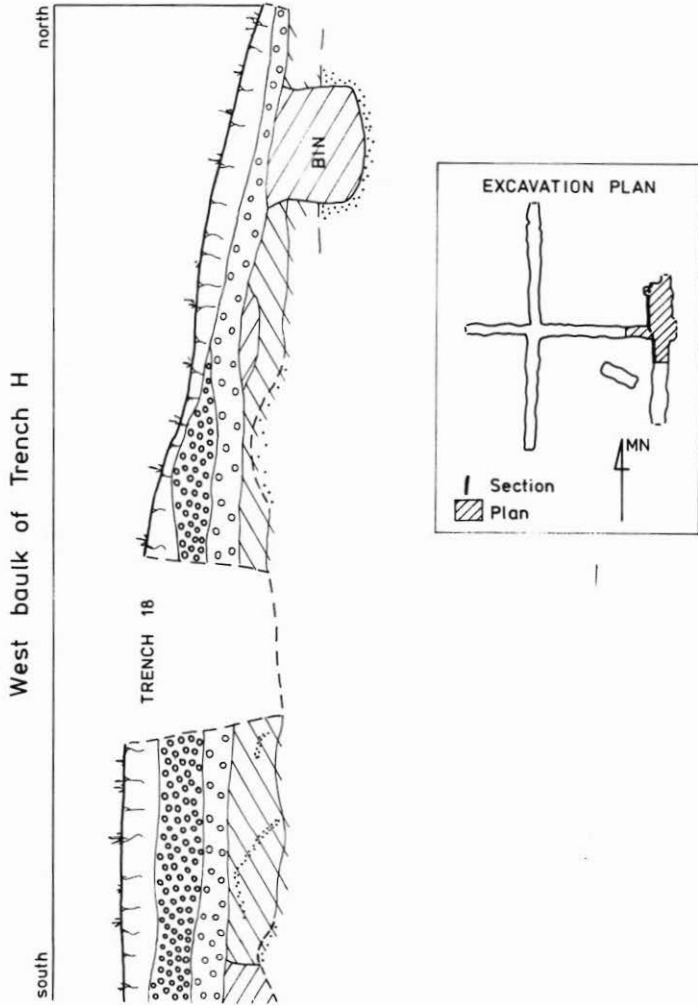


FIGURE 6. Section, Trench H.

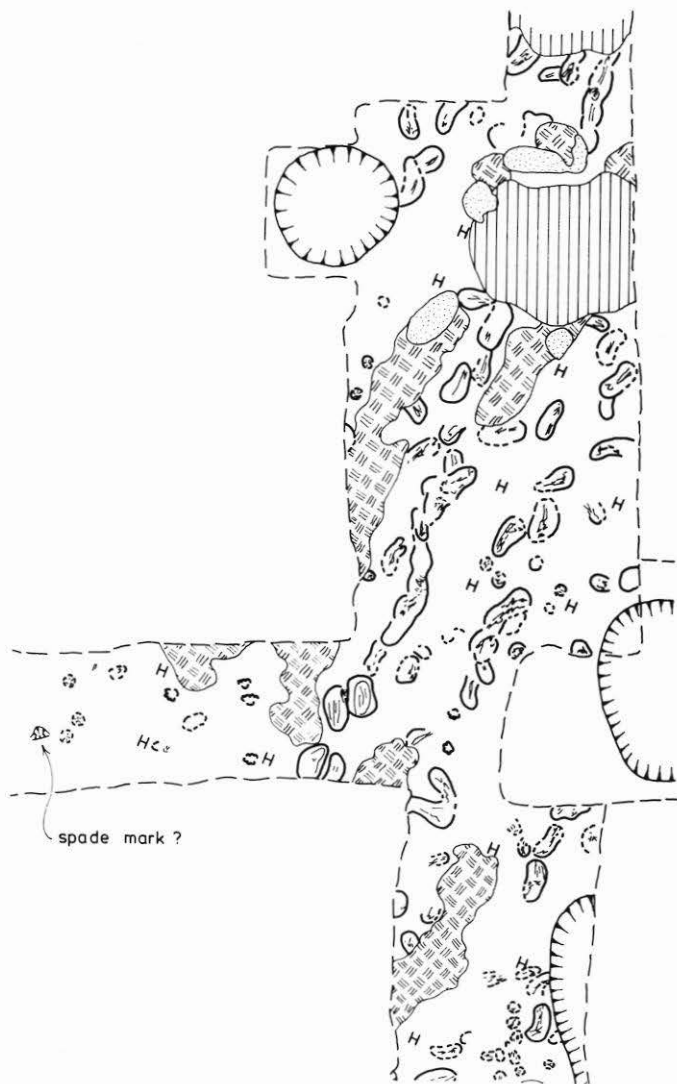


FIGURE 7. Features on footprint surface, Trench H.

As the trench was extended up the slope toward H18 the in situ ash was encountered, which needed a crowbar. Almost immediately a piece of ash was knocked off, to reveal the upper surface of Ash I, and I decided to expose this surface in plan. In the next two hours I opened a strip about two metres long by one metre wide, to find that the surface was covered with indentations, which I realised were human footprints. This seemed almost too good to be true.

#### Features on the footprint surface

It was immediately apparent that there was a site here that would appeal to a very great many people who otherwise would not encounter any prehistory of real interest to them, so it was important to explore the extent of this surface, or at least the portion with footprints, and the excavation was concentrated on this objective from this point on. As the hardness of the ash would have made extensive excavation very costly, I decided to dig a network of trenches over the site, and for convenience these were dug so as to connect the test-pits on the 10 m grid, starting from H18. Generally a bit under a metre across, these trenches were wide enough to prevent anyone being able to cross an excavated line without leaving footprints on the strip exposed, so the extend of the patch of footprints could be established with a minimum of excavation. In addition, being able to stop right on the surface depended on knowing just where the surface was, so once the layers of made soil and reworked ash had been stripped from the line of a trench, the in situ ash was removed by advancing a face; the ash was knocked off using a crowbar till only a few centimetres remained above the surface, and this was then removed using a handpick with a blade about 3 cm wide. It was later found that simply hammering on top of the thin skin worked even better, because of the weakness of the contacts between the coarse black fraction of Ash II and the brown material above and below.

Following the topography of the underlying sand dune, the surface of Ash I sloped toward the open sea to the north-west. Across this face ran hummocks, with an amplitude of 10-15 cm, about 70 cm apart in rows about 70 cm apart. These rows followed the line 200°-200° magnetic.

Human footprints are visible at many places on this surface, as isolated prints and clear sequences, the longest a line of seven prints running up the trench between G18 and G19 (Fig. 8).

In Trench H the prints can be seen to be travelling backwards and forwards between the rows of sand hummocks. This has produced several superimpositions, and in places the tracks have combined so as to appear to be grooves in the surface. South-west of H18 a trench was dug across the apparent line of march. I think that one track is visible, but this area is badly disturbed.

Dog prints were also found at several points in the trenches ranging in size from less than 4 cm long, clearly representing a puppy, to a very clear print 8 cm long including the striking claw marks. Notable is a group of prints in a small depression just north of G19, where ripple marks suggest a dog was drinking at a puddle (Pl. 1).

About half way between G18 and H18 are two small holes in the surface of Ash I. These are round, about 3 cm across by about 7 cm deep and about 20 cm apart. To me they look very like the marks made by a digging stick, and it is possible that the two holes were made by a stick with two prongs. A little closer to H18 is a mark that I suspect was made by a spade-like implement.

The last kind of feature on the surface are patches of disturbance, where it was impossible to find the boundary between Ash I and Ash II. These occurred in highpoints on the Ash I copy of the undulating sand surface. The patches are generally small, and it was possible to work round the disturbances, until the trench south from H18 had been advanced 4 m. Here disturbance stretched right across the trench, and I had to try again to find its top. I had done this several times before, but I had not been able to establish any satisfactory upper edge to them. Here, where a greater depth of in situ ash had survived the erosion along the slope, I found that the disturbances were part of Ash II, and that the interface between Ash I and Ash II had been destroyed. I therefore decided to follow the surface of Ash II.

By this time I had already excavated a small area of this surface in the area of G18. This had proved rather tricky, because Ash III had started with a hiccup - a thin band, mainly of the coarse black material - but no features had been found on Ash II there, and Ash II was removed, to trace features on Ash I.

When excavating in Trench H the hiccup at the beginning of Ash III was again found to be a complication, but the surface of Ash II was cleared through to a point 7 m south of H18. This surface was found to be very much more irregular than that of Ash I, and included streaks of red sand like that below the ash. The surface also had a few footprints, including the only two so far found with unmistakable toes (Pl. 2). Later, some footprints were also found on Ash II to the west of G18.

#### The Sunde excavation and prehistoric economics

For the purposes of my research, the original appeal of the footprints was that they provided what was obviously a very promising possibility of estimating the size of a group living at the site at the time of the ashfall. Apart from the general relevance to prehistory of this information, it fitted beautifully into the specific research strategy I had hoped all along to be able to employ on the site.

This involves a version of the 'Nelson-Gifford Model' (Ambrose, 1967; Nichol, 1978:Ch. 3). The approach suggested is that the significance of plant foods at a site be assessed by comparing the food that would be required by the people at the site (group size and duration of occupation to be determined), with the quantity of food that can be identified from the animal bone and shell remains surviving, the (presumed) deficit being attributed to vegetables. Here the accurate estimation of population is essential, and the footprints left by the members of a prehistoric group go closer to providing this information than any other possibility that I can think of.

For this reason I attempted to identify different people among the footprints by seeing how well visitors to the site could be fitted to the prints of various sizes. This needs to be done in a systematic way, and casts have been made that will eventually allow this, but for the moment, I am reasonably confident that I can identify at least eight individuals; three adults and five children, from my size or a bit more (180 cm+) to smaller than an infant of 18 months. Children can be expected to be easier to distinguish, because their size changes more rapidly with age, so there may be more adults unrecognised, and of course more children. Also, the sample size is still small. Overall, I would guess that ten or more people would have been at the site.

This is interesting information, and traces of food consumption on the northern flats (snapper scales and a small fire

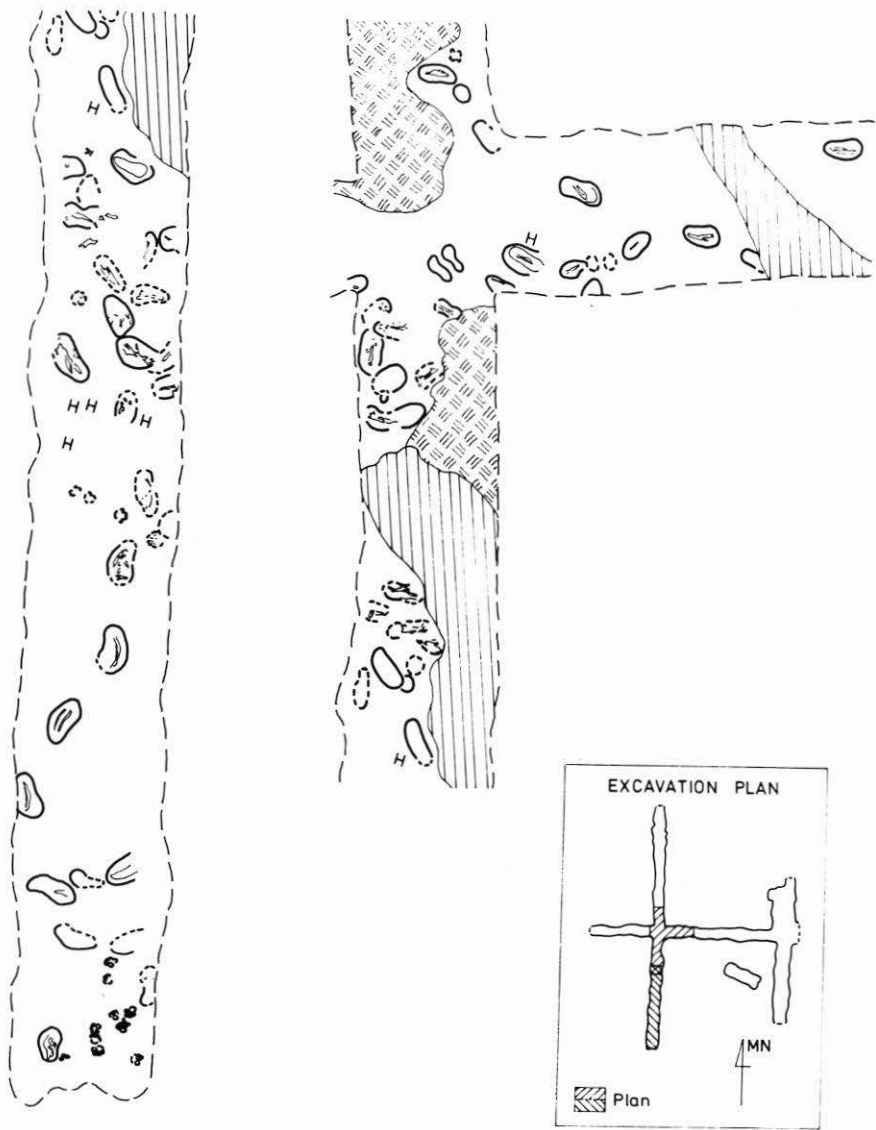


FIGURE 8. Features on footprint surface, Trench G18-G19.



on the surface of Ash I) indicate that the remaining variables of duration of occupation and meat consumption could also be specified. Whether the results would be of general applicability is most doubtful, however. The ash shower is such an unusual event that it is unlikely that people's behaviour in the vicinity would have been at all typical. I believe that the people walking on Ash I arrived after the ashfall, when they are likely to have brought food with them. This would probably have been stored food, which might not have been that usually consumed at that time of the year. And for people trying to subsist at the site, shellfish, wild plants, probably birds, and perhaps local stored foods, would have been inaccessible, and the fishing too might have been badly affected.

More generally, the geological setting of the site, on the contact between the Waitemata sandstones and the Waipapa greywackes, makes it probably the closest source of workable stone for the occupants of the fertile soils of the Auckland area; the roughouts among the beach boulders support this interpretation, and to the extent that the supply of stone was a major factor in the site's location, it cannot be assumed that subsistence behaviour there was typical of the period as a whole.

However, the results of the excavation do have very clear implications for the study of the subsistence economy of the inhabitants, once the meaning of the activities on the surface of Ash I are understood.

For some time it was my idea that the south bank was the living area for the residents of the valley, which made sense for several reasons. The south bank was sunnier and more sheltered. Early in the excavation I thought that Bin 1 was a feature beneath the ash, so occupation there seemed established. Features on Ash I were consistent with this interpretation: footprints showed that the inhabitants were taking an interest in the area; and the marks of the digging stick and the patches of disturbance on the surface of the ash looked to me somewhat like spoil deposited by people digging in the ash for belongings buried, presumably in their houses, by the first ash fall. However, it now seems unlikely that the area was occupied at the time the ash fell. It turned out that the bins are later than the ash, and the quite regular undulations in the red sand would probably be destroyed if people were living among them.

The fact that the patches of 'spoil' mixed with sand were on top of the high spots had led to to speculate on their resem-

blance to garden mounds described by Bruce McFadgen, but I could not understand why I could not find the surface of the heaps. It was Doug Sutton's suggestion that the big spoil-heap at the southern end of Trench H was a garden that drew together several pieces of information into an intriguing version of events on the south bank during the period of the ash fall.

Crucial to understanding the site are the patches of disturbance on Ash I. The interpretation offered is that these are indeed the remains of a garden, made by digging sand into the surface of Ash II. The patches generally occur on high spots on Ash I because of the method of digging in the sand: just as the topography of Ash I copies the underlying sand, Ash II copies Ash I. When Ash II was first dug over, the surface would have been generally flattened. That would have brought the buried surface of the first ash closer to the ground surface so a uniform final dig over might catch the hummocks, while missing the low areas (Fig. 9). We have been very lucky, particularly when most of the footprints run down the valleys.

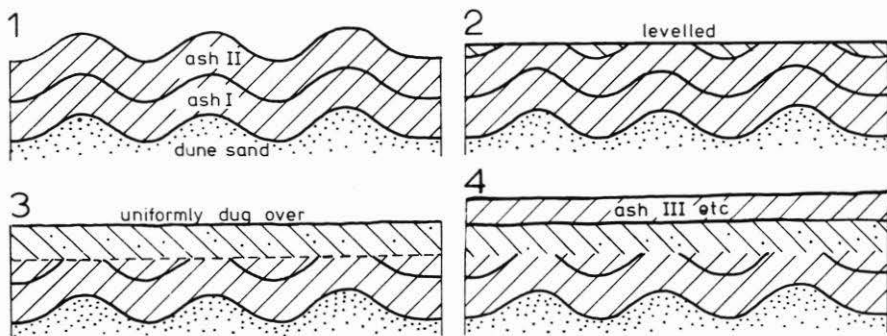


FIGURE 9. Stylised section showing nature of disturbance on hummocks.

But as that garden was made on the second shower the features on the surface of the first shower still need explaining, and my interpretation is that these are also associated with garden making. This would explain the marks of garden implements, and makes sense of the trails backwards and forwards between the rows of hummocks: I think that these tracks were

caused by people carrying kits of sand from the stream bank for adding to the ash, and returning.

The area being dug over at that time has not been found yet, but the patch might still have been very small when the second shower interrupted the work, and the people might only just have come to the island, out of curiosity.

A juvenile's rather peculiar print, with a very narrow heel, appears on both the first and second showers, so people seem able to survive the ash. Like modern Aucklanders, these people do not seem to have been deterred by the continuing activity, and disturbances over hundreds of square metres of the first ash show that this time they were able to dig over a large area.

Prints can be seen in section on top of the third and fourth showers, but they cannot be interpreted and erosion has removed much of this material. The gardening certainly persisted, however, and following the ash showers the area was occupied by a group of storage pits, and then two successive made soils, produced by digging gravel and rolled shell from the beach into the weathering surface of the ash. This coarser material seems more typical of the additives in Maori made soils, but after the first ash shower the beach is likely to have been buried, while the sand may well have been exposed in the stream bank, and a borrow-pit beside the stream would also be closer to the garden area.

It is almost certain that the borrow-pit for the garden on Ash II destroyed that for the garden on Ash I, and I think that both were in an area subsequently damaged by the stream. The small area of garden on the first ash is probably still accessible, however, and it is hoped that my interpretation can be tested by further excavation.

Nevertheless, from the point of view of the question of the subsistence base of the residents, the implications of these excavations are already clear. Even ignoring the possibility of the garden on Ash I, that on Ash II suggests very strongly to me that the people were fundamentally horticulturalists: literally before the dust had settled, they had taken the chance to make gardens in the freshly fallen fertile ash.

Summary of suggested sequence of occupation

1. Before the ash, adze making using local stone, with casual exploitation of local marine and forest resources.
2. During the period of ash showers, attempts at garden construction on south bank.
3. After the ash showers, use of storage pits on south bank. Perhaps contemporaneously, dog pen and other structures on north bank, though these may be associated with:
4. Development of garden soils on both banks. Use of local stone and fauna continues.
5. Drainage by European farmers.

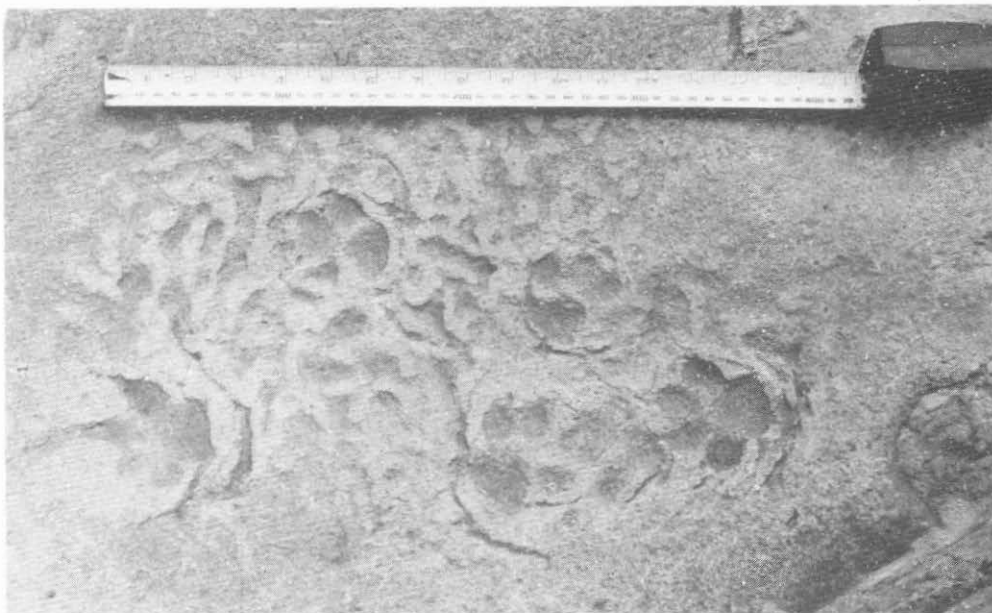
Acknowledgements

I have a great many people to thank for their interest, help and encouragement during the excavation at the Sunde site, and in the production of this report. Some of these people are: Fred and Tessa David, John and Francis, Tim and Kyra, Frank van Deusen, Bob McCabe and Graeme Bold, Bernie, Rangī and Willie, and Pip and Anne Mansell, and all the children, from Motutapu; Frank Arnott, secretary of the Hauraki Gulf Maritime Park Board; Graham Turbott of the Board's Scientific Committee; Professor L.H. Millener, Phil Millener, Stuart Park and Rudy Sunde; George, Brian and Steve of the Blue Boats. I also thank, from the Anthropology Department, University of Auckland, Karel Peters, Caroline Phillips, Val Bailey, Roger Green, Geoff Irwin, Harry Allen, Louise Furey, Richard Cassels and Ian Lawlor, Sue Bulmer of N.Z.H.P.T., Nigel and Kathy Prickett, Garry Law, Simon Best and Doug Sutton, and my wife Eve. Finally, all the students who made the excavations so very enjoyable.

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SUNDE SITE Plate 1. Dog prints in ash.



SUNDE SITE Plate 2. Human footprint in ash.