RECORDS OF
THE OTAGO MUSEUM

PUBLISHED BY THE OTAGO MUSEUM TRUST BOARD
GREAT KING STREET, DUNEDIN, NEW ZEALAND

Anthropology Number 4 15 November 1967

Little Papanui and Otago Prehistory

D. R. Simmons, Otago Museum

CONTENTS

INTRODUCTION

Little Papanui[1] has long been known in New Zealand prehistory as an important site, though an anomalous one, as the published collection of material from it includes both early and late items. Lack of precise stratigraphic information about this material has obscured the similarities to other material within Murihiku, or within the wider context of New Zealand prehistory.

The setting of the site is Papanui Bay just to the north of Cape Saunders and about twenty miles from Dunedin. At the southern end of the mile long bay

are steep cliffs containing an opal-jasperoid outcrop locally known as the 'Pudding-stone,' a well-known fishing ground and seal colony. Along the bay, among the sand dunes and at the foot of the cliffs, is a permanent rookery for yellow-eyed penguins, and the rocks abound in paua, mussel and small crayfish. The formerly bush-clad hills rising behind the bay must also have been a good source of food.

The main site lies at the southern end of the bay, but is not the only sign of prehistoric activity. About the mid point of the beach, above the rocks, is a fairly late terrace site excavated by the Otago Anthropological Society in 1965.[2] At the northern end of the bay is another small terrace and fishing site which was excavated by Teviotdale in 1929.[3]

The main site was discovered by collectors, notably Bollons and Christie, years before 1925, when it first came to the notice of David Teviotdale.[4] The eroding northern side was the main attraction for collectors who did little substantial damage to the site. Teviotdale visited the site on 27 December 1926[5] and found 'two good fireplaces' exposed by the wind. From then on he systematically dug a large part of the site, keeping a diary of his work, including details of the stratigraphy and position of artifacts. After his appointment as archaeologist at Otago Museum in 1929, his finds were entered in the Museum registers with the relevant details and all his previous collection placed in the Museum. During nine years, he continued to work methodically, with brief interruptions, every available day, weekends and public holidays.

In 1929, 1930, 1931 and 1932, Dr H. D. Skinner of Otago Museum organized parties of students and interested people to conduct excavations with Teviotdale at Little Papanui as part of the programme of the newly formed Anthropological Society, an archaeological branch of Otago Institute. For these excavations the site was gridded into ten-foot squares and all material catalogued and numbered as it was recovered.[6] A few photographs, maps, and one section-drawing, date from this period.

The work of the Otago Anthropological Society appears to have been the first attempt in New Zealand to excavate according to scientific principles. Before the Society's excavation in 1929, Teviotdale wrote a short account of his work which he later amplified. This later report is presented here. The quality of the recording at Little Papanui was sufficiently good[7] to allow a reconstruction on paper of the site some thirty years after the last visit of any of the principal excavators.

ACKNOWLEDGEMENTS

This study has been greatly facilitated by the kindness and cooperation of Charles Barwell of Invercargill, who lent Teviotdale diaries in his possession (now placed in Southland Museum) and Gordon White of Southland Museum, who placed other volumes at our disposal. The librarians of the Hocken, Mrs Strathern, Mrs Rodda and Mr Hitchings have been most helpful. Dr H. D. Skinner has been an unfailing source of information and a stimulating critic and colleague. P. W. Gathercole, L. M. Groube, M. G. Hitchings have been of great assistance in preparing the manuscript which the staff of Otago Museum, notably Mrs L. Jolly, have patiently retyped, with assistance from Mrs A. Stott. The illustrations have been prepared by Miss D. A. McHugh and Mrs P. G. Nevill.

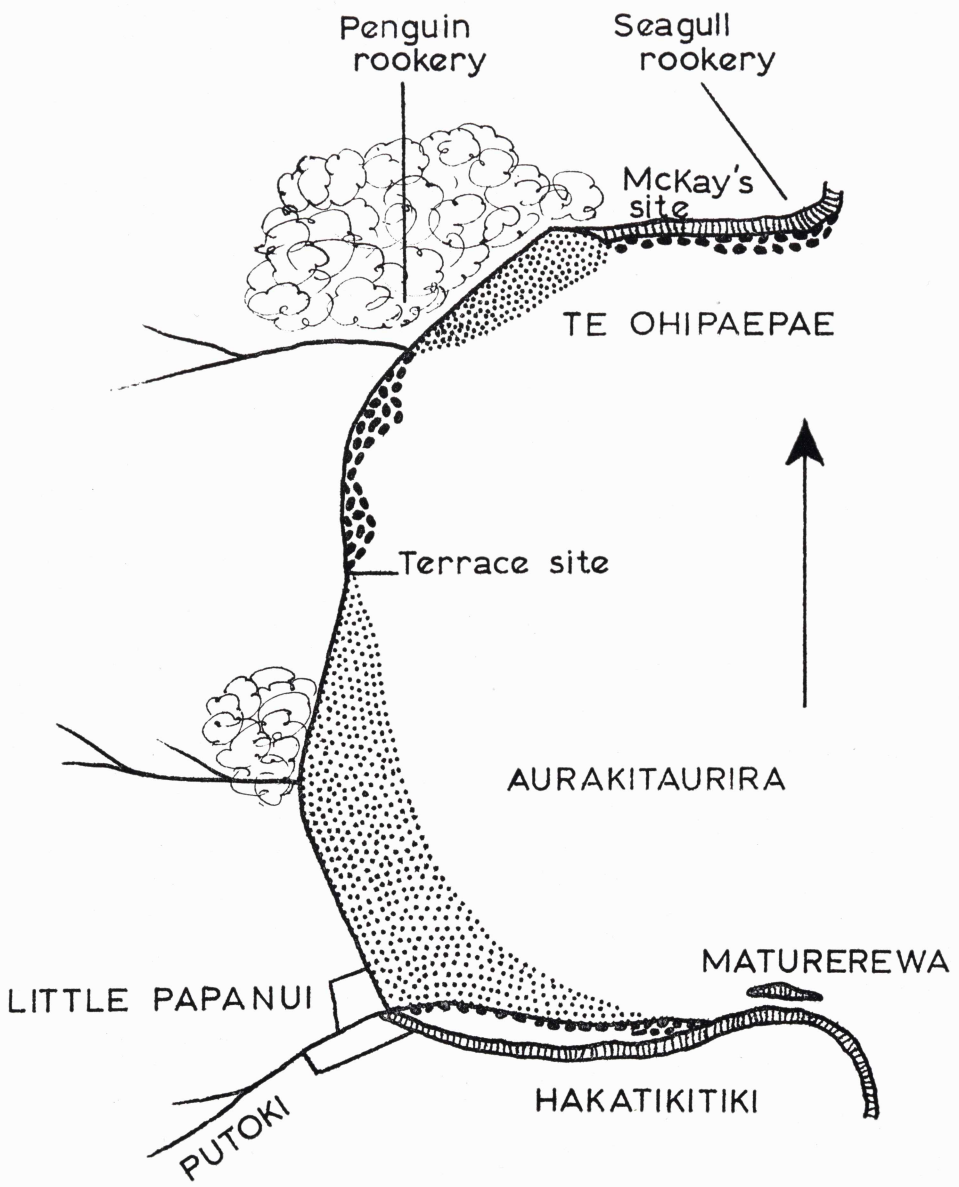


Fig. 1. Papanui Bay showing location of sites, from an original sketch by David Teviotdale.

REPORT BY DAVID TEVIOTDALE

THIS camp is north of Cape Saunders lighthouse on Otago Peninsula and lies at the mouth of a small creek marked on the Land and Surveys Department map as 'Putoki'. It is a warm sunny position, well sheltered from southerly winds and before the bush was felled, must have been a pretty and picturesque spot. It had all the ancient Maori could wish for as a convenient dwelling place, shelter, firewood, a sloping sandy beach for landing from canoes, while the rocky shores on either hand gave large supplies of paua and mussels to the bill of fare.

In company with the late Mr A. Gilmore I first visited this camp on December 27, 1926, and have visited it at intervals until the site has been almost completely worked over and in this article I propose to describe the work and its results.

As stated above, the camp is situated at the mouth of a small creek and is limited in area. At the right or south side of this creek mouth the bank slopes up to small cliffs and following along the tide level the cliffs are fully 150 feet

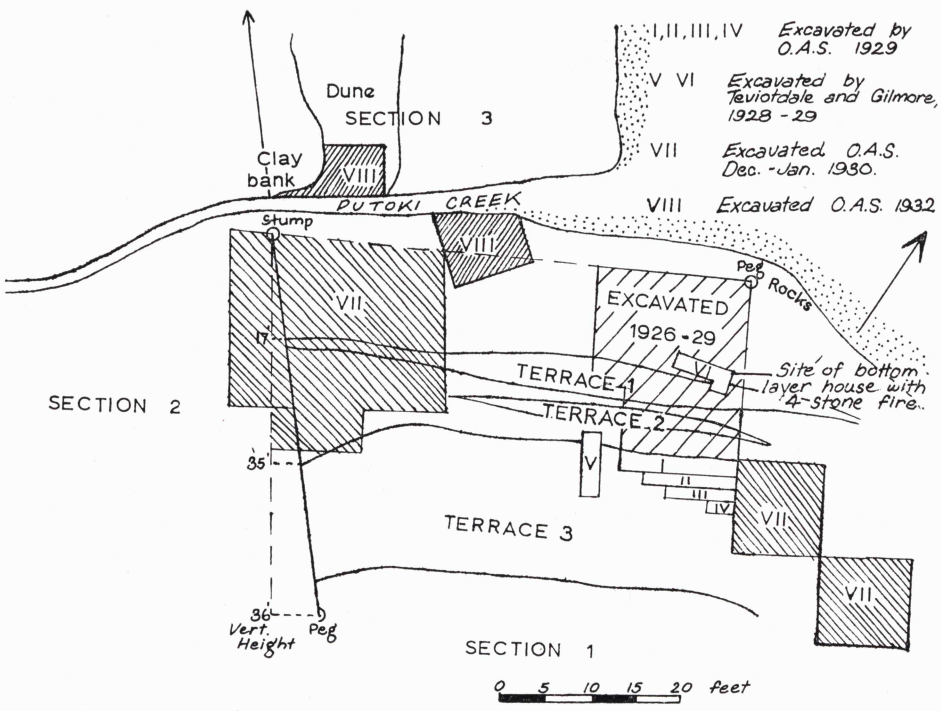


Fig. 2. Plan of excavations.

in height, rising steeply from the beach, but even at high tide it is possible to walk about a quarter of a mile under the cliffs.

At the mouth of the creek is a pile of huge rocks which form the toe of a slip from the cliffs forming a slope on which the natives camped. About thirty yards inland from this pile of rocks the creek is crossed by a fence and I will call the section between the sea and this fence on the south side of the creek No. 1.

The camp extends some distance from the fence inland and this is No. 2 section.

On the north side of the creek just inside the fence is a small gully perhaps 60 yards in length with a steep narrow clay ridge between it and the sea. The seaward side of this ridge was covered with sand and layers of Maori refuse and this refuse deposit continued parallel with the sea for about 100 yards. This is No. 3 section.

Section I

The position of this section seems to have been formed in past ages by a land-slip and looking from the north side of the creek three terraces could be seen distinctly but they are not so well defined when walking over the ground. The lower or No. 1 terrace is a few feet above the creek level and of small extent being about 10 paces long and 4 paces wide. It was excavated by a small working party from the Archaeological Branch of the Otago Institute directed by Dr H. D. Skinner. A hut site was found and on this site was a well-used whalebone carving mallet and several bone flutes as well as a number of bone fish hook points, sinkers etc. Near the hut site was a small oven containing a great deal of kokowai. The deposit over the hut site was upwards of three feet in depth.

No. 2 terrace is 35 paces long by 11 paces wide in the middle and the seaward end lies along a bank, so steep as almost to be a cliff, about 20 feet high. This terrace is perhaps 10 or 12 feet higher than No. 1. No. 3 terrace is 30 paces long by 6 paces wide and is from 6 to 8 feet higher than No. 2 and from it the ground slopes steeply upwards to low cliffs. At the seaward end these merge into the bold cliffs before mentioned. No. 3 terrace is thickly covered by boulders of varying size which have fallen from the cliffs above.

On No. 3 terrace I found two hut sites and a good deal of refuse containing seal and bird bones. The artifacts obtained were a few points of fish hooks and several adzes most being of greenstone. The deposit was shallow.

These terraces may have been formed by the slip but there was evidence that No. 2 had been at least partly formed by man. At the seaward end refuse had been thrown down the slope till a layer a few inches thick had been formed, then clay up to 12 inches in depth had been thrown over this and above the clay was a thick midden deposit. I think this layer of clay was waste from levelling the terrace. The terrace had been occupied from end to end and the deposit was from one to two feet deep but this deposit did not contain many artifacts.

Where the stream runs into the sea there is a pile of large boulders forming the toe of the slip. Just behind this pile of rocks and running up the slope to the terrace is the deposit mentioned above. The lower layer of this deposit contained

many fragments of moa bones but all were from bones suitable for manufacture. Many of the fragments were of large size. This area was the most interesting and prolific part of the site.

Just on the edge of the terrace and covered by a 12 inch layer of clay Mr Gilmore found a small hut site and a thin hard beaten layer of ashes etc. In this layer on the hut site he obtained a greenstone adze, a well made basalt adze and 2 damaged adzes and a toggle of bird bone. On the slope between this hut site and the pile of rocks from a space some 30 feet long by 20 feet wide I found 7 fish hook shanks of moa bone, a drill point made of greenstone, a large one piece fish hook of moa bone, a long slender bone fish hook point bevelled to fit into a slot in shank. I have found the butts of several hook points of this type but complete examples are scarce, 2 common adzes, a very large grooved sinker, 3 needles (one is very small), some bird spear points, bone chisels and a large number of tabs of moa bone in various stages of manufacture, a quartizite drill point, several flakes of obsidian, a grindstone and a number of rubbers and cutters of sandstone and several large flakes of quartzite. These large flakes are nearly always found in the lowest deposit. I found 5 butts of moa bone barracouta hooks in a space which could be covered by my hand. A well made point of a composite hook lay beside a broken one of the same type. These points were both of human bone. The shells in this deposit were mostly mussel with a number of paua shells which were generally faced downward. There were many bird bones. the majority apparently albatross. The outer half of the wings seemed to have been cut off and thrown away as these bones were usually together. From a space three feet long by one foot wide I obtained 8 pelvis bones of a large sea bird. Above this layer of refuse was about 12 inches of clay and above this clay was a layer of midden refuse one foot in thickness. This layer also contained adzes fish hooks etc. but was not as rich as the bottom layer. Moa bone was scarcer and the quartzite flakes were smaller than in the lower level. Otherwise there was no difference in the articles found. On the western end the terrace merged into the hillside and the midden extended along the slope and through the fence and a number of curios were found here. Working up the slope between the seaward end of No. 1 terrace and the inward end of No. 2 terrace Mr Gilmore found a large well made comb. All the teeth were broken but enough remained to show the comb had originally had 24 teeth. He also found the handle of a bone mere. This handle has two animal heads carved on the end.

Nearer the fence I found a hole about 8 inches in diameter and 18 inches deep and filled with ashes and a short distance away was a small circular depression ringed with stones and filled with ashes. I cannot suggest a reason for these features.

Section II

This extends over a large portion of the hillside on the south side of the creek and the traces of human occupation gradually peter out. Just outside the fence and a short distance from the creek there is a low steep cliff perhaps four feet in height. Midden refuse has almost hidden this bank and a large amount of material has been obtained here. At the inland end there was a midden fully three feet deep and here I obtained 3 very fine one piece fish hooks from the

bottom of the debris. Two of these are as perfect as when they left the maker's hands. I also obtained a number of well made needles, birdspear points and bone points of composite hooks as well as tabs and fragments of moa bone. On the bottom was the pelvic bones of a small species of moa very rotten and friable.

On the northern side of the creek some refuse had been thrown down the bank but I have found no trace of occupation above this midden. In it Mr S. V. Johnson obtained a number of bone artifacts and tabs of moa bones. The small gully mentioned above is also included in No. 2 section, and there was a lot of midden refuse in the bottom of the gully. This refuse contained a number of adzes and sinkers and other stone tools but the bone was all too perished to be of use.

Section III

Forming the eastern or seaward side of this gully is a small but steep spur. The southern end of this spur is just above the main creek and is perhaps 20 feet in height and is almost a precipice and forms a small narrow ridge until it merges into the hill. The top of the ridge has been swept bare to the clay by the wind and weather and the end at the creek was too steep to hold any deposit. On the seaward side sand had drifted against the ridge forming a long sandy slope. On this slope was a shallow deposit of Maori refuse. It was a favourite hunting ground for collectors and a great deal of material, mainly small articles such as fish hook points, needles, bird spears etc., has been obtained. Most of these were made of wing bones of a large sea bird, probably albatross but a few were made of seal.

In some places the clean sand was fully 3 feet deep and under it was a layer of midden refuse from 3 inches to 18 inches deep. This lies on a steep slope with a few inches of discoloured sand between it and the clay. In this lower layer I got a black stone adze (very neat) showing the mark of being sawn off a larger piece, also a needle in a bone case.

A whale bone pin or peg 11 inches long about 5 feet from the surface. 8 feet down head of stone shank serrated and well made. Harpoon point 4 feet down on top of bottom layer. Greenstone adze 8 feet from surface. Dog, moa and human bone.

Below this deposit was a layer of clean, wind drifted sand and for a long time I did not dig through this layer, altho by working from the edge of the creek I found there was midden refuse below this sand but owing to the sand continually slipping into my excavations I could make no progress.

In January of 1932 a working party from the Archaeological Branch of the Otago Institute, led by Mr H. D. Skinner, worked a portion of this deposit, and obtained a large number of curios. We turned the water of the creek in against the foot of the clay ridge and washed away the debris. Each time I visited the site I repaired the race and whenever sufficient water was available sluiced away the fallen debris and worked up the sloping clay bank, shovelling the sand and debris down the bank where the water could carry it to the sea. By this method I worked an area some 60 yards in length and 11 yards in breadth and some of it was fully 12 feet in depth. I found a beach of water-worn stones right up to the foot of the clay bank and ovens on the edge of this beach. The midden deposit

was often from 2 to 3 feet in depth at the foot of the slope but petered out until it merged with the surface layer near the top of the clay ridge.

Beween the two layers was a layer of clean sand and in this sand layer several human skeletons were found. Most of these were buried in the usual sitting or trussed up position but one had undoubtedly been a reburial. The bones of the body had been carefully placed in position, the foot and big bones underneath, pelvis and vertebra above these and armbones at either side. The skull was at the end of the vertebra, but placed so that the back of the skull was against the vertebra and the face looking in a N.W. direction. The face had a thick layer of kokowai over it. These skeletons must have belonged to a later generation than the first inhabitants as the burials were above the lowest occupation layer. It is hardly likely that they were the latest occupants of the site as I found hut sites above the burials and Maoris would not live above the graves of their people.

These hut sites were small and were close together. On and around them many of the commoner Maori artifacts were found. Moa bone had been used but was not as plentiful as in the lowest midden.

While the party was working Mr Skinner obtained the pelvis bones of a small species of moa. It was among the debris in the lowest level and was very decayed and friable. This pelvis and the one I found in Section II are the only ones obtained at Little Papanui and show that some moas were eaten there by the first inhabitants.

As the work progressed the deposit became thinner and sometimes there was little but discoloured sand but artifacts were often found on the clay just where the midden layer touched the clay bank. These articles were obtained at all depths and there was nothing by which the surface ones could be distinguished from those from the deepest layer. Moa bone was more plentiful and the fragments were larger in the lowest layer.

At the foot of the clay bank on the pebble beach and in the usual midden refuse I found a very large unbarbed one piece hook of moa bone. It is nearly $9\frac{1}{2}$ inches in length and is by far the largest one piece hook found in New Zealand. It lay at a depth of nine feet from the surface.

A stone fish hook point of the shape usually called barracouta hooks was found on the clay about 8 feet from the surface. It is well made and polished but has the point broken off. A large harpoon point was on the clay also. Farther up the clay bank and in the upper layer about three feet from the surface I found a well made 'Whakapapa' of human bone. It has 14 notches on one side and 16 on the other.

In this upper layer I found the burnt and broken bones of an adult human skeleton and a little distance from these were the partially burnt and broken bones of two children. These bones were mixed up with the rest of the usual midden refuse. Evidently the bodies had been used for food and the bones thrown among the midden refuse. This is the only evidence of cannibalism I have found so far in Murihiku village sites.

Greenstone was not uncommon in the lowest layer altho the total quantity obtained from the site is not large as all the articles made from it are small.

While doing this sluicing I was terribly handicapped by the actions of other fossickers. Nearly every time I visited the site I found my water race filled up

with debris thrown down the slope and a large part of the rest of the race would be washed away. Many days, half my working time was taken up repairing the damage done by these irresponsible diggers, who never attempted to open the ground for themselves but only took advantage of my work. Finally a spell of very wet weather brought down several slips filling up about two-thirds of my race and I gave up the struggle. It is very noticeable that these diggers have visited Little Papanui very seldom since then.

STRATIGRAPHY AT LITTLE PAPANUI

TEVIOTDALE'S report tells us a certain amount about the stratigraphy of the site. This, allied with the more detailed information from the diaries and Otago Anthropological Society records, has made possible a reconstruction of the stratigraphy.[9]

I. The southern side of the site contained two main occupation layers separated by up to a foot of clay in which occasional ovens and artifacts were found.

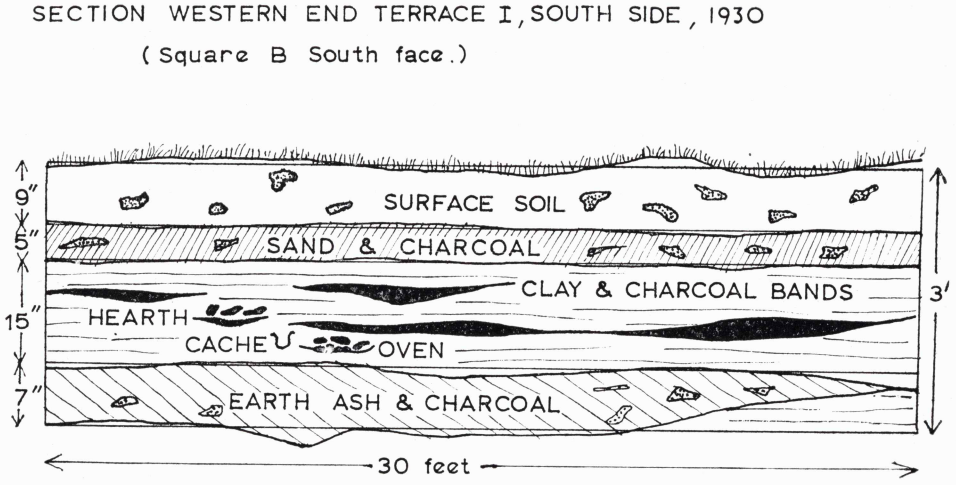


Fig. 3.

The Bottom Layer

The lowest layer, which varied from three feet in thickness to a few inches, consisted of ashes, shells, fish bones and scales, bird bones, and moa bones including the pelvis of a small moa. It was fairly deep in Section I at the eastern end of the site and continued along Terrace I into Section II, where it thinned out to two or three inches deep. The eastern end of the site slopes steeply to the sea shore and the layer followed the slope down reaching a depth of four feet, but at this point and at the western edge of Terrace I there was no interposed clay between the bottom and top layers. On the eastern end of Terrace

I, under the sealing clay layer at a depth of three feet from the surface, Teviotdale found a four-stone fireplace and a well-tramped floor. The fireplace was the usual type found by Teviotdale on Otago sites[10] consisting of two long and two short stones forming a rectangle about two feet long. From details of excavation it can be inferred that the house floor was between ten and twelve feet long and was a small terrace excavated into the sloping clay, the uphill edge formed by a steeply cut bank. The terrace was cut with the longitudinal axis at a right angle to the slope. About midway between the sea or eastern end of Terrace I and the former post and wire fence which marked the boundary of Teviotdale's Section I, a small oven was found. At the inland or western end of the terrace was an 18 inch posthole and a small nearly circular shallow depression filled with ash and ringed with small stones. Nearby Teviotdale found a large oven, six feet wide and 18 inches deep with a raked-out heap of ashes at the western end. This oven was similar to large ovens at the moa hunting sites at Shag River Mouth and Waitaki River Mouth.[11]

On Terrace II the lower occupation was not so extensive. An oven was found on the western end which was partly filled with ashes containing quartzite flakes and a large stone beneath which were two bird-spear points, a barracouta point and many pieces of moa bone.

Underlying the upper deposits on Terrace III was an area measuring about six feet by eight feet of fish bones and scales which Teviotdale considered identical with the lower layer on Terraces I and II.

The Middle Layer

This layer is not well described. It is best represented in the section drawing made in 1930 (fig. 3). It was a layer of clay up to twelve inches thick in Sections I and II containing ovens, caches and occasional artifacts.

The Top Layer

The upper layer extended over the great part of Teviotdale's Sections I and II on all three terraces. At the seaward end of Terrace I it followed the slope and reached a depth of four feet, otherwise it averaged eighteen inches. The layer consisted mainly of ashes, oven stones, charcoal, and contained food refuse in the form of shellfish, sea birds of the albatross family, a lot of seal (including many skulls), porpoise and human bones. Much of the bone material was burnt. There were a number of ovens in this layer, but no details are recorded as to their distribution. Four-stone fireplaces of houses are recorded in this layer, two on the top terrace and one on the western end of the bottom terrace.

II. The northern side of the site lies across Putoki Creek which is a small stream even in winter. When the area was bush-covered, as it was until about 1930, the creek would have formed a reliable fresh water supply. The northern side, or Section III was composed of occupation layers interspersed with dune sand terminated in about twelve feet of deposit against a windswept clay knob, the deposit extended to the beach and stretched for about one hundred yards north. The datum point used to indicate depth is the surface of the knob.

Bottom Layer

The bottom layer consisted of dirty sand and bones which included a small moa pelvis and other moa bones, bird and some seal bones, and shells. The layer

sloped from the western end where it touched the clay knob and was about 3 feet 6 inches to 4 feet from the surface and 2 feet thick, to its eastern extremity just below spring tide level about 40 feet away, where it was 9 feet below surface level of the clay knob and about six inches thick. Near the western end was a raked out oven, and two ovens were found at the eastern end. About the middle point a fire is noted, while some feet further on a posthole some 4 inches in diameter by 16 inches deep is recorded. In one area Teviotdale remarks on large pieces of tree, apparently burnt, and stones found. Part of the layer was capped by a six inch layer of clay.

Middle Layer

The middle layer on the north side consisted of sand and bones two feet below datum and two feet thick. It extended to near the present spring-tide level about forty feet away, where it amalgamated with the upper layer spilling down the slope. The middle layer contained much oven material and was black in colour. Teviotdale records ovens at the western end and also near the mid point. Seal bones were common, but split or worked moa bone was also present.

The Clean Sand Layer

The middle layer was separated from the top layer by a band of clean sand one foot thick at the western end where it was one foot below the datum. At the eastern end it was two feet thick and two feet down. In this clean sand Teviotdale found four skeletons and some other scattered human bones. Skeleton 1 was three feet from the knob surface at the western end; Skeleton 2 lay some feet further east, six inches below the top layer at a depth of about 18 inches; another skeleton (3) was nearby at a depth of 2 feet 6 inches to 3 feet below the datum. All these skeletons were deliberate burials. Teviotdale's account of Skeleton 1 is (June 30th 1932):

> 'The leg and arm bones were under the pelvis bones and not connected with it. The shoulder blades were on top of the ribs about where they should be if the body was buried face downwards. The skull was placed at the end of the bones but sitting erect not face downwards as the position of the other bones would suggest. The bones were laid and the skull faced due north or very near it. The face of the skull seemed to be (is) painted red . . . The bones were about three feet from the surface. There were several inches of clean sand between the bones and the lowest (middle) layer of midden. So the deceased must belong to the later inhabitants but not to the latest as there was no midden refuse mixed with the sand covering the bones and the upper layer was undisturbed . . . There was a fireplace not far away where I got some adzes (upper layer) and a large fish hook shank.'

Teviotdale considers it unlikely that a house would have been established above a known burial unless customs had changed. Skeleton 2 was female (Aug. 18, 1932):

> '. . . lying on its left side with head towards the west and the face looking northwards. It had been trussed up closely and was about 10' - 12' from the other one (No. 1). The sand immediately around was stained a deep brown.'

Skeleton 3 was excavated by H. D. Skinner and R. Duff on 6 September 1932. It was three feet from the surface a few inches above the middle layer.

> '. . . lay on its left side with head to the north and the body south and face to the east. The right arm lay along the right side with the hand on the abdomen. The left hand was under the cheek. The right leg was flexed and the left extended. It was probably female.'

Other human bones apart from those mentioned were found in the clean sand near Skeletons 1 and 2. Skeleton 4 was found some distance further east at a depth of five feet from the datum. It was trussed with the skull facing north. Three feet of deposit lay above it.

The Top Layer

The top layer on the north side extended from the surface of the clay knob, down to the sea face. At the clay knob it was a few inches thick but quickly deepened to 12 inches, then three feet. At the sea face it was covered with some five or six feet of drift sand which extended up the slope. The layer was characterized by much kokowai and burnt bone, mainly seal, with some bird, dog and human bone. In one spot the human bones included the burnt skulls of two children. Worked human bone was not uncommon.

The fireplace mentioned by Teviotdale, above, but not far from Skeleton 1, was in the middle of the layer and was of the four-stone type. Near it was burnt human bone. Further to the east at a depth of about three feet, on the bottom of the top layer, Teviotdale found six four-stone fireplaces each about ten feet from the next. Material was found around these — e.g. 5 September 1933:

> '. . . small fireplace and near it a large flat stone which had been used to grind kokowai. Near this were three round stones used for grinders. There were a few shells and sealbones and a few piles of cut bird bone.'

On 14 September 1933 he uncovered a fireplace three feet down with brown sand above it containing a few shells and bone. There was a great deal of kokowai in the floor layer of the hut. On the floor were found two serrated and multibarbed hooks, two tattoo needles, some cut bone and two small quartzite flakes. About twelve feet from this fireplace was another 30" long by 14" wide. The only indication of the size of the huts is recorded for another on 21 September 1933. He found six feet to the south of the fireplace the end of a pointed stake three inches in diameter. Six feet north of the fireplace was another stake of about four inches diameter:

> . . . these may have been the main supports of the roof and would show the hut to be about fourteen feet as the fireplace was about two and a half feet long.'

More than one occupation is represented in the top layer for on 30 September 1933, he records:

> 'I found (another) fireplace about six inches below the floor of the site (of the previous hut) evidently the site of an earlier camp.'

and on 10 November 1933 he noted a

> '. . . fairly large fireplace just on the upper edge of the midden refuse but there was nothing near it.'

On 10 March 1931 Teviotdale found in the upper layer, near its eastern end, a circular fireplace formed of seven stones touching each other. It was eighteen inches in diameter and filled with ashes. Two small boulders each a foot from the outer rim of the fireplace lay on either side so as to form the base corners of an isosceles triangle if the centre of a fireplace was the apex. Nearby was the skull of a small dog. On 23 May 1934, at the eastern end near where the top layer dipped down to the sea, another circular fireplace was found. It was twenty-one inches in diameter:

> '. . . formed of seven stones each about 9" long by 6" wide all touching each other in the ring. The bottom was sand and the fireplace was full of ashes. Nearby was a notched bird bone and some quartzite flakes and discoloured sand.'

LITTLE PAPANUI MATERIAL CULTURE

Little Papanui was a site rich in artifacts. In the analysis that follows, the two sides of the site, north and south of the creek, are considered independently and the various categories of artifacts from each layer treated separately.

It was necessary to devise methods first of dividing the artifacts into groups and then of comparing them. Adzes, for example, were subjected to a variable analysis, each feature of a particular adze being recorded separately. Subsequent consideration of these features revealed that certain of them formed constellations which occurred regularly in groups of adzes which were then taken as classes or types. Some features of course overlap the groups. Other artifacts were subjected to similar analyses.

ADZES

The raw materials used require a more detailed petrological study than has been attempted here. However at least one easily recognizable material used in the manufacture of adzes does have chronological significance, namely greenstone. Where an adze group has been made in both common stone and greenstone they are treated as two separate classes. The various classes of adzes are:

1. *Quadrangular,* tending to front wider than back in cross-section, ungripped.
2. *Same in greenstone.*
3. *Greenstone chisels,* usually circular or rounded in cross-section and c.5cm. long.
4. *Small flake adzes and gouges.* These have been considered together as a group of chisels. In cross-section they are as irregular as a flake, but the gauges are mainly ovoid or circular. The majority of this group are small, c. 6cm.

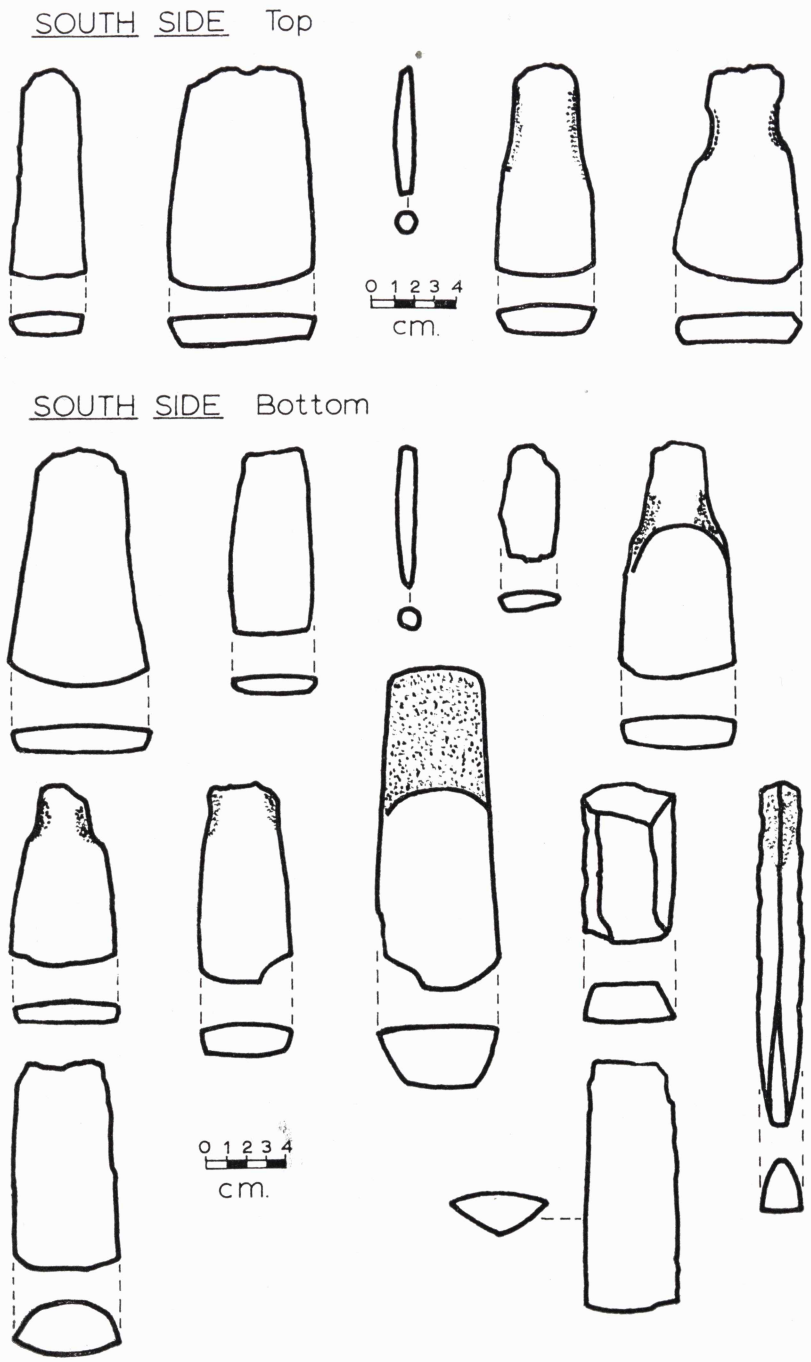


Fig. 4. Adze classes. South side.

5. *Marked spade shoulder.* Quadrangular cross-section tending to back wider than front. The grip has been produced by marked side reduction so that on an adze 6cm. long and 5cm. wide at the mid-point, the butt is reduced to 3.2cm. wide and a clear shoulder formed.
6. *Slight spade shoulder.* Cross-section same as for marked spade shoulder. Reduction of the sides is not marked and an adze 9cm. long and 4cm. wide at the mid-point is reduced to 3.5cm. on the butt.
7. *Greenstone spade shoulder,* usually the slight form.
8. *Waisted greenstone adzes.* Quadrangular cross-section with indentations on either side at about the mid-point.
9. *Quadrangular, front grip.* Cross-section usually thick, e.g. 5.5cm. x 3.5cm., with the back tending to be narrower than the front. Occasionally the cross-section is thinner (5cm. x 2cm.). Reduction of the grip is from the front, and usually two sides, to produce a rounded cross-section on the butt. The thickness of the adze may be reduced by as much as 1.5cm. or only slightly (1-2mm.) towards the butt which is thoroughly roughened by hammer dressing. Occasionally the butt is at a slight angle to the body of the adze making the back concave.
10. *Reversed quadrangular.* Back wider than front with a hollow bevel, ungripped.
11. *Triangular, apex up.* Triangular, apex to the front cross-section varying in size from 4.5cm. deep and 17cm. long to 2.5cm. deep by 17cm. long. The grip is produced by front reduction (1 to 5mm.). In many cases the back of the adze is concave and the front convex (hog back).
12. *Triangular, apex up, ungripped.*
13. *Triangular, apex down.* Low triangular cross-section (adze 12cm. long, 2.5 cm. thick). A slight grip is often produced by a roughening or flaking of the poll area and a very slight side reduction (c. 1mm. each side). The bevel is hollow ground and ends high up, about the mid-point of the adze.

FLAKE MATERIAL

1. *Parallel sided or leaf shaped blades.* Struck off from a prepared striking platform, usually in one operation. The cutting edges are then further prepared by fine retouch from one side or from alternate sides to produce a straight or saw edge. A number of finer sub-divisions into backed blades, thin blades, thick blades etc. are possible but were found to add little to the general analysis.
2. *Incipient blades.* Tools produced by the same technological process as the blades, but which have not resulted in the same fine tools. The distinction between blade and incipient blade has been found to have significance in the wider context of Murihiku prehistory.
3. *Large conchoidal flake.* A simple shell-shaped implement retouched on one, two or three sides and measuring more than 5cm. in width, i.e. across the bulb of percussion, parallel to the striking platform.
4. *Small conchoidal flake.* Similar to the large conchoidal flake but measuring less than 5cm. in width.

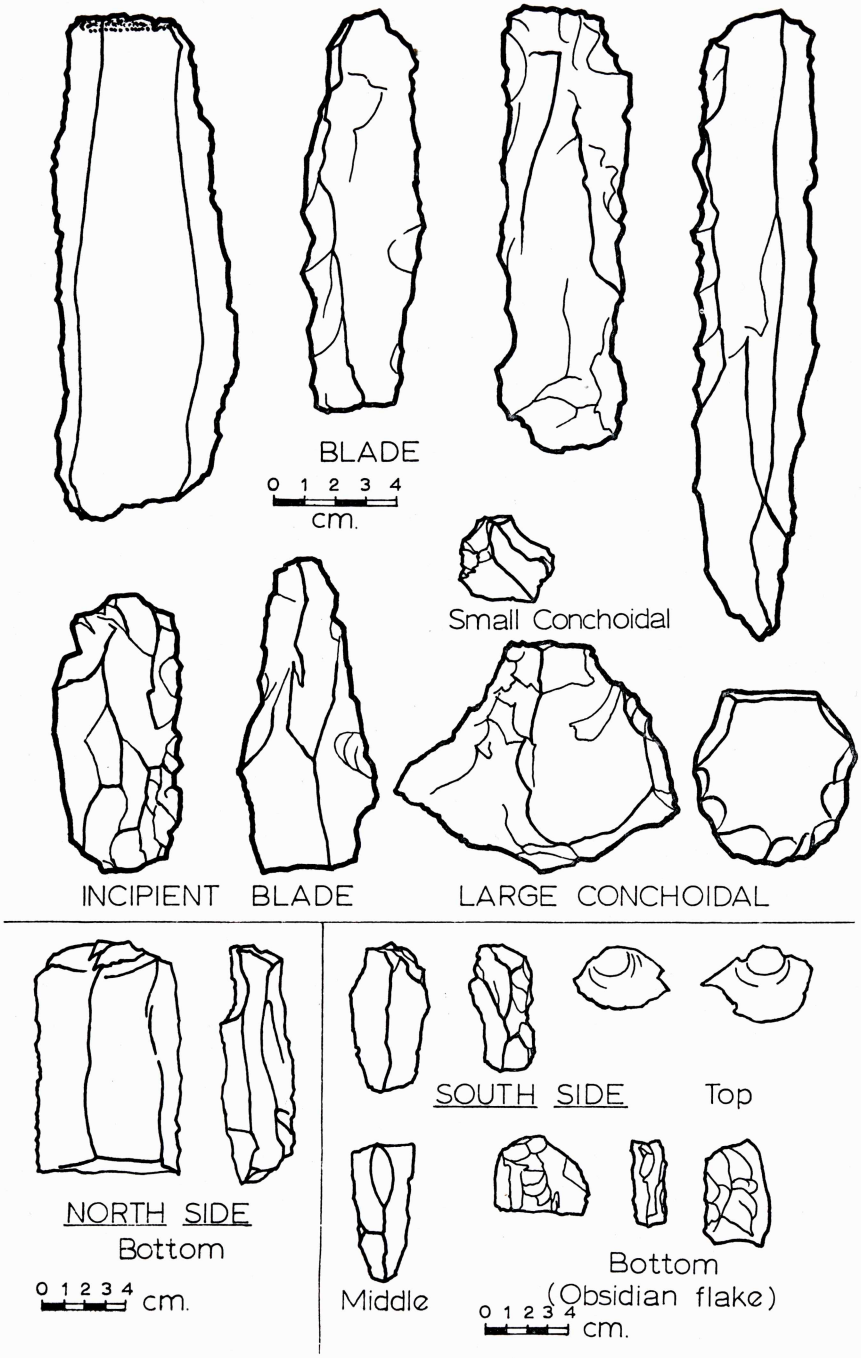


Fig. 5. Flake tools. South side.

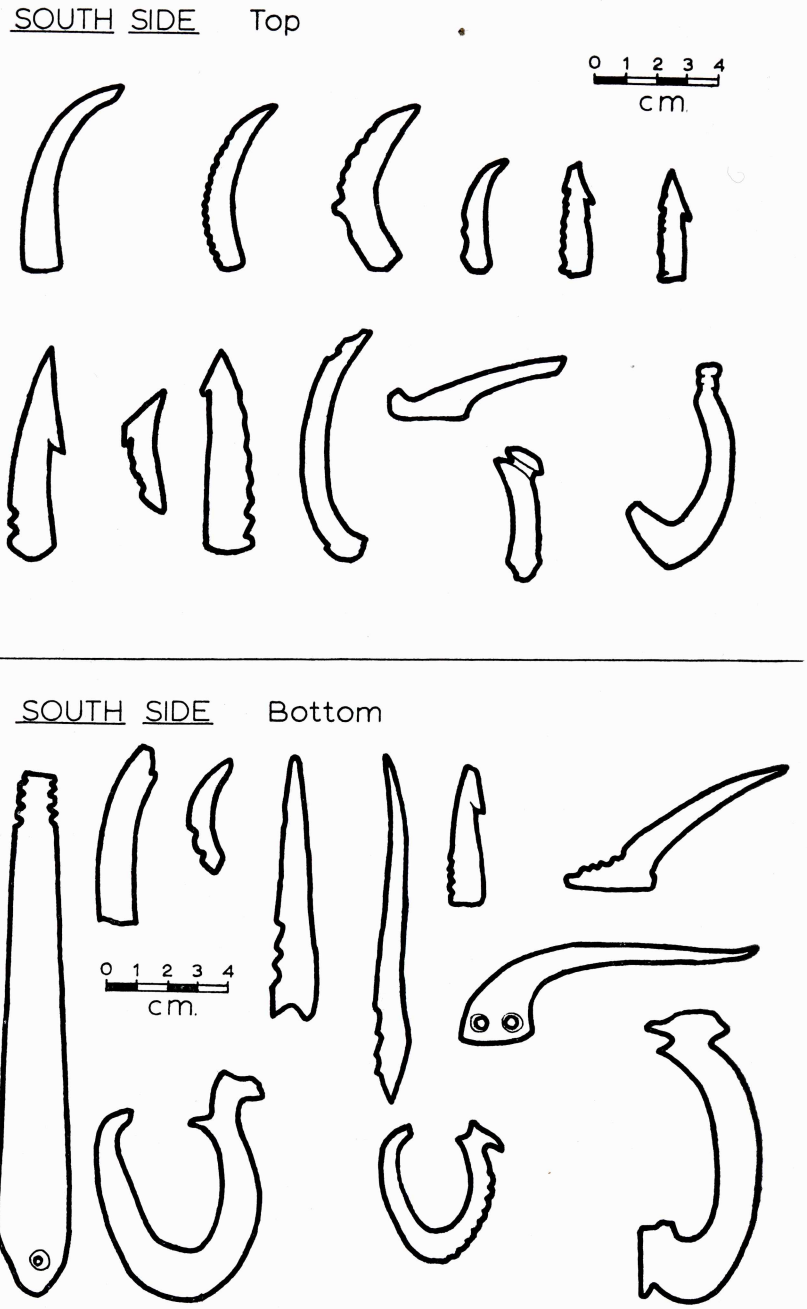


Fig. 6. Fish hooks. South side.

5. *Miscellaneous flake* — is to indicate the proportion of waste material, some of which may have been used subsequently as tools. A reliable sample should include at least 10% waste if collection has not been selective.

FISH HOOKS AND FISHING GEAR

The fish hooks were divided into two main functional groups, *lure hooks* and *bait hooks*.

Lure hooks were further subdivided by constellation of features.[12]

1. *Simple barracouta points.* A simple, slightly curved point with round or oval cross-section and no lashing device. Made of moa or other bone, occasionally of stone.
2. *Serrated barracouta points.* Similar to the simple form but tending to be flat oval in cross-section with serrations on the outer edges of the curve.
3. *Dog-leg barracouta points.* Often flat in cross-section made from dog jawbone or seal tooth, shaped like a dog's leg. These are knobbed at the outer bend of the curve and serrated along the outer edge. Lashing attachment is often present as a perforation.
4. *Minnow lure points.* Two forms of minnow lure points are present.
   (a) A curving point with no basal projection and one or two perforations.
   (b) A similar point with distal projection grooved on top.

Bait Hook Points

5. *Small unbarbed points.* Round cross-section, often made from canine incisors. Lashing device is a series of grooves on the outer base of the point.
6. *Long slender unbarbed points.* Usually about 12cm. long. The inside of the base ends in a median ridge and the outer edge of the base is provided with up to seven grooves or notches for lashing.
7. *Medium unbarbed points.* With or without basal barb. Length c. 7cm. The point is straight and stout, attachment by grooves.
8. *Simple points with outer barb.* The lashing device of grooves is on the opposite side of the base to the barb. Material is often bird bone. Some of these points are large (11cm.), others small (6cm.).
9. *Reversed barb point.* An 'S' bend hook with the barbs and lashing grooves on the same side.
10. *Serrated and multibarbed points.* These have been considered together in the analysis.
    (a) Serrated point is a barbed hook point ornamented with notches on the non-barb edge and on the upper surface of the barb.
    (b) Serrated and multibarbed points have more than one barb and a plethora of serrations. A type described by Hjarno[13] as 'baroque'.
11. *One-piece bait hooks.* U-shaped, the majority having incurved points, although examples with shank leg longer than point leg, or with basal barb on the point leg, are included. A fairly common feature is the placing of serrations on the outer surface of the shank leg or on both shank and point legs. Head types of one piece hooks will be considered in more detail in the conclusions.

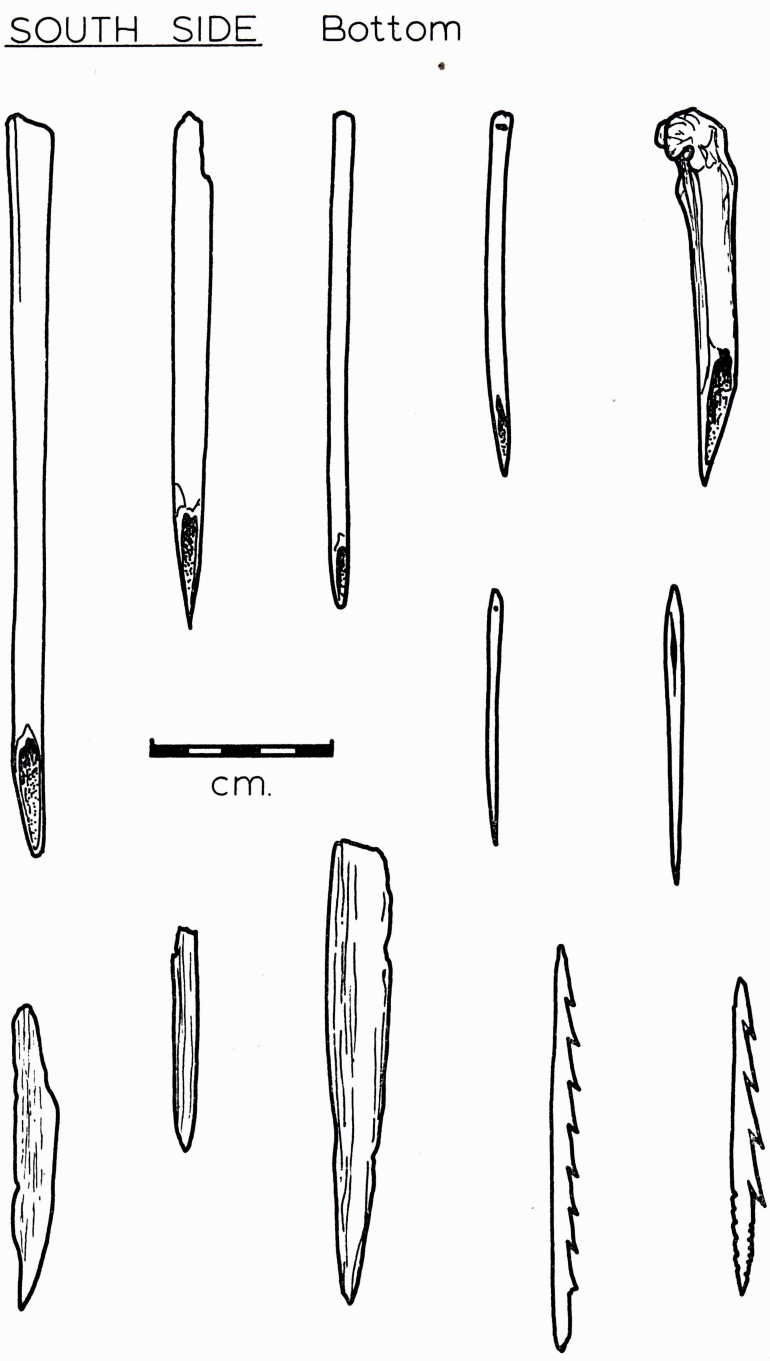


Fig. 7. Bone tools. South side, bottom.

12. *Fish gorges.* Slivers of bone pointed at each end. They may be furnished with notches or grooves at the mid-point.

SINKERS

1. *Penis shape* with longitudinal (and transverse) grooves.
2. *Egg or bun shape* with transverse groove.
3. *Egg or bun shape* with longitudinal groove.
4. *Egg or bun shape* with longitudinal and transverse grooves.

Other types of fishing gear, minnow shanks, shanks for composite hooks and harpoons will be considered as they occur.

BONE TOOLS

1. *Pickers.* Pointed bones from sea birds commonly stated to have been used in eating shellfish.
   (a) Large (c. 19cm.) pickers with rounded points.
   (b) Large pickers with sharp points.
   (c) Long slender pickers (c. 14cm.).
   (d) Short slender pickers.
2. *Threaders.* The same as above but perforated.
   (a) Large threaders.
   (b) Short slender threaders.
3. *Awls.*
   (a) Leg awls — awls made from sharpened leg bone with one joint intact.
   (b) Spatulate awls — small slender points with spatulate thumb piece.
4. *Bone Points.* Flat bone points (c. 11cm. x 0.5cm.) made from bird bone.
   (a) Plain with no attachment device.
   (b) Notched, grooved or knobbed at the distal end. These could be tines or points for a hunting or fishing spear or even for a composite comb.
5. *Stout moa bone point.* Dagger shaped points made from massive moa bone rounded and pointed at one end. Usually c. 12cm. x 1.5cm.
6. *Needles.* Slender perforated bone points ground on all sides, varying in length from 8cm. to 4cm. Two forms are present:
   (a) Needles with drilled eye (c. 1mm.)
   (b) Needles with sawn eye.
7. *Bird-spear points* with up to seven backward pointing barbs on one side. Some bird spear points have grooves or perforations at the base.
8. *Spear point* with barbs down both sides. This point is 20cm. long with 7 barbs on one side and 6 alternate barbs on the other. The base is pointed.

FILES, CUTTERS, POLISHING AND GRINDING TOOLS

These tools can be divided into four main classes — grindstones or sharpening stones, files for working bone, cutters for grooving or separating, and polishing stones. Materials used for these tools are sandstone, schist and occasionally basalt. Sandstone is used for the artifacts unless otherwise noted. Some forms are made in either material.

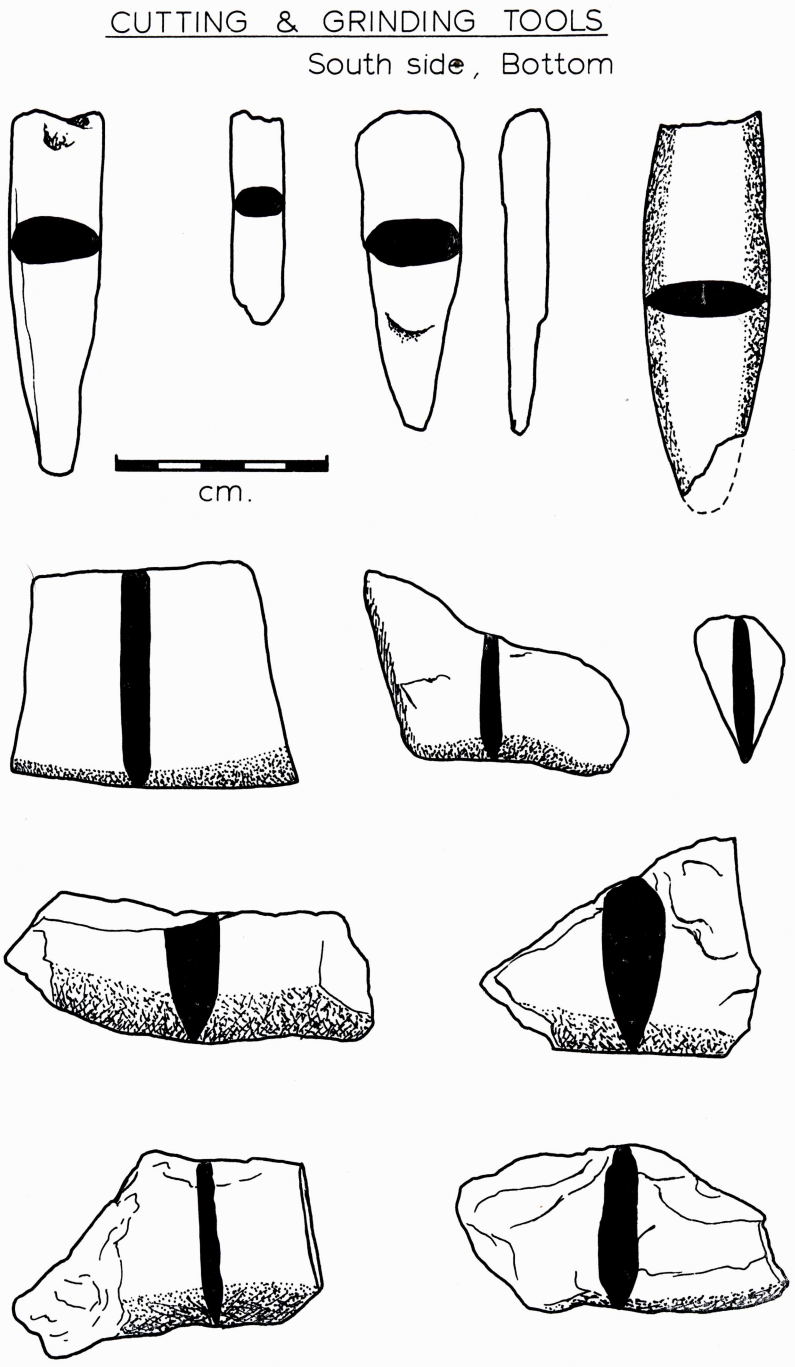


Fig. 8. Files and cutters. South side bottom.

1. *Grindstones* are usually large blocks of sandstone at least 10cm. across. One or two sides have been used for grinding. Smaller rougher pieces of sandstone (8cm.) have been used for minor grinding or polishing.

2. *Files* may have several outlines and cross-sections:
   (a) *Plain point files* with a flat-oval cross-section, 4-9cm. long. One end is pointed (cf. Suggs 1961, Fig. 32 g, long and triangular). Material sandstone or schist.
   (b) *Circular files* which are usually pointed at one end and 5-7cm. long.
   (c) *Undercut point files* — similar to circular files except that the point has been ground away on one side to produce a characteristic curved point. Length c. 8cm.
   (d) *Triangular file* about 9cm. long, flat in cross-section, the base unworked (cf. Suggs 1961 Fig. 32 a and b).

3. *Cutters.* A cutter is an attrition saw which has a bevelled edge produced by wear in a groove. Cutters are often shaped so as to produce a thin edge for this purpose. They can be subdivided as follows:
   (a) *Adze shaped* with one cutting edge, square or rectangular in outline and about 5cm. long.
   (b) *Two sided,* where a right angle is formed by the intersecting and cutting bevel (6cm.).
   (c) *Triangular point* cutters which are small (2cm.) and may be broken points from (b).
   (d) *Isosceles triangle* cutters about 7cm. across the base. The feature of this small group is their regular shape.
   (e) *Elliptical* cutters with one side straight, one side convex in outline and elliptical cross-section. The convex edge is the cutting surface. 9cm. long.
   (f) *Rough elliptical,* similar to (e) but less regular. 7cm.
   (g) *Rough elliptical schist* cutter. c. 9cm.
   (h) *Large cutters,* large pieces of sandstone of irregular shape with one cutting bevel (16cm.).
   (i) *Basalt cutters,* flakes of basalt with one cutting bevel (11cm.).
   (j) *Large schist cutters,* irregular flakes of schist with one bevel, c. 9cm. long.

4. *Polishers* have been used over most of their surface to grind down rough areas.
   (a) *Flat schist polishers* are flat or oval shape in cross-section, shaped as 3 (f) but without bevel.
   (b) *Round sandstone polishers,* usually c. 10cm. long.
   (c) *Round schist polishers* about 13cm. long.
   (d) *Elliptical schist polishers,* about 10cm. long.

HAMMERS

   (a) *Disc,* flat pancake-shaped retouch hammers varying in size from 5 to 10cm. in diameter.
   (b) *Round,* egg or ball-shaped hammers which have been further subdivided according to weight.

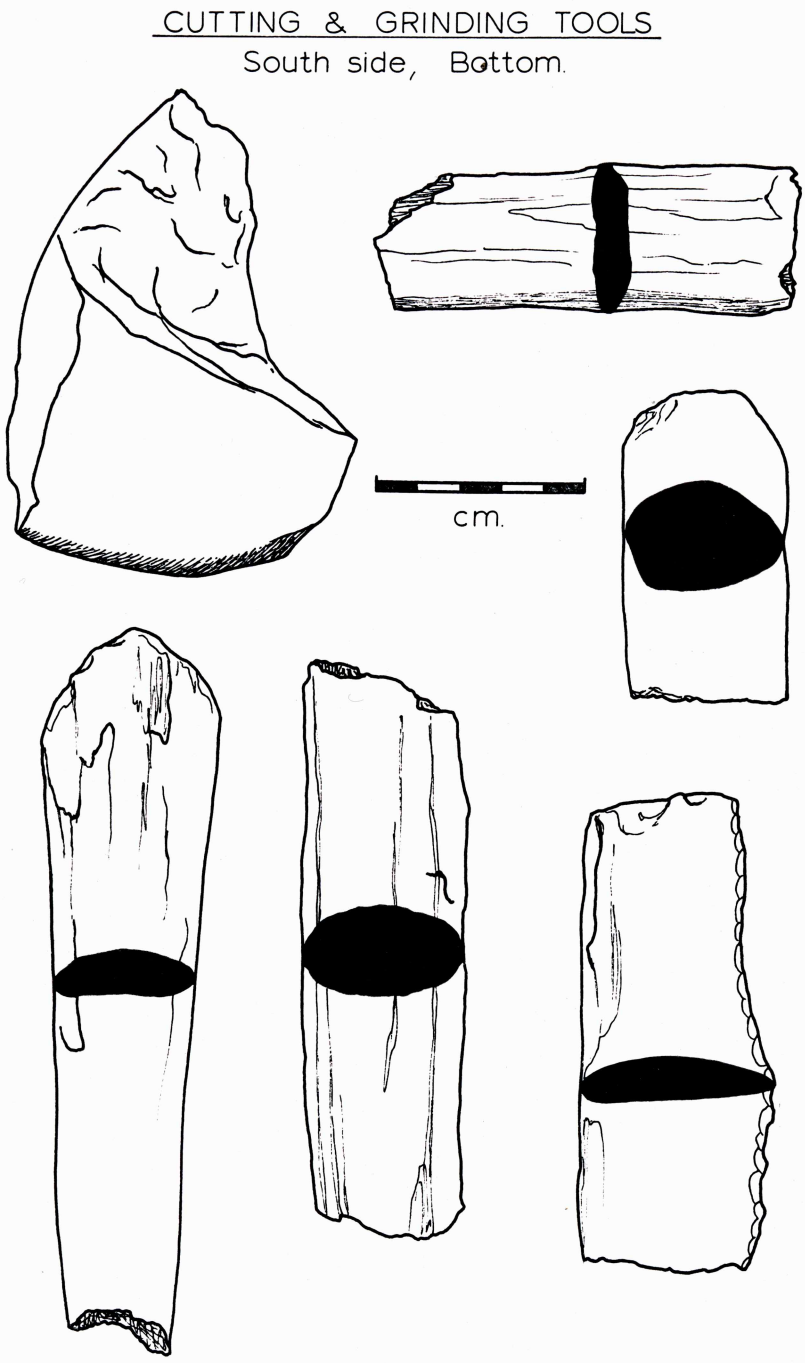


Fig. 9. Cutters, grinders and polishers. South side, bottom.

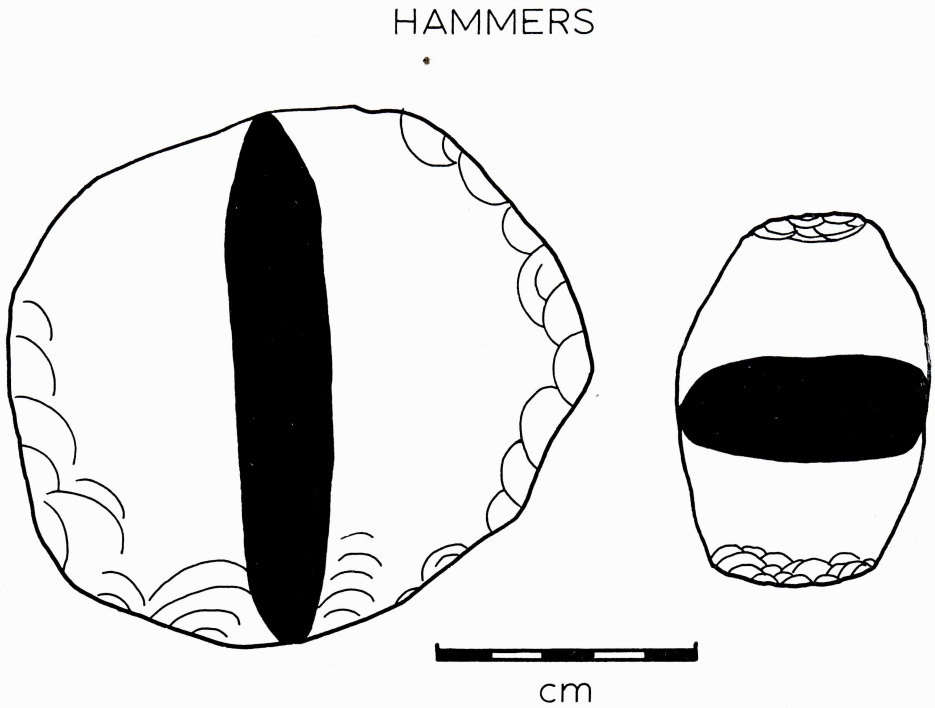


Fig. 10. Hammers.

POLISHED SLATE OR STONE KNIVES

A rectangular or semi-lunate artifact made from a thin plate of polished slate, basalt or greenstone. Sometimes called by the Eskimo name 'ulu'. Several varieties are present in Murihiku:

(a) *Plain rectangular.*
(b) *Side notched,* with a notch at each side for hafting.
(c) *Circular.*
(d) *Perforated.*
(e) *Knife shaped,* a stone blade like a handleless European knife.

All speciments from Little Papanui are broken but appear to belong to group (a) which is the commonest.

ORNAMENTS

1. *Dentalium shell beads,* cut tubes of *Dentalium nanum.*
2. *Toggles,* bird-bone tubes (6cm. long) perforated on one side at the centre.
3. *Mat pins,* curved bone pendants up to 10cm. long and 4mm. wide, perforated at one end.
4. *Ear pendant,* of bone (7cm. long x 1cm.) with perforated lug at top end.
5. *Kinky pendant,* of bone (average 8cm. long) with one or more 'knee' bends giving an 'S' shape.

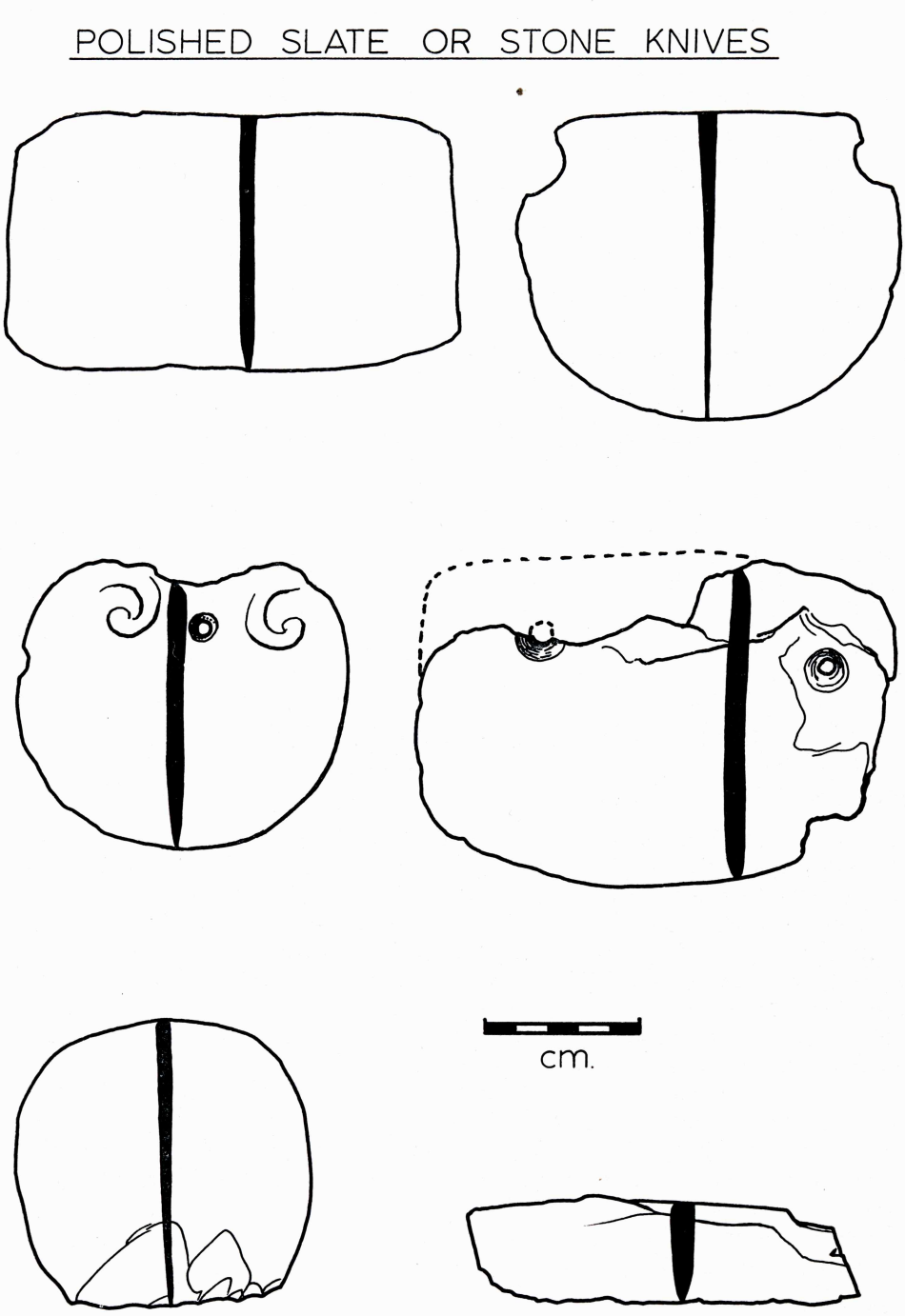


Fig. 11. Varieties of polished stone knife in Murihiku.

6. *Perforated human teeth.*
7. *Tattooing chisels.* Flat bone (3-7cm. long) with or without notched knob at one end, the other end being cut so as to produce fine teeth 1mm. apart.
8. *Pear-shaped pendant,* a conical polished root of a sea-elephant tooth. 3cm. high, 2.5cm. wide at the base and 1.2cm. at the top. Perforated through one side at the top.
9. *Greenstone pendant,* a flat piece of greenstone with attachment by perforation or lug.
10. *'Whakapapa',* a notched amulet or pendant.
11. *Combs* are of two types:
    (a) bird bone, made from a half-section of an albatross leg bone, the upper part left solid, the lower part divided into 3 or 4 tines which are ground smooth.
    (b) Flat combs of whalebone of the typical classic Maori pattern.

MUSICAL INSTRUMENTS

Bone flutes are represented by six examples. They are made from sections of albatross leg bone provided with a suspension hole near one end, and two, three or four note holes. It is to be noted that a bone flute can be played without holes and that some of the open end tubes found in the site may be flutes.

THE DISTRIBUTION OF ARTIFACTS BY LAYERS

South Side Bottom Layer

Adzes. 57 adzes can definitely be assigned to this layer. The predominant adze has the deep almost square quadrangular front wider than back cross-section, with front grip (Duff Type 1a)[14] which forms 20% of the total, i.e. 9 examples Next in importance are the small gouge chisels or flake adzes which, taken as a group, form 20%. The most notable feature of the layer illustrated by the graph is the wide range of East Polynesian adzes represented. An important form is the spade - shoulder adze. There are two forms, the marked spade shoulder which has a definite shoulder and marked side reduction, and the slight spade shoulder which has no marked shoulder and very little side reduction. In this layer the marked spade is 14% of the total while the slight spade is 12%. This variation is important. A possible derivative of a side hafted adze is the very rare spade shoulder variety with uneven shoulders, or only one shoulder, found in the bottom layers. Raw materials used are greenstone (16%) and argillite (20%) along with a range of local basalts. The greenstone is mainly West Coast nephrite. The nearest sources of argillite are D'urville Island and Southland.

Fishing Gear. 92 hooks and 6 gorges.

Lure Hooks. The predominant form of lure hook point is the simple barracouta, 62% being of this type. The minnow shank lure is represented by 5 bone shanks with dorso-ventral perforation. Minnow lures are also represented by two types

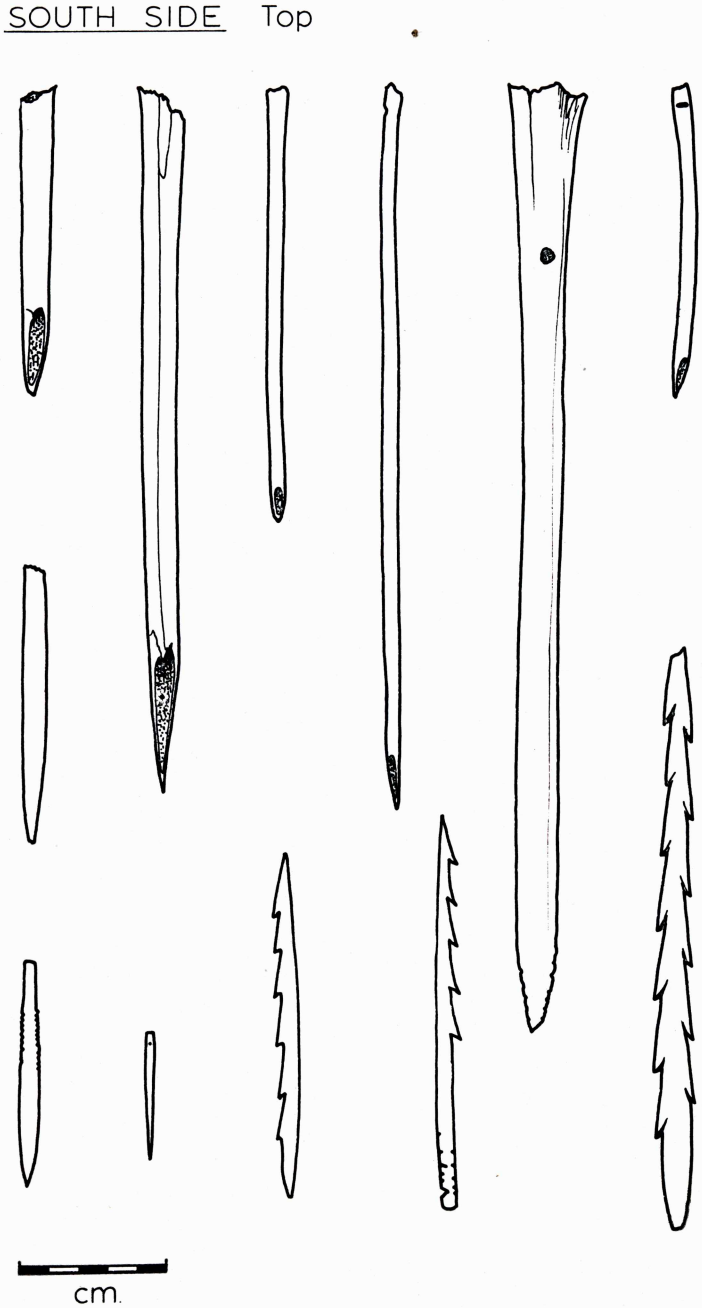


Fig. 12. Bone tools. South side, top.

of points, the typical slender, slightly curved point with no basal projection and two perforations, and a slightly heavier point with a distal projection and grooved on top.

Bait hooks. The one piece U-shaped bait hooks form 19% of the total (18). These are mainly made from moa bone. More important typologically are the three groups of unbarbed points illustrated.

Sinkers. Four types of sinker are present, those with longitudinal and transverse grooves being the most important.

Flake Industry. In this layer 62% of the material is blade or incipient blade. Blades total 42%, averaging 14cm. in length. The majority of all flake tools in this layer are made of quartzite (70%), though other materials are used including obsidian which totals only 2% of all the flakes and is usually the greenish Mayor Island type.

Bird Spears. Ten examples of one sided bird spears are present in the bottom layer.

Ornaments and Musical Instruments. One bird bone toggle was found near the hut site.

The distribution of bone tools and the various classes of polishing, grinding and cutting tools are summarized for all layers in the conclusion.

South Side Middle Layer

Adzes. 4 adzes comprising 2 small (6.5cm.), quadrangular, ungripped adzes and a well-finished flat triangular, apex-to-back, or trapezoidal cross-section adze with slight spade shoulders, and a broken blade of a triangular, apex-to-back adze.

Fish Hooks. None were found in this layer.

Flake Industry. Blades total 25% averaging 5cm. in length. Small conchoidal flakes increase to 30%. In the middle layer the local opal-jasper outcrop is a more important material than quartzite. Obsidian is used for 5% of all flake tools.

Bird Spears. Only two bird spear points were found in this layer.

Ornaments and Musical Instruments. No ornaments were found. A broken albatross bone flute of exceptionally large size is the only example of a musical instrument.

South Side Top Layer

Adzes. There were 67 adzes in this layer. In contrast to the bottom layer, the predominant adze is the thin quadrangular ungripped adze (Duff 2A, 2B) which in ordinary stone or greenstone forms 70% of the total, with 15% of these in greenstone. 36% of all adzes are made of greenstone, or more correctly, of near nephrite from the Dart Valley, Lake Wakatipu. Argillite is used for only 2%. The marked spade shoulder adze form is still present but only forms 4% of the total, whereas the slight spade-shoulder has increased to 10%. A quadrangular greenstone adze form with two indentations at the mid-point has been named a waisted adze in the graph, though it may perhaps be an axe form.

Fishing Gear. 131 hooks, 8 gorges.

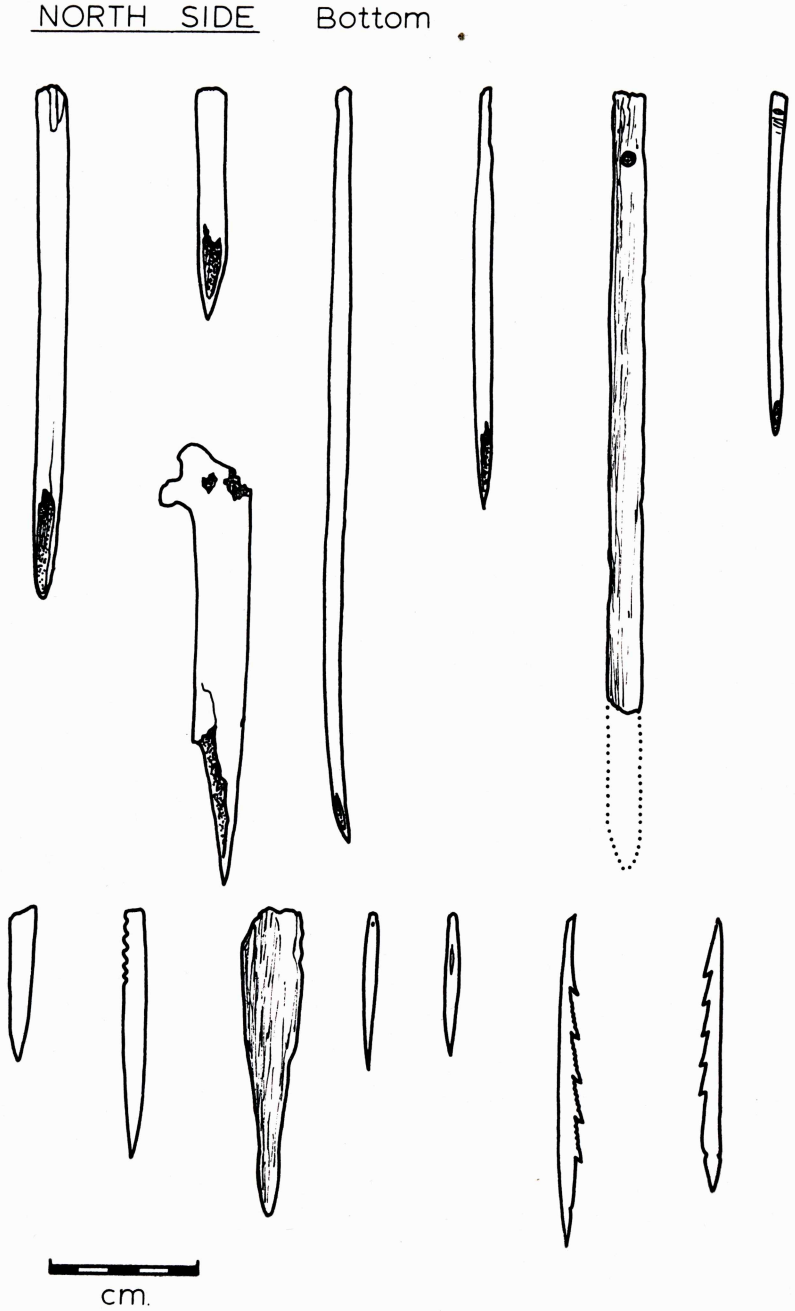


Fig. 13. Bone tools. North side, bottom.

Lure hooks. All forms of barracouta points still form 52% of the total but the simple rounded form of the bottom layer is reduced to 34% and replaced by two new forms — a serrated point and a serrated dog-leg point which is often perforated. The material used for the manufacture is occasionally moa bone, but is more commonly dog or seal. Other lure hooks are notably absent.

Bait hooks. One-piece bait hooks and unbarbed composite points together make up only 3% of the hooks. This contrasts markedly with the bottom layer as does the high proportion of barbed composite bait hooks which make up 53%, 30% of which is taken up by serrated or multi-barbed points. A small bone shank for a composite bait hook was found in this layer.

Flake Industry. Blades are only 17% of the total and average 4cm. in length. The decreasing percentage of blade tools in the top layers is matched by a corresponding increase in the small conchoidal flakes. Quartzite is again predominant (38%) though not so markedly as in the bottom, as opal-jasper and chalcedony are also much used. Obsidian reaches 8% in the top layer where it has predominantly the clear-grey, or grey with brownish halo of the Taupo or Coromandel types.

Bird Spears. Twenty-one bird spears are attributed to this layer. This is twice the number in the bottom layer.

Ornaments and Musical Instruments. A number of characteristic ornaments were found, three combs, one flat knobbed whalebone example and two albatross leg bone examples; two toggles, four mat pins, a bone ear pendant, a flat greenstone pendant, four kinky pendants and five albatross bone flutes.

North Side Bottom Layer

Adzes. 35 adzes present. The predominant adze is again the deep quadrangular adze, back wider than front cross-section, with front grip (Duff 1A). In this layer it forms 30% of the total as compared to the South side bottom layer 20%. The spade shoulder is present in the marked form as 12% and the slight form as 8%. Greenstone is used for 26% of all the adzes, West Coast nephrite being commoner than the nephrite from nearer sources. Argillite is the raw material for 18%.

Fishing Gear. 26 hooks, 10 gorges. There are too few hooks to give a reliable distribution pattern. This layer contained a stone minnow shank with top serration. Remarkable finds were a large perforated harpoon point, and a 9" one-piece bait hook in moa bone. The tendencies exhibited by the distribution of the hooks are similar to those in the South side bottom layer, with four barbed composite points.

Sinkers are also too few for a reliable picture. The general distribution is similar to the South side.

Flake Industry. The bottom layer, North side, exhibits the same features as the South side bottom with 70% falling into two blade classes (42% blade, 30% incipient). There is a higher proportion of broken material (40% as compared with 14%) than in the South side bottom layer so the average blade length is less (8cm.) though some of the North side blades are up to 22cm. in length. Quartzite is used for 83% of all flakes.

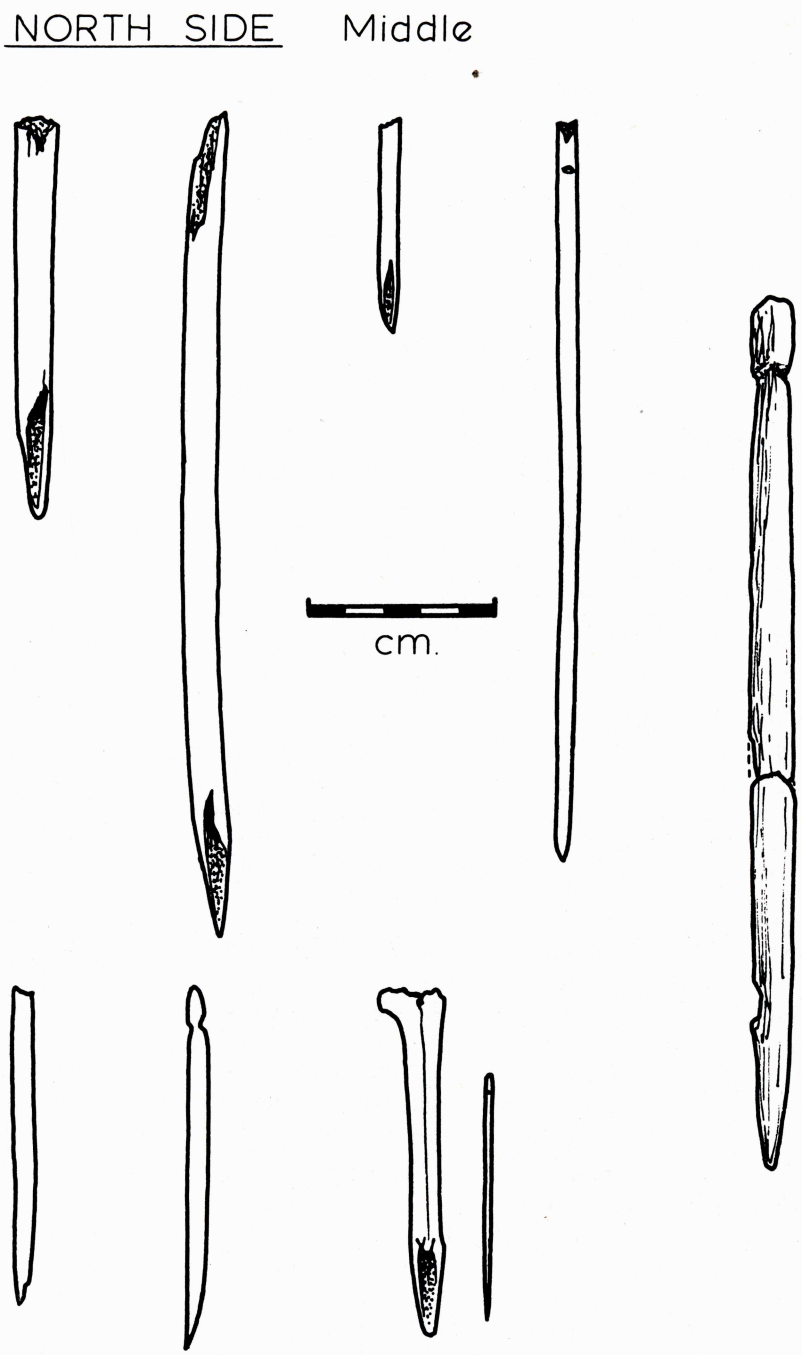


Fig. 14. Bone tools. North side, middle.

Bird Spears. Eleven bird spears were found and one double-sided point.

Ornaments and Musical Instruments. A dentalium shell bead and a small bone toggle with centre perforation were found.

Bowling Stones. Three objects described by Skinner as bowling stones were found in this layer. They are illustrated in Skinner 1946: Figs. 6-8. Fig. 5 is top layer.

NORTH SIDE MIDDLE LAYER

Adzes. 17 adzes came from this layer which is too few for reliable comparisons. Interesting features are the almost equal proportions of quadrangular ungripped (Duff 2A, 2B) and rectangular gripped (Duff 1A) at 28% and 22% respectively, and of slight and marked spade shoulder each at 10%.

Fishing Gear. 3 hooks, 5 gorges. Three fish hook points were found, a long slender unbarbed point, a short unbarbed point with faceted base and a simple rounded barracouta point. A moa bone blank for a one-piece hook was also found.

Flake Industry. Insufficient flake material can be definitely assigned to this layer. The only two flake tools available are a broken blade 8cm. long and an incipient blade 6cm. long. The broken blade would have been about 15cm. long when complete.

Bird Spears. No bird spears are recorded.

Ornaments and Musical Instruments. One curved mat pin was found in this layer.

NORTH SIDE TOP LAYER

Adzes. 41 adzes. As with the South side top layer the predominant form is the quadrangular ungripped at 62%. Greenstone adzes make up 33% of the total, slightly less than in the South side top. Argillite is used for 3% of the adzes. Again there is a complete absence of earlier types except for the spade-shoulder in the slight form at 7%. The marked spade is absent altogether.

Fishing Gear. 47 hooks, 9 gorges.

Lure hooks. As with the South side, lure hooks are represented by the three types of barracouta lure points which total 50%.

Bait hooks. One-piece bait hooks are relatively unimportant, a feature noted for the South side top layer. Unbarbed composite bait hooks are present. The occurrence of an example of the long slender unbarbed point in this layer is surprising but may be due to incorrect attribution. Barbed composite points total 43% with multibarbed serrated hooks forming half that number.

Sinkers. The predominant sinker is the longitudinal grooved form, the others being relatively less important.

Flake Industry. Distribution of the classes of flake material is similar to that of the South side top. Blades are reduced to 15%, incipient blades to 5%; small conchoidal flakes have attained 75%. Quartzite is used for 30%, obsidian 35% (as compared with 8%) and puddingstone and chalcedony are 10% and 15% respectively. While flake material is not numerous, these results are strengthened by the results of analysis of a collection of material with similar characteristics, which judging by the dates and details written on the box should come from the North

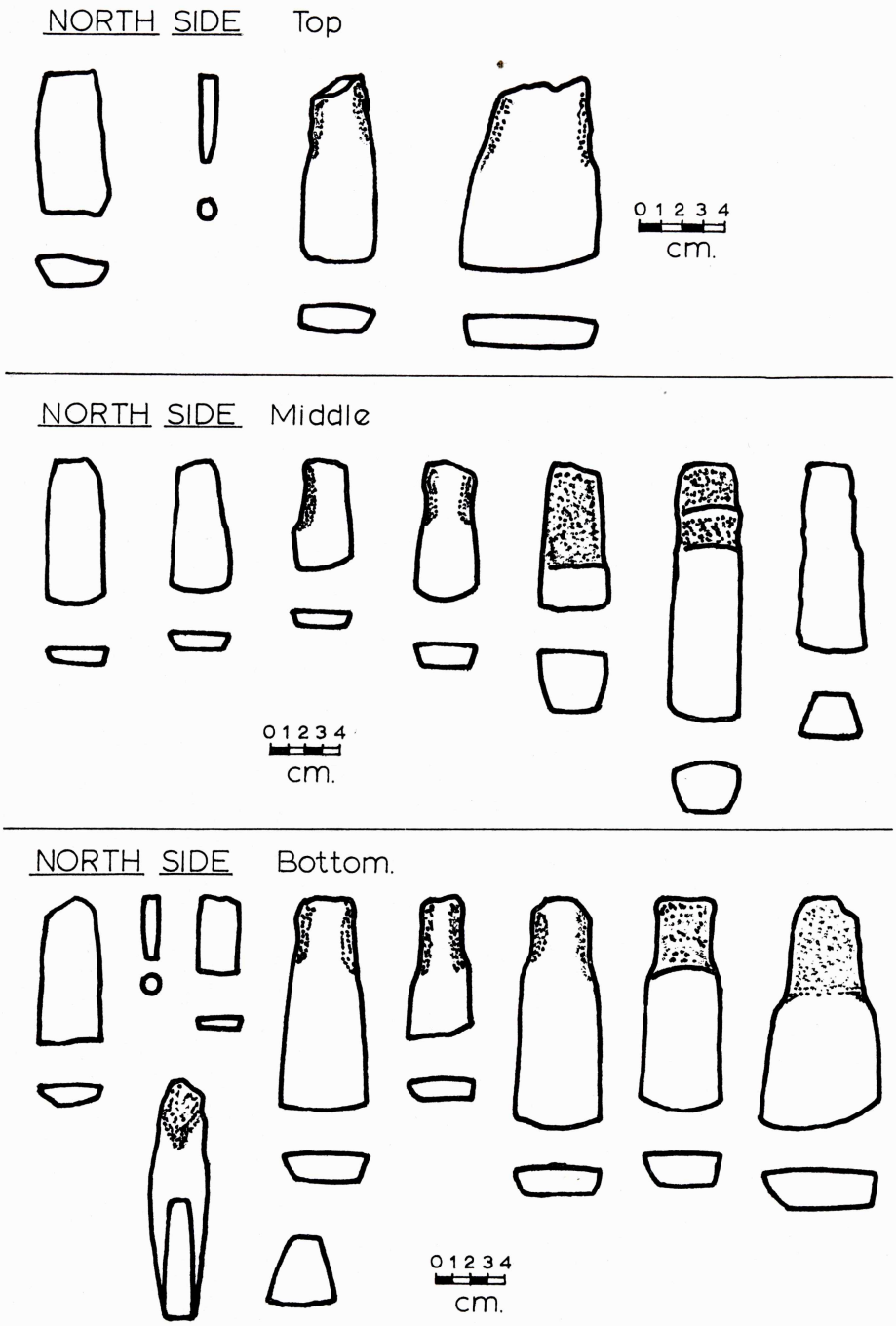


Fig. 16. Adzes. North side.

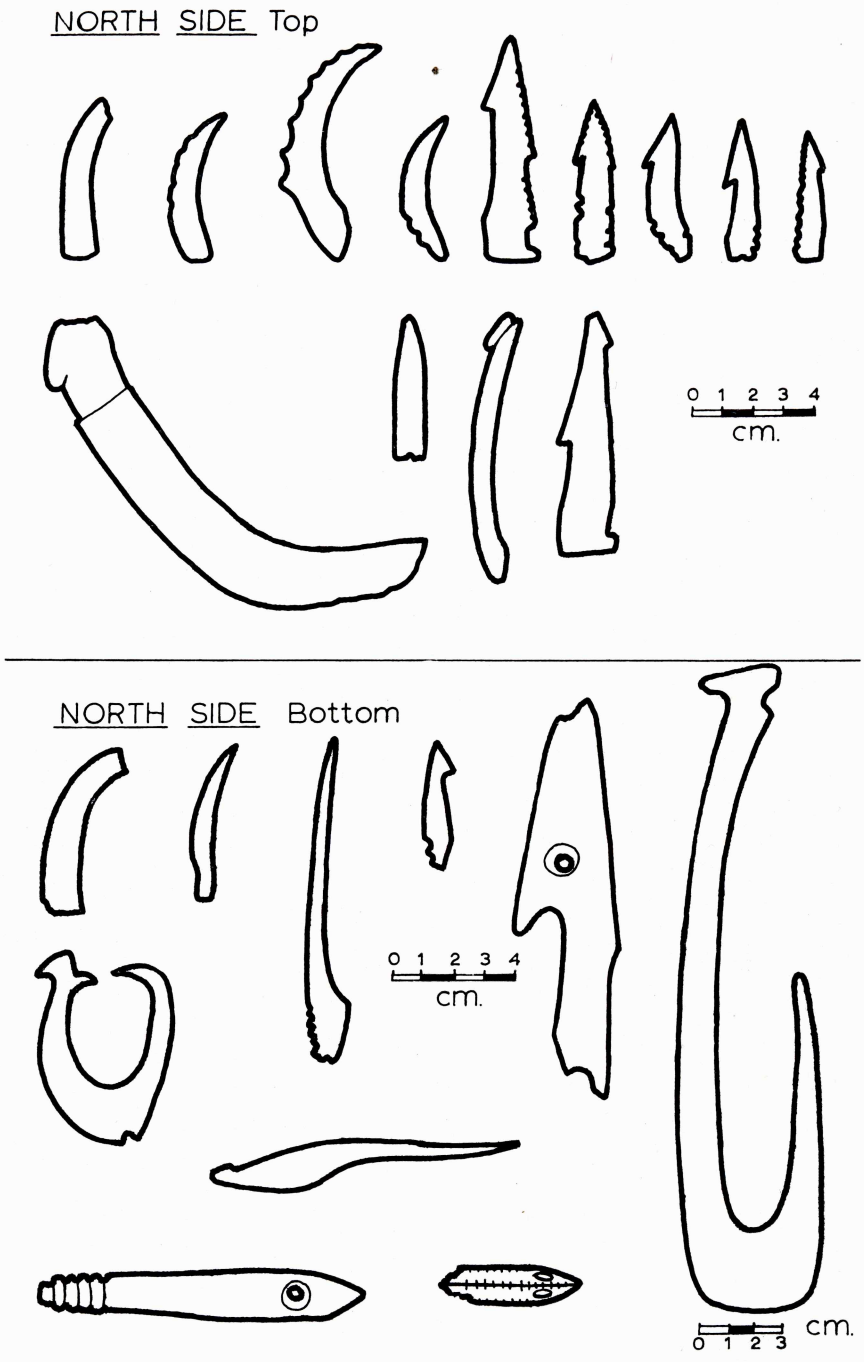


Fig. 15. Fish hooks. North side.

side top layer, but which has not been included here because of a certain element of doubt.

Bird Spears. Only 12 bird spears are definitely recorded. This contrasts with the South side top layer number of 21.

Ornaments and Musical Instruments. As with the South side top layer, a number of characteristic items are recorded, one bird bone comb, two toggles, seven mat pins, four perforated human molars, five tattooing chisels and one kinky pendant. No flutes are definitely recorded.

CONCLUSIONS

The earliest inhabitants of Little Papanui were people bearing an evolved but still recognizable East Polynesian culture. After settling in the southern part of New Zealand the Polynesian immigrants had to change from an economy based on cultivated crops to an economy based on hunting the moa. In the context of Murihiku prehistory, whether the sub-tropical plants were introduced from Polynesia by the first immigrants to New Zealand or by later arrivals is unimportant as it is unlikely that sub-tropical plants would have survived at any period in the southern climate. In the early phases in Murihiku, settlement was at first concentrated along the coast and associated with nesting or gathering places of moa. By about 1,000 A.D. most of the likely river mouths, inlets, or beaches had been occupied by Polynesians. Their culture included a wide range of Eastern Polynesian adzes, many of them made from argillite. Fish hooks were mainly one-piece and made from moa bone. Composite lure hooks were the stone minnow shank with bone point derived from the Polynesian bonito lure, and barracouta lures. Some unbarbed points or halves of bait hooks were used but no barbed points. The most noticeable innovation in the Otago region was the development of ortho-quartzite blades, probably used mainly for butchering the moa. The area was not completely isolated as obsidian from the North Island is not common but does occur on most early Murihiku sites. These phases during which the greatest exploitation of the moa took place have been dated at a number of sites in Murihiku. Kaikai's Beach bottom layer c.1050 A.D.,[15] Shag River bottom layer c.1127 A.D.,[16] Pounawea c.1140 A.D.,[17] Papatowai bottom layer c.1185.[17]

The culture of the early layers in Otago includes characteristically, 'slate knives, reel-type units, minnow-shaped stone shanks of composite fish hooks, adzes and other material typical of the moa-hunter period'.[18]

The next major phase is that which Lockerbie has demonstrated for South Otago when a change in economy started to take effect as moa began to be scarce. As he says 'By A.D. 1450 the moa was becoming less plentiful in the district and greater quantities of fish and shell fish were being consumed by the moa-hunters'.[19] No details are given of the changes in culture occurring in the South Otago moa hunter sites as the change in economy took effect, but he does say 'The artifacts present are still typical of the early Moa hunter period, but, as active moa hunting decreased, artifact type concentrations changed'.[20]

The drop in the moa population is paralleled by the gap in the regeneration of forest trees which according to Wardle[21] began to develop around 1300 A.D.

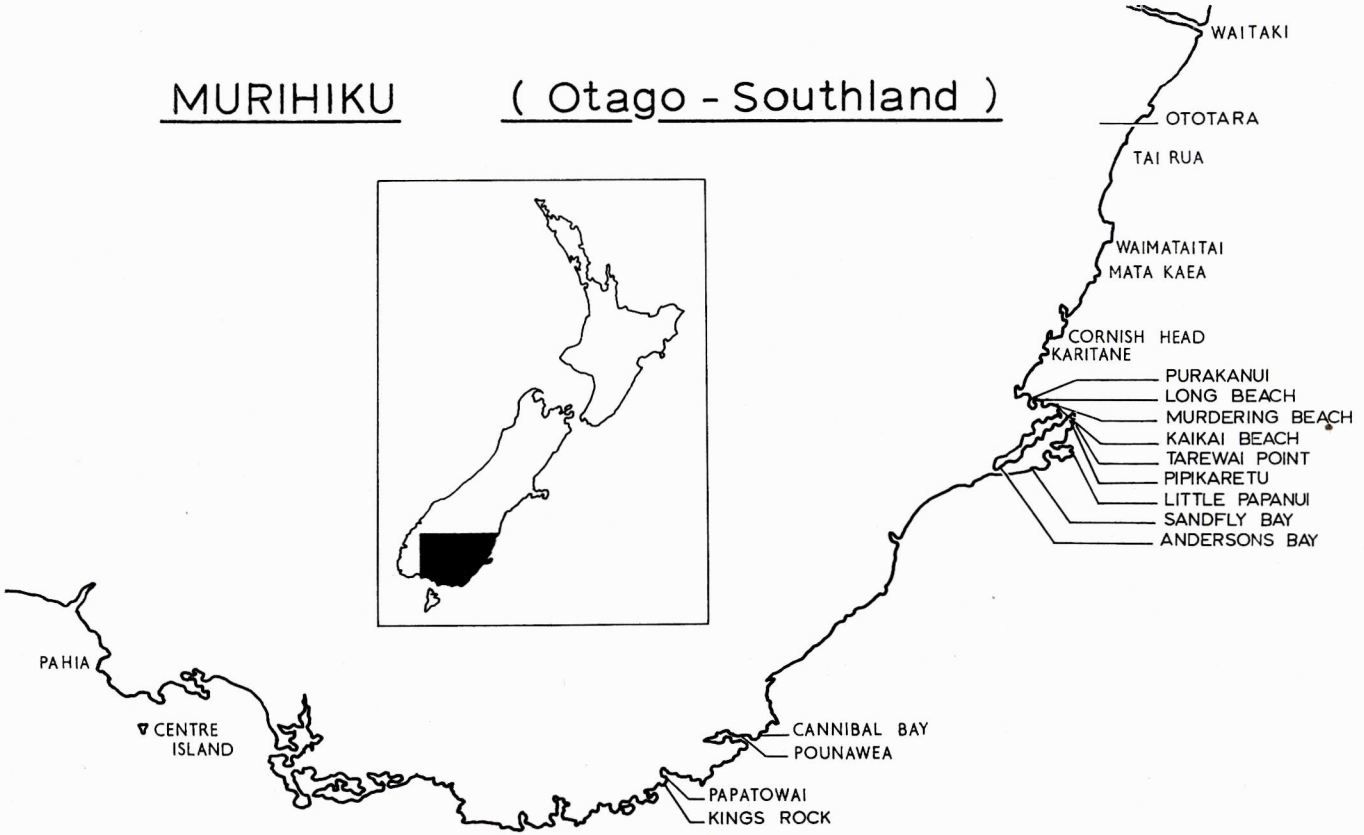


Fig. 17. Map of Murihiku sites.

and became most intense between 1600 and 1800. Swamp evidence would indicate that the moa was primarily an inhabitant of the bush or bush fringes.[22] Burning of what was probably already dry bush[23] reached a peak in Canterbury and Otago in the thirteenth and fourteenth centuries A.D.[24] The archaeological findings support the hypothesis that after the fourteenth century, various species of moa existed as unstable populations in a shrinking habitat. Extinction was undoubtedly hastened by hunting. By the fifteenth century both moa and bush survived only in local pockets. Distribution of many of the late moa-hunting sites of Otago in or near relict patches of bush[25] would seem to be a reflection of this situation.

Following on from this change are what can be described as the intermediate phases. An example of an intermediate site is Cannibal Bay in South Otago, which has been dated to about 1550 A.D.

Lockerbie summarizes his excavation 'Refuse, although including some moa bones is composed chiefly of shells, fish bones, seal bones, and the bones of small birds. Artifacts are typically Moa-hunter . . . Fish-hooks are numerous, adzes are *generally* small, and *flake knives are neither as massive nor as plentiful* as at Pounawea'[26] (italics mine).

At King's Rock, Teviotdale and Lockerbie[27] excavated another intermediate site which spans the later phases of late moa-hunting and early intermediate phases. The lower layer contained a four-stone fireplace, much moa bone, a slate knife, two barbed fish hooks, a number of barracouta points and an unperforated lure hook with distal and proximal projection, knobbed on top. Lockerbie remarks on a 'dearth of flaked implements and chips'.[28] It is significant however that materials used were agate, basalt, chalcedony, jasper, obsidian, quartz, quartzite and silicified claystone.

While the regional aspects of the various phases at this time have not yet been fully described, there is some North Otago information available which suggests a similar development. Trotter and Gathercole excavated a fishing camp at Tai Rua which contained at least two species of moa. The two main occupations at this site have been dated to the early and late fifteenth century respectively.[29] The artifacts included flake tools and Trotter notes 'although only a small percentage of the artifacts were adzes, harpoons or ornaments, these are all Murihiku Moa-hunter types. One-piece hooks are of several varieties of which U-shaped with inturned point and large U-shaped with basal barbs are the most important. . . Out of a total of 107 . . . nine were points of two-piece bait hooks, four of these being barbed.'[30]

A comparison of the artifacts from intermediate sites in both North and South Otago indicates that all were following a similar pattern of development. Adzes tend to be concentrated in fewer types with the quadrangular ungripped becoming important. They are smaller and more often made of greenstone. Argillite becomes rare. The large flake knives of the bottom layers, e.g. at Shag River, are still made but in decreasing numbers and are much smaller (6cm. as against 14cm. average). Quartzite, as a predominant material for flakes, gives way to a wider range of chalcedony, cherts, jaspers, mudstones and similar materials. The stone minnow shank has been replaced by the flat bone minnow which finally disappears.[31] Shark teeth necklaces and dentalium beads are the main ornaments.

At this point in the sequence of Murihiku sites it is now possible to follow contemporary and subsequent development more accurately on the stratified site of Little Papanui.

The typological distribution of adzes, fish hooks and flake material allow both bottom layers at Little Papanui to be dated to about the fourteenth century. The separate analysis of the two sides of the Little Papanui site confirms a general picture of development and change illustrated within the site, which is only discernable elsewhere by comparing layers from different sites.

LITTLE PAPANUI ADZES

The bottom layer adzes from Little Papanui are distributed into a number of types, the most important of which is the quadrangular, front-wider-than-back, with front grip (Duff 1A). The predominance of this type in the assemblage is not accidental but the result of change and development on earlier sites. Similarly the low proportion of triangular, apex-up, front grip (hogback) adzes is also the result of evolution as the following table of the distribution of adzes in Otago sites indicates.

Little Papanui bottom layers thus exemplify the trend to increase the quadrangular, front grip at the expense of the triangular apex-down.

Another form present at Waitaki, Shag and the early sites is the marked spade shoulder which gradually increases in importance though its rise is paralleled by the slight spade-shoulder form. Within Little Papanui the slight spade-shoulder replaces the marked form. The changing distribution of other forms is illustrated by the graph. The quadrangular ungripped form undergoes a further change in sites of European contact period where the greenstone form predominates. At Tarewai Point excavated by Teviotdale[32] 65% of all the adzes were greenstone; 50% were quadrangular ungripped greenstone, 3% were spade-shouldered greenstone. Slight spade-shoulder was also present in 7% of the adzes made of other stone and marked spade were reduced to 3%. Similarly at Murdering Beach about 88% of all adzes were greenstone, with slight spade-shoulder being present in 3%.

It is possible then to delineate a number of principles which have operated on the typological distribution of Murihiku adzes by which a wide range is reduced by successive stages to a few generalized types:[33]

1. The apex-to-front, gripped adze (hogback) becomes less important.
2. The quadrangular, front-wider-than back, front gripped adze becomes predominant.
3. The marked spade-shoulder becomes an important diagnostic form, but is largely replaced by the slight form in later phases.
4. The quadrangular, front-wider-than-back ungripped adze becomes the predominant form in the later phases.
5. In the early North Otago and Dunedin sites argillite is an important raw material.
6. In the later phases greenstone becomes an important raw material and argillite is rare.

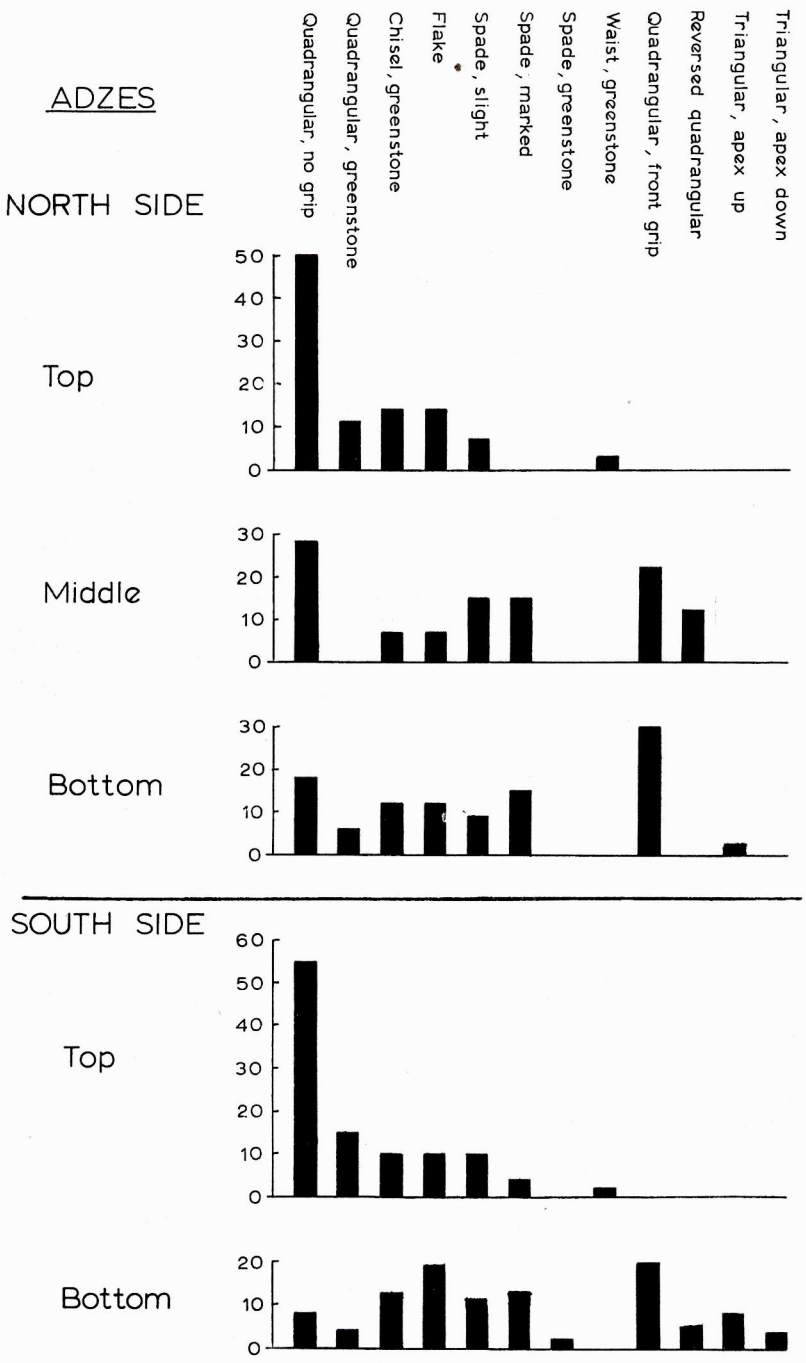


Fig. 18. Percentage and layer distribution of Little Papanui adzes.

TABLE

Percentage distribution of adze types in Murihiku sites

	Quadrangular Ungripped	Quadrangular Ungripped Greenstone	Chisel Greenstone	Flake Chisel or Adze	Slight Spade Shoulder	Marked Spade Shoulder	Spade Shoulder Greenstone	Quadrangular Front Grip	Reversed Quadrangular	Triangular Apex Up Front Grip	Triangular Apex Down Grip	Triangular Apex Down No Grip	Side Hafted or ovoid	Total Adzes	Percentage Greenstone	Percentage Argillite
Murdering Beach	13	**41**	37	1	2	1	4	0	0	0	0	0	1/0	100	88	1
Tarewai Point	18	**35**	30	2	7	3	3	0	0	0	0	0	0	56	65	7
Little Papanui Top Layers	**52**	12	15	12	7	1	0	0	0	0	0	0	0	108	31	1
Shag River Top Layers	**30**	15	9	6	9	3	6	12	3	0	0	0	6/0	33	33	3
Little Papanui Middle Layers	**29**	0	0	14	0	10	0	24	4	0	0	9	0	21	0	5
King's Rock	**31**	0	0	0	23	16	0	23	7	0	0	0	0	13	0	7
Sandfly Bay	**29**	0	17	17	8	4	8	17	0	0	0	0	0	24	20	0
Little Papanui Bottom Layers	7	4	13	16	10	15	1	**24**	3	5	0	2	1/0	92	9	2
Papatowai	9	2	0	16	9	16	0	**25**	4	8	8	4	0	52	0	4
Shag River Bottom Layers	14	0	0	14	7	**18**	0	**18**	3	**18**	0	7	0	28	0	3
Waitaki	8	1	5	8	4	5	1	**32**	1	**25**	3	2	1/s	346	11	45
Pounawea	4	4	0	18	4	18	4	**21**	0	**25**	0	0	4/s	28	10	0

At Little Papanui there is a definite shift in the importance of adze types from quadrangular with front grip to quadrangular ungripped. Greenstone becomes more important though not predominant in the top layers. The shift in emphasis from marked spade to slight spade-shoulder indicates the lessening importance of gripped adzes, but, more importantly, argues for a cultural link between the early, middle and late inhabitants of the site. Comparisons made with the adze assemblages of European contact period sites would suggest that the top layers on both the North and the South side of Little Papanui can be placed earlier in time (though not very much) by virtue of greenstone being less important as a raw material and the proportionately greater number of slight or marked spade-shouldered adzes present. At Tarewai Point or Murdering Beach, both dated c.1800 to 1830 A.D., such adzes *are* present, but are numerically unimportant, forming only 3%-5%.

FLAKE MATERIAL

The quartzite flake industry of Otago appears to be largely a local development from the generalized adze-making techniques of Polynesia. This aspect will be dealt with more fully in a future paper.

The bottom layer industry at Little Papanui is characterized by a predominance of blade tools of quartzite — the South side and North side each having

	Percentage of Blades	Average Blade size cm.	Small Conchoidal (less than 5cm.)	Large Conchoidal (greater than 5cm.)	No. of flakes available
Long Beach	5	4	95	0	250
Murdering Beach	12	4	74	0	100
Little Papanui Top Layers	16	5	58	0	250
Little Papanui Middle Layers	25	4	30	3	177
Anderson's Bay	35	6	21	2	52
Tai Rua	42	6	32	4	100
King's Rock	46	7	27	5	24
Little Papanui Bottom Layers	41	11	23	6	500
Shag River	74	12	0	13	350
Pounawea All Layers	50	7	10	9	34
Papatowai All Layers	34	7	13	14	160
Waitaki	32	7	24	14	778

about 40% blade. In the following tables a comparison is made with other sites of earlier date where moa hunting was more important, and with later sites.

Insufficient information is yet available in published form to attribute material to layers at the excavated sites of Pounawea and Papatowai, but according to Lockerbie[34] the majority of artifacts at both these sites came from the bottom two layers.

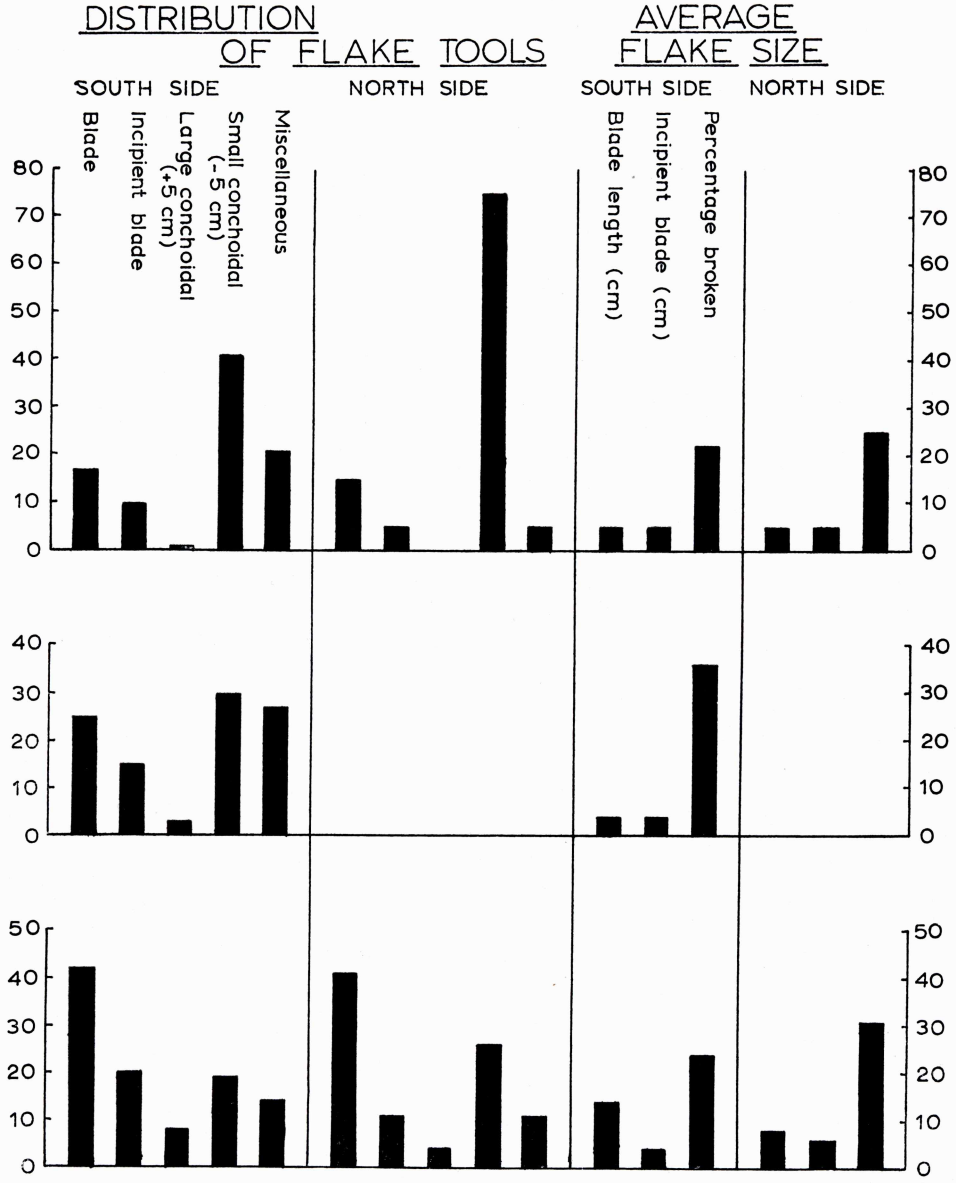


Fig. 19. Distribution of flake tools at Little Papanui.

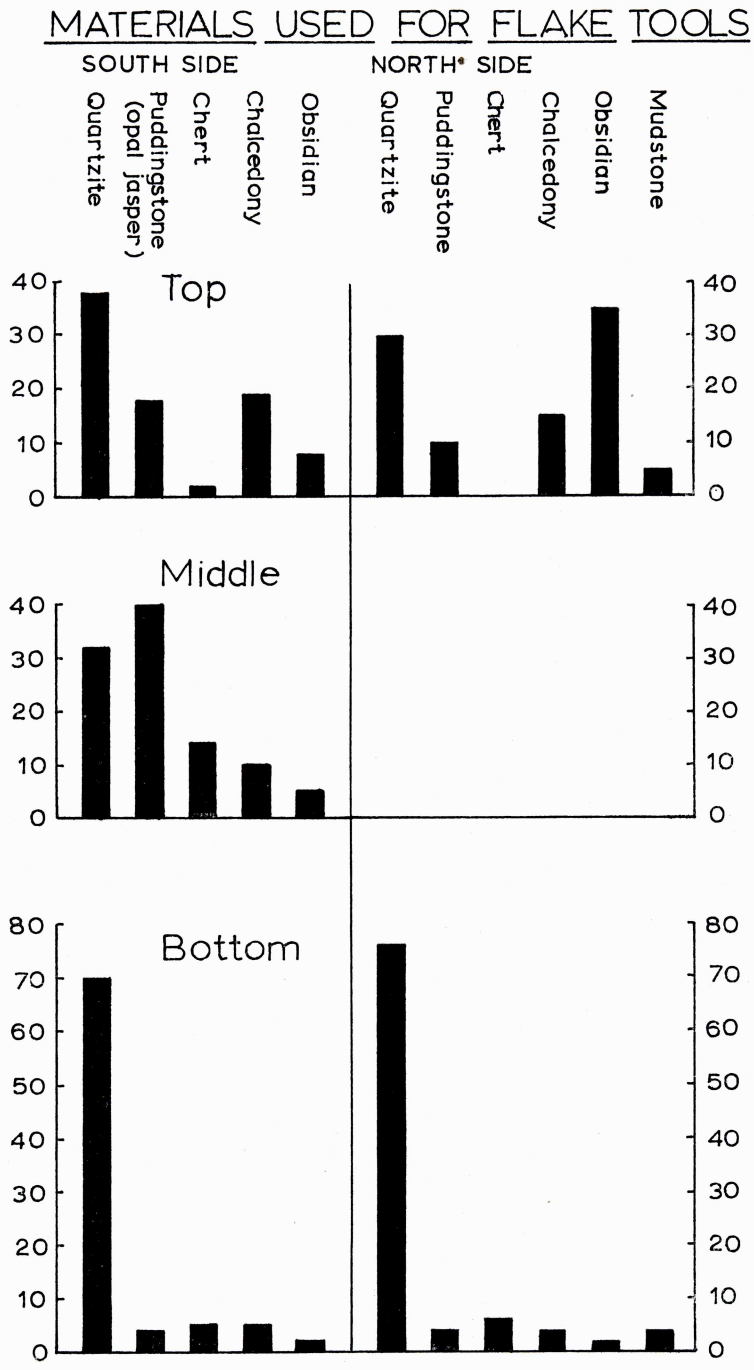


Fig. 20. Materials used for flake tools at Little Papanui.

FISH HOOKS AND FISHING GEAR

The bottom layers at Little Papanui contain 15% one piece hooks, as well as points and shanks of composite bone minnows, points of simple barracouta lures, unbarbed composite bait hook points, and a few barbed points of composite hooks. One piece hooks are common in early sites in Otago but gradually decrease in numbers as the following table illustrates:

PERCENTAGE OF ONE-PIECE FISH HOOKS IN OTAGO SITES

Papatowai	63	Sandfly Bay	12
Waimaitaitai	46[35]	Cannibal Bay	6
Tai Rua	62[36]	Karitane	5
Shag River	28	*Little Papanui Top*	3
Ototara	25[37]	Murdering Beach	3
Mata Kaea	17[38]	Long Beach	5
Little Papanui Bottom	15	Tarewai Point	0
King's Rock	15[39]		

A comparison of the head shapes of one-piece hooks indicated that significant information may be obtained from this course.

Typically early sites employ a range of head types, with concentration on the first two groups shown in the table. Late sites have a different distribution or, as in sites of the late European-Maori phase such as Tarewai Point, have no bone one-piece hooks at all.

TABLE OF HEAD SHAPES
PERCENTAGES

	Papatowai	Shag	L. Papanui Bottom	Kings Rock	L. Papanui Top	Murdering Beach	Tarewai Pt.
Knob-groove	36	50	75	50	50	0	0
Top grooved knob and grooves	27	46	16	17	0	0	0
Back lugged or grooved knob	18	0	4	17	0	0	0
Back notched knob or double knob	18	2	4	16	50	100	0

The minnow-shaped lure is represented at Little Papanui by flat bone shanks with dorse-ventral perforation. No published information is available on the chronological distribution of this type, but Lockerbie has confirmed an idea gained from the site distribution of these shanks in the Museum collection. Specifically, at Pounawea, the lower half of the bottom layer contains stone minnow shanks which gradually decrease in number in the upper half of the same layer where they are found to be paralleled by bone shanks. In the extreme lower section of the middle grey layer, occasional stone minnows are found but are outnumbered by bone minnows. In the mid and upper sections of the middle layer, only bone minnows have been found. One bone minnow was found in the bottom of the shell layer.[40] They in turn are absent from the top of the shell layer. In the bottom layers at Little Papanui bone shanks are more numerous

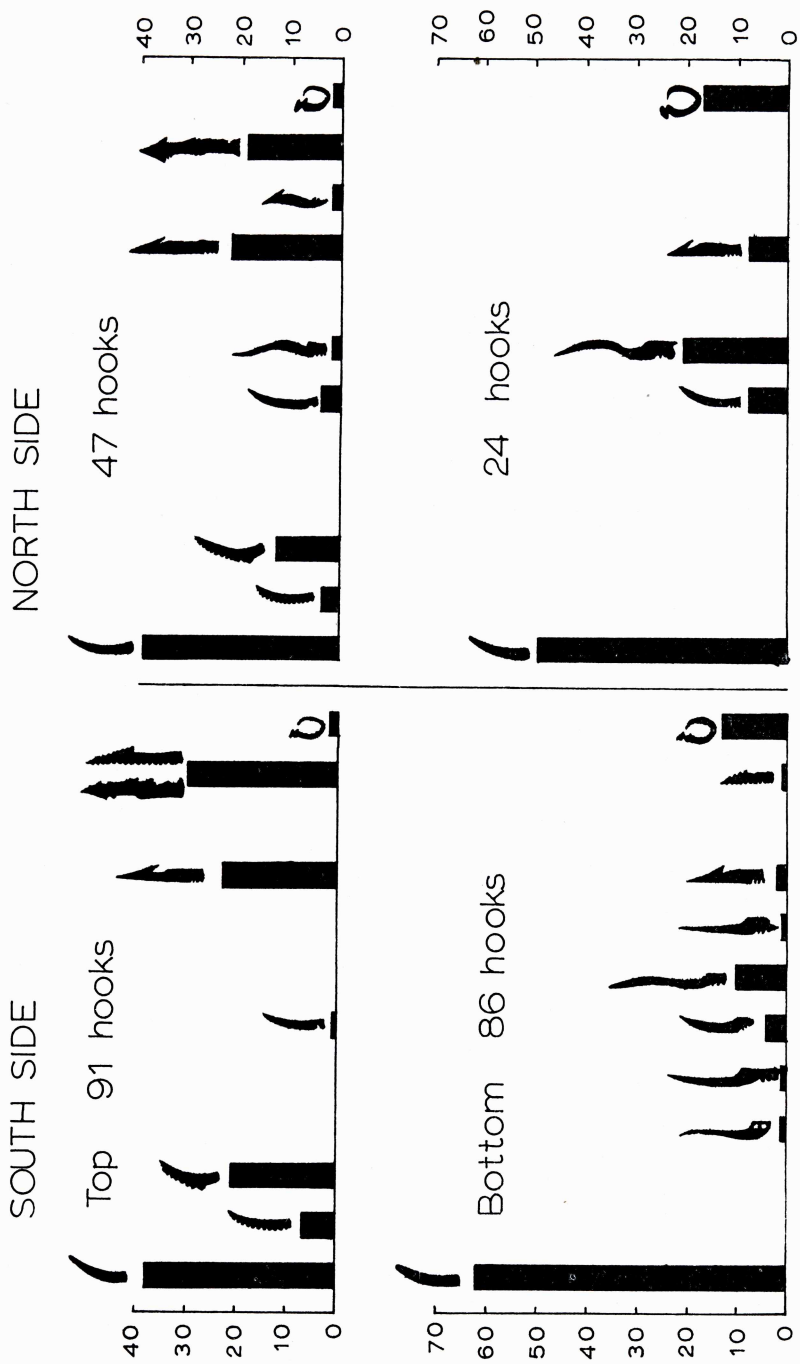


Fig. 21. Distribution of fish hook groups at Little Papanui.

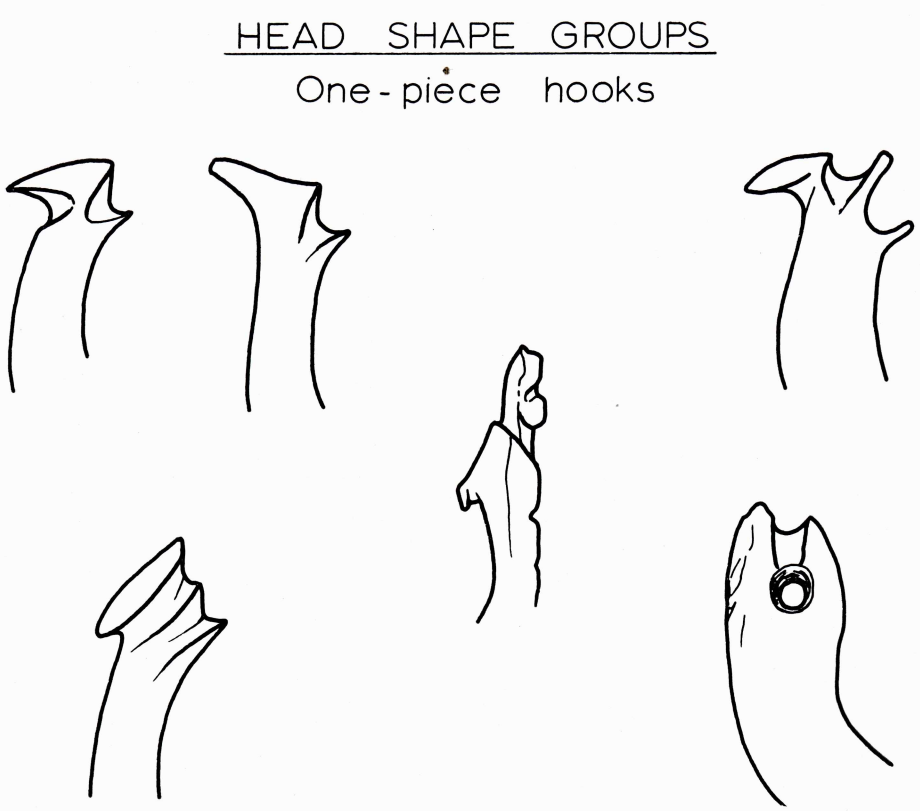


Fig. 22. Head shapes of one-piece hooks.

than stone shanks: five bone on the South and two bone and one stone on the North side, together with a finely made harpoon.

The simple barracouta is common on all Otago sites but is almost replaced in later sites by the serrated and dog-leg forms. A comparison with other sites is as follows:

TABLE OF PERCENTAGE OF BARRACOUTA HOOK POINTS

	Simple	Serrated	Dog-leg
Tarewai Point	46	8	46
Murdering Beach	10	8	80
Long Beach	50	11	39
Little Papanui Top	65	10	25
King's Rock	46	37	18
Cannibal Bay	80	20	0
Sandfly Bay	100	0	0
Tai Rua	100	0	0
Little Papanui Bottom	100	0	0
Shag River	100	0	0
Papatowai	100	0	0
Pounawea	100	0	0

The top layers at Little Papanui are characterized by a variety of barracouta points but the serrated and dog-leg forms are not predominant — a trait shared by Cannibal Bay and King's Rock upper layers.

Barbed points of composite bait hooks have been shown to be present in intermediate sites; all layers at King's Rock[41] (2 in bottom layer), there being 7 out of a total of 23, at Waimaitaitai[42] (5/28), Ototara[43] (2/4), Tai Rua[44] (4/107), Cannibal Bay[45] (27/63) and in Little Papanui bottom layers (6/115).

In the top layers at Little Papanui only two unbarbed point forms are found — a simple notched point made from dog canine and one example of the long slender point. Much more important are the barbed forms. The percentage of barbed points is comparable with other late sites, though the variations between the sites raise further problems.

TABLE OF BARBED POINTS ON SOME LATER SITES
(Percentages of total hooks)

	Simple barb	Serrated and Multi-barb
Karitane	2	50
Tarewai Point	12	29
Murdering Beach	15	24
Long Beach	21	18
Little Papanui Top Layers	21	19
King's Rock Top Layers	22	16
Cannibal Bay	34	2
Sandfly Bay	45	2
Little Papanui Bottom Layers	4	1
Shag River	4	0

Top layer material at Little Papanui included two bone shanks for composite bait hooks similar to the wooden examples recovered from the top layer in Monck's Cave, Sumner,[46] and a large seal bone shank.

BONE TOOLS

The most significant, chronologically, of the bone tools are the bird-spear points. Whether the bird-spear point of New Zealand and the Chathams is an ancient form or not, it is absent from the lower layers of all early sites in Otago.[47] Duff reports one example from Wairau Bar,[48] but with no information as to its position. The artifact is also absent from the North Island Archaic.[49] In Otago the distribution of the bird-spear parallels that of the barbed fish hook point. The comparative table illustrates this distribution.

DISTRIBUTION OF BARBED BIRD-SPEAR AND BARBED FISH HOOK IN OTAGO SITES

	No. of Bird-Spears	% of Barbed Hooks
Tarewai Point	13	41
Murdering Beach	5	39
Long Beach	64	39
Kaikai's Beach	80	16
Little Papanui Top Layers	33	40
King's Rock Top Layers	0	38
Cannibal Bay	25	34
Sandfly Bay	20	45
Little Papanui Bottom Layers	21	5
Shag River	6	4
Papatowai[51]	0	0
Pounawea[52]	0	0

OTHER BONE TOOLS

The other classes of bone tools appear to have no chronological significance though they do have a regional distribution.

Fine bone needles are a feature of many sites in Otago. They are divisible into the sawn and drilled eye groups. In Little Papanui they are distributed as follows:

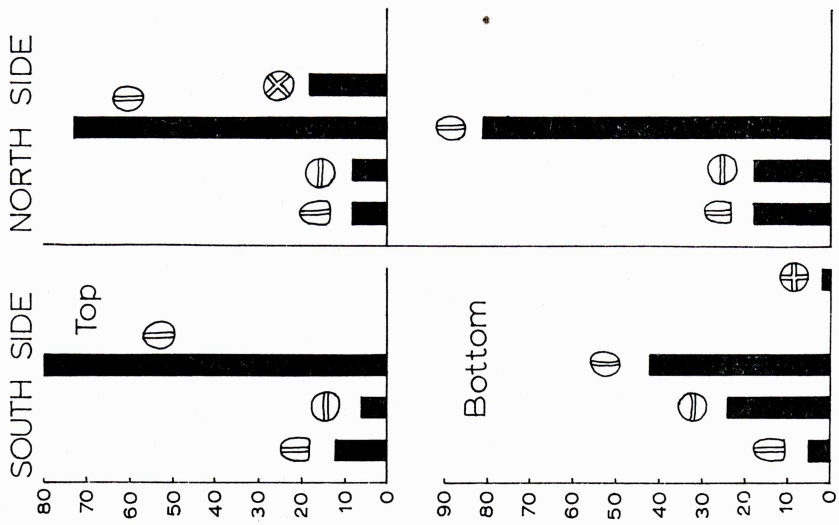
	Sawn	Drilled	Broken	Total
Top Layers	3	15	5	23
Middle Layers	1	1	1	3
Bottom Layers	2	7	2	11
Totals	6	23	8	37

The increase of needles in the top layers may be of interest when more detailed information from excavated sites is available. The following table shows the distribution of needles in some sites in Murihiku.

NEEDLES IN MURIHIKU SITES

	Sawn	Drilled	Broken	Total
Kaikai's Beach	6	16	8	30
Long Beach	4	8	0	12
Tarewai Point	3	0	0	3
Murdering Beach	0	4	0	4
Pipikaretu	0	19	8	27
Little Papanui top	3	15	5	23
Little Papanui middle	1	1	1	3
Little Papanui bottom	2	7	2	11
Shag River	0	5	1	6
Papatowai[46]	0	1	0	1
Pounawea[46]	0	4	0	4

Pickers of various types, made from the wing bone of albatross, mollyhawk or occasionally smaller birds, are a common feature of Murihiku sites at all periods. Like needles they appear to have little chronological significance.



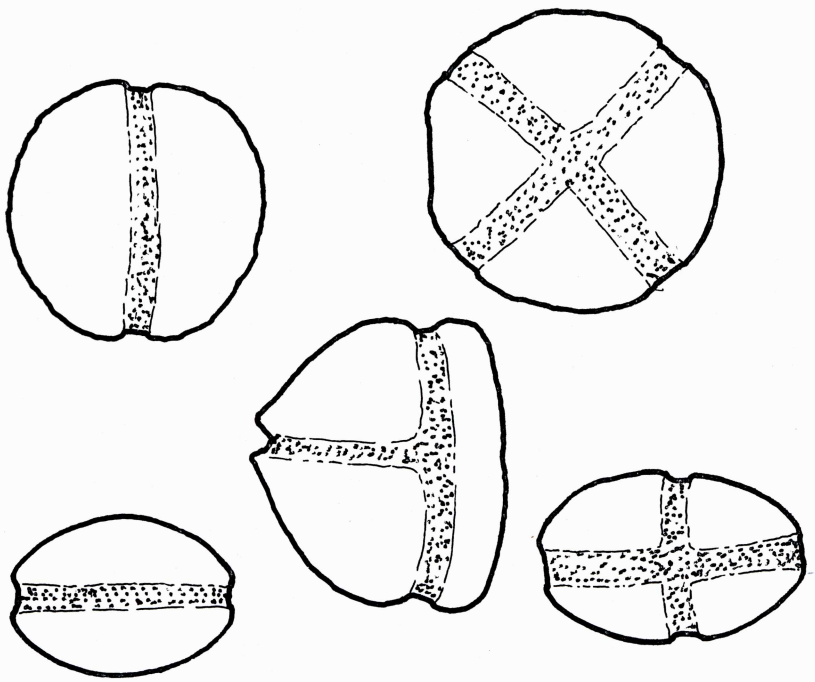


Fig. 23. Distribution of sinkers at Little Papanui.

LITTLE PAPANUI PICKERS

	Large round point	Large sharp point	Long slender	Short slender
Top	11	14	3	16
Middle	10	1	0	3
Bottom	25	21	3	10

There is a decrease in the number of pickers recovered from the top layers as compared with the bottom layers. In later sites the short picker is more common than the other forms. Threaders, which are in effect, perforated pickers are not common on the site. Altogether only three were recovered, two from the middle layers and one from the top layers. Awls were found in the various layers:

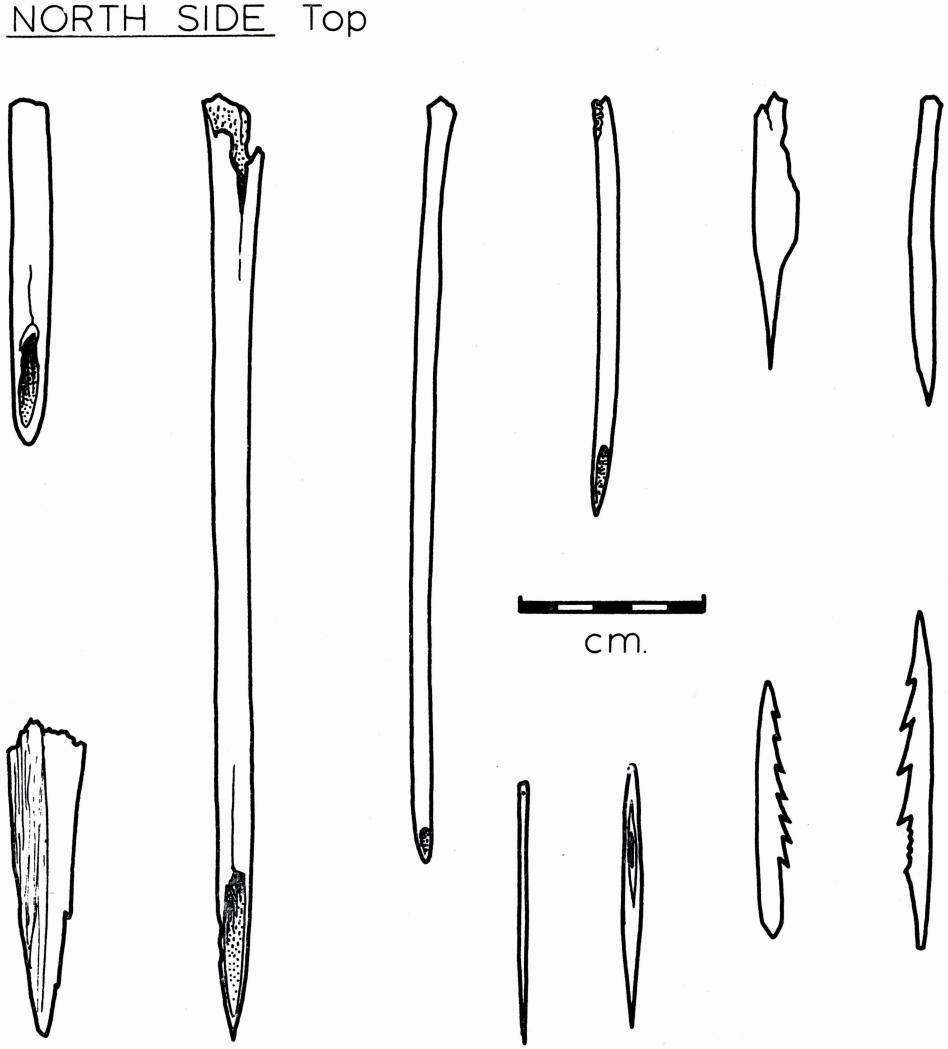


Fig. 24. Bone tools. North side, top layer Little Papanui.

LITTLE PAPANUI AWLS

	Leg Awls	Flat Awls
Top	3	4
Middle	1	0
Bottom	1	6

BONE POINTS

The stout moa bone point is restricted to sites on which moa is plentiful. There appears to be no related form in later layers or sites.

Plain bone points and notched or serrated points are present but no significance can be attributed to their vertical distribution:

BONE POINTS AT LITTLE PAPANUI

	Stout Moa	Plain Points	Points with lashing device
Top	0	12	3
Middle	0	4	1
Bottom	6	27	4

FILES, POLISHING AND GRINDING TOOLS

In all layers there is a full range of bone or stone working tools. The separate analysis of the two sides of the site has failed to indicate any consistent variations in the proportions of such tools present between the top and bottom layers of either side of the site, except that there is a tendency for files to be more numerous in the bottom layers. This may be a reflection of manufacture of one-piece hooks:

TABLE OF GRINDING AND POLISHING TOOLS
LITTLE PAPANUI

		Bottom	Middle	Top
	Grindstone	10	1	15
	Misc. polishing	19	3	2
Files	Undercut point	7		1
	Plain point	15	4	11
	Triangular point	2		5
	Circular	10		3
Cutters	Basalt	1	1	1
	Adze shape	1		
	Square			
	Two-sided	3		
	Triangular point	3	1	1
	Misc.	31	8	33
	Isosceles triangle	1		
	Elliptical	4	3	1
	Rough elliptical	1		
	Large			
Polisher	Flat elliptical	17	5	8
	Elliptical	1	1	
	Round	13		4

HAMMERS

Hammers are of two main forms, round and disc shaped. Round hammers are apple or egg shaped, disc hammers are flat circular discs. Weight would appear to be an important criterion and it is perhaps significant that at Little Papanui, there are few hammers weighing more than 1¼lb.

HAMMERS

	Bottom	Middle	Top
Disc	1		2
Round Total	9	3	33
¼lb	2		9
½lb	3	1	8
¾lb	2		7
1 lb		1	3
1¼lb			3
1½lb	1	1	
2 lb	1		1
2½lb			2

POLISHED SLATE OR STONE KNIVES

This artifact, a polished flat stone knife similar to the stone or metal reaping knives of Asia, the Eskimo *ulu* and American stone knife, is characteristic of early sites in the southern part of New Zealand. The northern limit of the form is Wairau Bar (1 circular example[53]). Outside New Zealand it is found in Polynesia at Pitcairn. A rare form having the shape of a European knife is found at Easter Island.[54] One of the specimens from the Waitaki Mouth site is almost identical with this Easter Island form. At Little Papanui one example can be definitely placed in the bottom layer. Two other examples found on the site may also have come from this layer. The following is the distribution of polished knives in Murihiku:

DISTRIBUTION OF POLISHED STONE KNIVES IN MURIHIKU

Tai Rua	0	Papatowai[56]	2
Sandfly Bay	0	Pounawea[57]	2
King's Rock Bottom[55]	1	Shag River	20
L Papanui Bottom	1 (+2)	Waitaki River[58]	50
Kaikai Bottom	2		

ORNAMENTS

Reels, whale tooth units, shark teeth and most of the other early ornaments were absent from Little Papanui except for one example of a cut *Dentalium nanum* necklace unit from the bottom layer. This is in marked contrast to earlier sites such as Pounawea,[59] Waitaki and Papatowai, but similar to the intermediate sites of Tai Rua[60] or King's Rock.[61] One other ornament form, the toggle, identical

in all respects to those in the upper layers, was represented by two examples from the bottom layers. Unstratified material from the site includes a chevroned amulet and another pendant. One of these amulets recovered from Shag River[62] and the Lake Grassmere[63] example could suggest that chevron amulets belong to the same phases as the people who occupied the bottom layers at Little Papanui. A dagger-shaped amulet in a red slate rock, similar to rock in use at Waitaki, was found on the surface, but may have come from the bottom layer.

The top layers at Little Papanui contained a variety of Classic Maori ornaments as listed below:

a. Mat pins, 5.

b. Bone ear pendants, 1.

c. Kinky pendants, 4.

d. Perforated human teeth, 4.

e. Tattooing chisels, 5.

f. Pear-shape pendant, 1.

g. Greenstone pendant, 1.

h. Whakapapa, 1.

Combs were represented by the two varieties (a) bird bone, 3, (b) flat, 1. Except for the mat pins none of these items are recorded from other than late Classic Maori sites.

A reflection of adornment is the kokowai grinders and kokowai ovens found on both sides of the site in the top layers.

Carving is rare in Murihiku, but the presence of two paua shell rings in the top layer is evidence for the craft. Both rings are small and would fit into the head carving of a canoe prow.

MUSICAL INSTRUMENTS

Five three-hole flutes and one two-hole flute were found in the top layers. A single broken example came from the middle layer. Such instruments are common in late sites such as Kaikai's Beach 7, Murdering Beach 9, Long Beach 2, Tarewai Point 7, Purakanui 2, Pene Bay Pahia 13, Centre Island 3.

WEAPONS

A single example, a whalebone patu butt was excavated from the top layer. A *wahaika* whalebone patu figured by Skinner[64] is said to have been found in the top layer. The same applies to a rough patu type found on the surface and a re-used butt of a typical ridged butt *onewa*. In Murihiku, ridged butt *onewa* are recorded from only two other late sites.

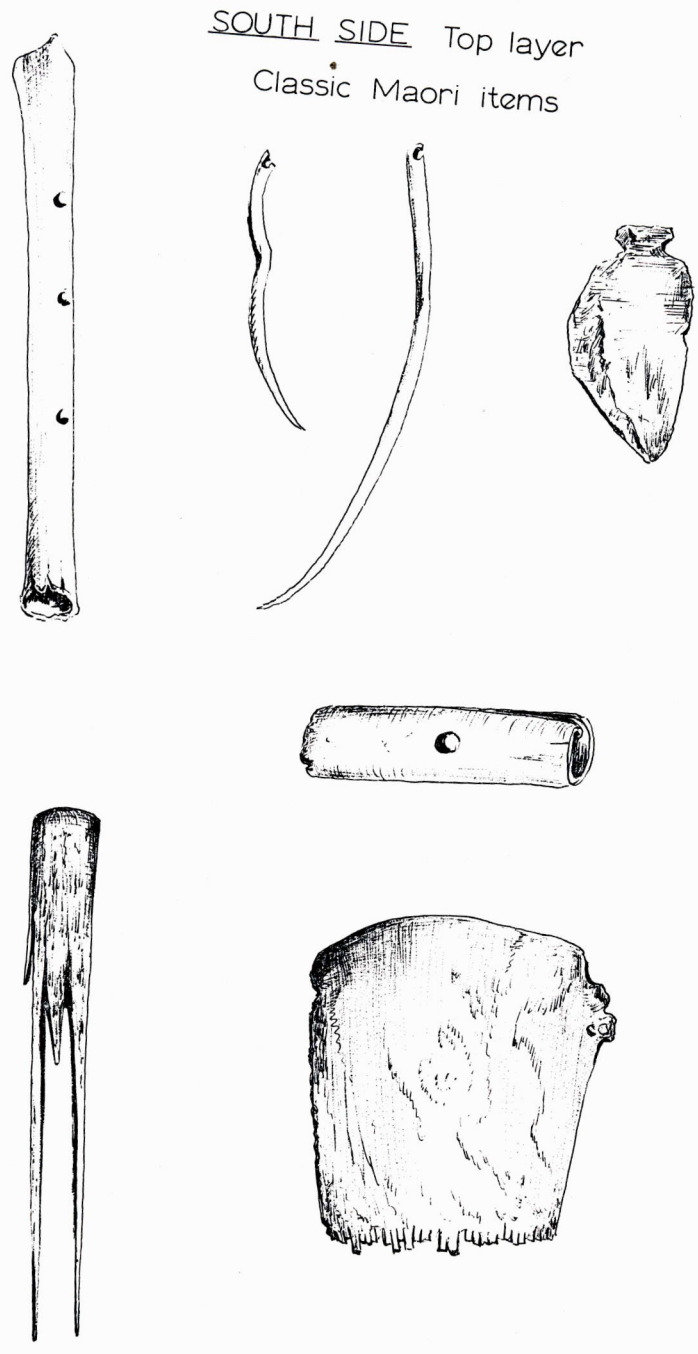


Fig. 25. Classic Maori ornaments and musical instrument. South side, top layer at Little Papanui: Flute, kinky pendant, mat pin, greenstone pendant, toggle, bird bone and flat combs.

PATU IN MURIHIKU SITES

	Mere	Onewa	Whalebone Semilunate butt	Whalebone 'mere'	Wahaika	Other stone patu
Long Beach						1
Kaikai's Beach				1		1
Tarewai Point				2		
Murdering Beach	1	4	1	1		
Anderson's Bay				1		
Karitane				2		
Cornish Head		1				
Little Papanui top		1?	1		1?	1?
Warrington			1			
Puketeraki			1			
Centre Island				1		
Mararoa R.		1				
Pahia				3?		
Queenstown	1					
Preservation Inlet	1					

GENERAL CONCLUSION

The earliest inhabitants of Little Papanui were bearers of a culture which can be dated by analogy with other Murihiku sites to the fourteenth or fifteenth centuries. The middle layer inhabitants of the site were somewhat later and can probably be dated to the seventeenth century. Their material culture, though not extensively represented, is clearly derived from that of the earlier inhabitants. The top layer represents an invasion by a dominant group bearing a form of Classic Maori culture. While the evidence for cannibalism indicates a conquest, the continuance of certain items such as the slight spade-shouldered adze provides evidence that the local groups were not exterminated but rather absorbed into the dominant culture. Similar Classic Maori groups living at Tarewai Point, Murdering Beach and other sites of European contact were by about 1817 cultivating potatoes for trade.[65] It is unlikely that non-agricultural groups would take to tuber agriculture so that it is probable that the Classic Maori movement into Otago brought with it the potato. Indications that this move may have preceded actual European contact in the Otago area is provided by five points which suggest contact between Cook at Queen Charlotte Sound and some of the people later known to be in Otago.

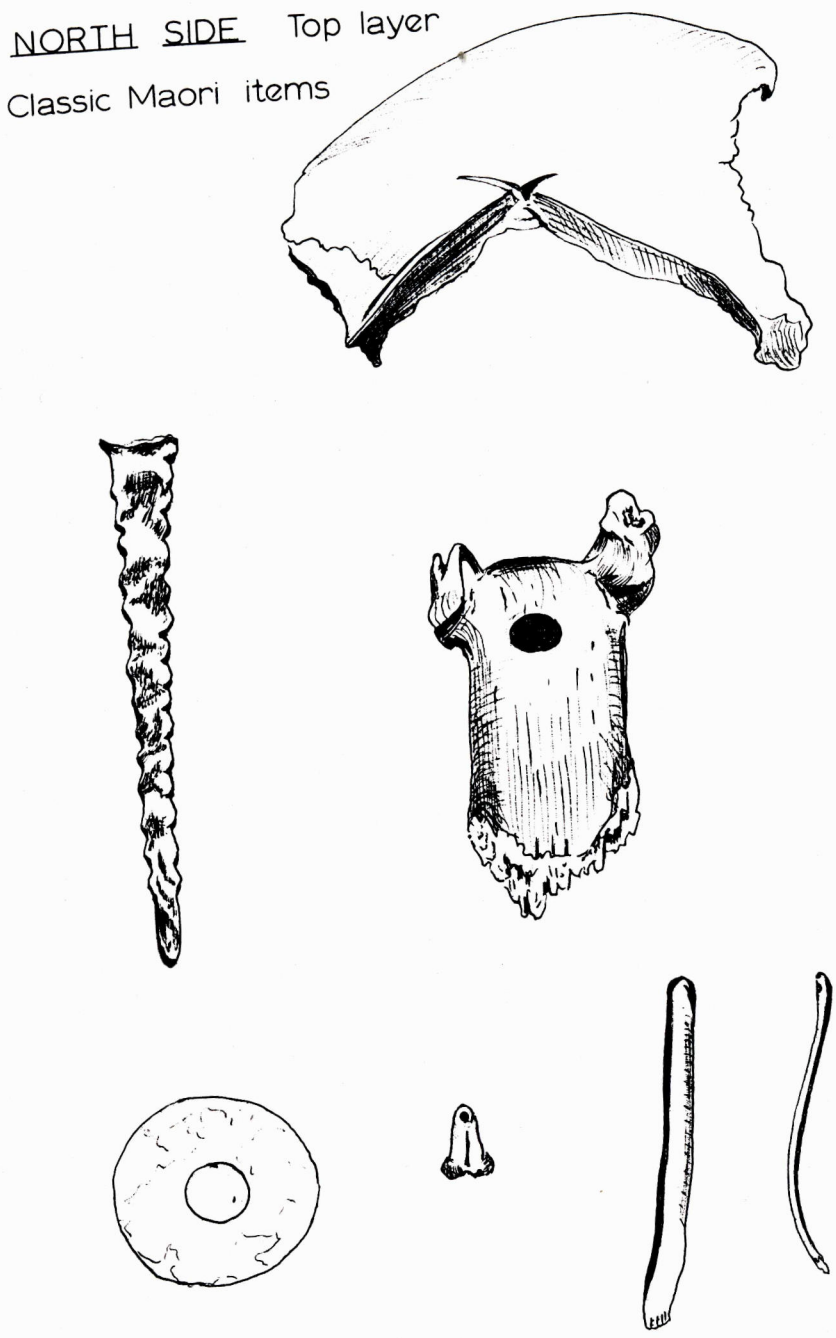
1. The finding, at Murdering Beach, of a medal issued by Captain Cook on his second voyage, this being one of only half-a-dozen objects of European manufacture recorded from the site.
2. The report of the missionary J. Watkin in 1840 that Korako, one of the chiefs associated with Murdering Beach, had met Cook, and had been given a tomahawk by him, and remembered potatoes being introduced. Korako was one of Watkin's converts at Waikouaiti. He died in 1852 at a very advanced age.[66]
3. On 7 December 1848, Mantell notes that he 'Purchased from old Korako an old tomahawk given to the natives at Queen Charlotte Sound by Captain Cook'.

4. Watkin's report is partially corroborated by reports by Forster and Cook that on the second visit to Queen Charlotte Sound they were approached by two small canoes containing five men who subsequently returned with a woman and three children.[68] Their language is remarked on as being a singular mixture of gutturals and vowels.[69] The names of some of them are given as Towhanga, Kotugha-a, Koghoaa, Kollakh, Koparee, Taywaherua.[70] Some of these names are also found among the immediate relatives of Korako[71] (Kollakh). On Cook's return seven months later this group brought 'a great number of green nephritic stones wrought into chisels and blades of hatchets.'[72] It was at this time that Cook took a member of the party to the garden on Motuara, planted a while before by the Captain of the Adventure, and showed him 'some potatoes planted there . . . There seems to be no doubt of their succeeding as they were in a very thriving state, the man was so pleased with them, that he immediately began to hough up the earth about the plants. I called them Coumalla a root common in many parts of Eahei-nom-awe and as I could find from this man not unknown to the inhabitants of Tavai-Poenamimoo.'[73] When Cook returned again he found that though 'New Zealanders are fond of this root it was evident that they had not taken the trouble to plant a single one.'[74] He should have added, in that garden, as it is quite clear that the fierce battles which raged between rival groups of North and South Islanders for possession of the area during and between Cook's visits[75] would not have rendered life in the area very secure. Cook and Forster both remark on these battles without realizing that they were the cause. At least two non-resident groups, Teiratu's people from Cape Terawhiti[76] and the greenstone traders,[77] who probably included Korako, were aware of the value of the potato.

5. The statement by a paramount chief of Kai-Tahu, Tuhawaiki, during the 1844 Otago Land Purchase—

'Here and there and there and yonder; those are all burial places but those of this generation — our parents, aunts, brothers, uncles, sisters, children, they lie thick around us. We are a poor remnant now . . . but even in my time we were a large and powerful tribe, stretching from Cook Strait to Akaroa, and Ngatimamoe to the South of us were slaves.'[78]

The first two items indicate that there was some sort of relationship between the people who met Cook at Queen Charlotte Sound and those who were later in Otago. If the statements of Watkin, Cook and Forster are correct and refer to the same people then it would seem that some of the later Otago people were actually at Queen Charlotte Sound and may have obtained potatoes there. The introduction of the more tolerant white potato may then have meant an explosive extension of the Canterbury tribes' area into the less favoured climatic region of Otago-Southland even before the presence of Europeans made such a move desirable from a trade point of view. Periodic movement into the area may have occurred well before this, but it is unlikely that unless forced to do so an agricultural group would have stayed permanently in an area where sub-tropical crops were impossible. Such forays might produce site intrusion or trait intrusion, not cultural dominance of a whole region as is evident in Murihiku in the last phases.



The Classical Maori material Little Papanui, North side, top. 'Whakapapa', cut human skull, patu butt, paua ring, perforated human tooth, tatooing chisel and curved pendant.

NOTES

1. Site Record No. S164/1.
2. Directed Simmons — a report is being prepared.
3. Teviotdale ms. 500.
4. Teviotdale ms. 500/B.
5. Teviotdale ms. 500/B. Dec. 27th 1926.
6. Skinner 1960: 189.
7. Skinner 1960: 188.
8. Teviotdale M.I. 500/H3.
9. Teviotdale ms. 500 and O.A.S. ms.
10. Teviotdale 1924: 25.
11. O.A.S. Excavation Shag River 1965 oven dated c. 1143 A.D. and personal observation.
12. This analysis was inspired by Hjarno, 'Maori Fish hooks from Southern New Zealand', but differs from it in many important respects.
13. Hjarno 1966.
14. Duff 1959.
15. Lockerbie personal communication 1050 A.D. ± 55.
16. 1127 A.D. ± 50.
17. Lockerbie 1959: 106.
18. Lockerbie 1959: 83.
19. Lockerbie 1959: 84.
20. Lockerbie 1959: 84.
21. Wardle 1963: 313.
22. Duff 1952: 37. Most remains are found in the upper half of the yellow marl. Most of the skeletons clearly belong to the yellow marl though some may belong to the black peat above.
    Eyles 1955: 260 gizzards containing leaves, twigs and seeds.
    Duff 1952: 20 records *Podocarpus spicatus* (matai) seeds, *Myoporum laetum* (ngaio) and *Carmichaelia* leaves.
    Falla 1941: 341 gives the contents of an *Emeus crassus* crop as 58 matai seeds, 8 ngaio seeds and *Carmichaelia* and *Gaimardia*. A *Dinornis* crop contained 200 *Coprosma rhamnoides* seeds and a mass of twiggy material.
    Oliver 1949: 181 mentions the matai, ngaio seeds but also includes *Weinmannia racemosa* (kamahi), *Rubus* sp. (a climber), *Epilobium sp.* (herbs), fruit of *Carex* (sedge) and leaves of *Suttonia divaricata* (a shrub), *Drosera auriculata* (Eared Sundew) and matai.
    Falla 1962: 189 The larger ones (moas) cropped twigs, small branches, grasses.
    Scarlett 1955: 261 lists 17 bush birds, 11 waterfowl, 5 open country birds, and one swamp bird occurring with the moa in the yellow marl.
    Hornibrook 1955: 274 lists pond ostracods occurring in a considerable period of uniform swamp or pond forming the yellow marl.
    Harris 1955: 17 records a maximum percentage of c.66% for *podocarpoid* pollen, 48% for *Nothofagus* (beech). *Leptospermum* (tea tree), is never greater than 10% and grass or bracken do not occur until the end of the period.
    Duff 1952: 29 bottom of yellow, beech leaves, giving way to seeds and bark of matai and much timber in the western margin.
    Oliver 1949: 26-29 moa bones in Herbert, Te Aute, Clevedon etc., are found in deposits with associated plant or tree remains.
23. Holloway 1954: 373.
24. Molloy et al 1963: 70-71.
25. eg. Pounawea, Papatowai, King's Rock, Little Papanui, Sandfly Bay.
26. Lockerbie 1959: 88.
27. Teviotdale 1937, 1938.
28. Lockerbie 1940: 403.
29. Trotter personal communication.
30. Trotter 1965: 351.
31. Lockerbie personal communication.
32. Teviotdale 1939: 108-115.
33. An analysis of the Pareora, Rakaia, Redcliffs and Wairau Bar collections in Canterbury Museum indicates that these principles may have wider application.
34. Lockerbie personal communication.
35. Trotter 1965: 352.
36. Trotter 1965: 351.
37. Trotter 1965: 352.
38. Trotter 1965: 352.

39. Lockerbie 1940: 398, 412-419 Lower Layer 10% Upper 25%.
40. Lockerbie personal communication.
41. Lockerbie 1940: 412-419.
42. Trotter 1965: 352.
43. Trotter 1954: 352.
44. Trotter 1965: 352.
45. Lockerbie 1959: 88 and O.M. Colln.
46. Skinner.
47. Lockerbie personal communication and O.M. Colln.
48. Duff 1956: 225.
49. Golson 1959: 44-47.
50. Lockerbie 1940: 412-419.
51. Lockerbie personal communication.
52. ibid.
53. Canterbury Museum Colln. Rare North of Hurunui Mouth see Duff 1956:194.
54. Heyerdahl 1961: Fig. 100.
55. Lockerbie 1940: 405.
56. Lockerbie personal communication.
57. Lockerbie 1959 Fig. 5 and personal communication.
58. O.M. and Willets Colln.
59. Lockerbie 1959: 83 Figs. 48-57.
60. Gathercole 1961: 33.
61. Lockerbie 1940: 412.
62. Hamilton 1892: 489.
63. Robson 1876: 279.
64. Skinner 1960: P1 XI and personal communication.
65. Bowden 1964: 47.
66. Quoted in Pybus 1954: 29, 92, 94.
67. Mantel 1848.
68. Forster 1777 I:204.
69. Forster 1777 I:208.
70. Forster 1777 I:208, Taywaherua (Taweiharooa) and Kokoa sailed with Cook, Taywaherua's mother is given as Tiratoutou.
71. Shortland 1851: Genealogical Table between pp.94-96.
72. Forster 1777 I:500 Beaglehole 1961: 289.
73. Beaglehole 1961: 167-168.
74. Cook 1784 II:125 Forster 1777 II:495 suggests the potatoes had been lifted though other crops had gone to seed.
75. Beaglehole 1961: 172, 178, 291, 293, 571.
    Beaglehole 1962: 456. Cook 1784 II:124, 131, 132, 137, 138.
76. Forster 1777 I:222.
77. Beaglehole 1961: 168.
78. Quoted Pybus 1954: 109.

BIBLIOGRAPHY

ANELL, Bengt. 1955. Contribution to the History of Fishing in the Southern Seas. *Studia Ethnographica Upsaliensia 8*. Uppsala. Almqvist and Wiksells Boktrycheri A.B.

ARCHEY, Gilbert. 1941. The Moa, a Study of the Dinornithiformes. *Bull. Auck. Inst. Mus. 1*. The Unity Press, Auckland.

BATHAM, Elizabeth. 1958. Ecology of Southern New Zealand Exposed Rocky Shore at Little Papanui, Otago Peninsula. *Trans. Roy.* Soc. N.Zeal. 85: 647-658.

BEAGLEHOLE, J. C. (ed.) 1955. *The Journals of Captain James Cook. The Voyage of the Endeavour 1768-71*. Cambridge University Press for Hakluyt Society.

——1961. *The Journals of Captain James Cook. The Voyage of the Resolution and Adventure 1772-75*. Cambridge University Press for Hakluyt Society.

——1962. *The Endeavour Journal of Joseph Banks 1768-71*. 2 vols. The Trustees of the Public Library of New South Wales in association with Angus & Robertson.

BELL, R. 1956. Archaeological Investigations at Murdering Beach, Otago, New Zealand. *Journ. Polynesian Soc. 65*: 38-40.

BOWDEN, Keith. 1964. *Captain James Kelly of Hobart Town*. Melbourne University Press.

BURRELL, Juliet, 1965. Ecology of *Leptospermum* in Otago. *N.Zeal. Journ. Botany 3*: 3-16.

COCKAYNE, L. & TURNER, E. Phillips. 1958. *The Trees of New Zealand*. Wellington, R. E. Owen, Government Printer.

COOK, Capt. James & KING, Capt. James. 1784. *A Voyage to the Pacific Ocean . . . in the years* 1776-1777, 1779, 1780. 3 vols. Published by order of the Lords Commissioners of the Admiralty. Dublin, printed for H. Chamberlaine etc.

DAWSON, Elliot & YALDWYN, John, 1952. Excavation of Maori Burials at Long Beach, Otago. *Journ. Polynesian Soc. 61*: 283-291.

DEEVEY, Edward S. Jr. 1955. Paleolimnology of the Upper Swamp Deposit, Pyramid Valley. *Rec. Cant. Mus. 6*: 291-334.

DUFF, Roger. 1941. Notes on Moa Excavations at Pyramid Valley, Waikari. *Rec. Cant. Mus. 4*: 330-338.

——1949. Moas and Man (Part 1). *Antiquity 23*: 172-179.

——1950. Moas and Man (Part 2). *Antiquity 24*: 72-83.

——1952. *Pyramid Valley, The Story of New Zealand's greatest Moa Swamp*. Christchurch. The Pegasus Press for the Association of Friends of the Canterbury Museum.

——1955. Further Reports on Excavations at Pyramid Valley Swamp, Waikari, North Canterbury. *Rec. Cant. Mus. 6*: 253-255.

——1956. The Moa-Hunter Period of Maori Culture. *Cant. Mus. Bull. No. 1*. Wellington R. E. Owen, Government Printer.

——1959. Neolithic Adzes of Eastern Polynesia in *Anthropology in the South Seas,* Freeman and Geddes (eds.), New Plymouth, Thomas Avery & Sons.

——1962. Aspects of the Cultural Succession in Canterbury, Marlborough. *N.Zeal. Archaeological Assoc. Newsletter 54*: 205-209.

——1963. The Problem of Moa Extinction. *Thomas Cawthron Memorial Lecture No. 38*. Nelson, R. W. Stiles & Company.

ECCLES, Alfred (ed.). 1944. *A Pakeha's Recollections. The Reminiscences of Murray Gladstone Thomson*. Wellington, A. H. and A. W. Reed.

ELLIS, W. 1784. *An Authentic Narrative of a Voyage Performed by Captain James Cook and Captain Clerke in His Majesty's Ships Resolution and Discovery during the years* 1776, 1777, 1778, 1779, 1780, 2 vols. (3rd ed.), London. Printed for G. Robinson etc.

EMORY, Kenneth, BONK, William & SINOTO, Yoshiko. 1959. Hawaiian Archaeology: Fish Hooks. *Bishop Museum Special Publications 47*, Honolulu, The Bishop Museum.

EYLES, J. R. 1955. Field Notes on the Excavations (Pyramid Valley). *Rec. Cant. Mus. 6*: 257-260.

FALLA, R. A. 1941. Reports on Excavations at Pyramid Valley Swamp. The Avian Remains. *Rec. Cant. Mus. 6*: 339-353.

——1962. The Moa Zoological and Archaeological. *N.Zeal. Archaeological Assoc. Newsletter 53*: 189-191.

FLEMING, C. A. 1962. The Extinction of Moas and Other Animals during the Holocene Period. *Notornis 10*: 113-117.

FORSTER, George and FORSTER, Johann. 1776. *Characteres Generum Planatarum Quas Itinere ad Insulus Maris Australis.* London, Printed for B. White etc.

FORSTER, Johann. 1777. *A Voyage round the World in His Britannic Majesty's Sloop Resolution.* 2 vols. London, printed for B. White etc.

GATHERCOLE, Peter. 1961. Excavations at Tai Rua, Otago, 1961. *N.Zeal. Archaeological Assoc. Newsletter 4* (3) : 32-33.

——(with KNIGHT, HARDWICKE). 1961. A Reconnaissance at the Waitaki River Mouth, Otago. *N.Zeal. Archaeological Assoc. Newsletter 4* (3) : 22-25.

——1962. Murdering Beach, Otago, a Suggestion. *N.Zeal. Archaeological Assoc. Newsletter 5* (3) : 194-196.

GOLSON, Jack. 1959. Cultural Change in Prehistoric New Zealand in *Anthropology in the South Seas.* Freeman and Geddes (eds.). New Plymouth, Thomas Avery & Sons.

——1960. Archaeology, Tradition and Myth in New Zealand Prehistory. *Journ. Polynesian Soc. 69*: 390-402.

——and GATHERCOLE, Peter, 1962. The Last Decade in New Zealand Archaeology, Part 1. *Antiquity 36.*

HAAST, Julius von. 1874a. Researches and Excavations Carried on in and near the Moa-bone Point Cave, Sumner Road in the year 1872. *Trans. N.Zeal. Inst. 7*: 58-85.

——1874b. Notes on an Ancient Native Burial Place near the Moa-bone Point, Sumner. *Trans. N.Zeal. Inst. 7*: 86-91.

——1879. Notes on an Ancient Manufactory of Stone Implements at the Mouth of the Otokia Creek, Brighton, Otago. *Trans. N.Zeal. Inst. 12*: 150-153.

——1885. On the Stone Weapons of the Moriori and the Maori. *Trans. N.Zeal. Inst 18*: 24-30.

HAMILTON, Augustus. 1892a. Notes on some bone combs for dressing of the head of a Maori Chief, found in Otago. *Trans. N.Zeal. Inst. 25*: 483-486.

——1892b. Notes on some old flax mats found in Otago. *Trans. N.Zeal. Inst. 25*: 486-488.

——1892c. On two bone pendants found in the South Island of New Zealand. *Trans. N.Zeal. Inst. 25*: 489-491.

——1892d. Notes on Maori Necklaces. *Trans. N.Zeal. Inst. 25*: 491-493.

——1895a. Notice of a Moa-hunter's Camping Place on the Old Man Range. *Trans. N.Zeal. Inst. 27*: 232-238.

——1895b. On an account of a massacre at the Entrance of Dunedin Harbour in the year 1817. *Trans. N.Zeal. Inst. 28*: 141-147.

——1896. Notes from Murihiku. *Trans. N.Zeal. Inst. 29*: 169-178.

——1900. Handlist of certain papers relating more or less directly to the Maori Race and published in various publications. *Trans. N.Zeal. Inst. 33*: 515-537.

——1908. Fishing and Sea-foods of the Ancient Maori. *Dom. Mus. Bulletin No. 2.* Wellington. John MacKay, Government Printer.

HARRIS, W. F. 1955. 'Progress Report on Pollen Statistics from Pyramid Valley Swamp'. *Rec. Cant. Mus. 6*: 179-290.

HEYERDAHL, Thor. FERDON, Edwin. et al. 1961. Archaeology of Easter Island. *Monographs of the School of American Research and the Museum of Ne wMexico 2* (1). London. George Allen & Unwin.

HJARNO, J. 1967. Maori Fishhooks in Southern New Zealand. *Rec. Otago Mus. Anthrop. No. 3.*

HOLLOWAY, J. 1954. Forest and Climates in the South Island of New Zealand. *Trans. Roy. Soc. N.Zeal. 82*: 329-410.

HORNIBROOK, N. de B. 1955. Ostracoda in the Deposits of Pyramid Valley Swamp. *Rec. Cant. Mus. 6*: 267-277.

LAING, R. M. & BLACKWELL, E. W. 1957. *Plants of New Zealand.* New Zealand, Whitcombe & Tombs.

LOCKERBIE, Leslie. 1940. Excavations at King's Rock, Otago, with a discussion of the fish hook barb as an ancient feature of Polynesian culture. *Journ. Polynesian Soc. 49*: 395-446.

——1950. Dating the Moa-hunter. *Journ. Polynesian Soc. 59*: 78-82.

——1953. Further Excavation of the Moa-hunter Camp Site at the Mouth of the Tahakopa. *Journ. Polynesian Soc. 62*: 13-32.

——1954. Stratification in Otago Archaeological Sites. *Journ. Polynesian Soc. 63*: 141-146.

——1955. Otago Museum Expedition to Hawksburn, Central Otago. *Journ. Polynesian Soc. 64*: 351-352.

——1959. From Moa Hunter to Classic Maori in Southern New Zealand in *Anthropology in the South Seas.* Freeman and Geddes (eds.). New Plymouth, Thomas Avery & Sons.

McKay, Alexander. 1874. On the Identity of the Moa-hunters with the present Maori Race. *Trans. N.Zeal. Inst. 7*: 98-105.

McKay, Stuart and Trotter, Michael. 1961. Pa a Te Wera, Huriawa Peninsula, Karitane. *N.Zeal. Archaeological Assoc. Newsletter 4* (3): 26-28.

McNab, Robert. 1907. *Murihiku and the Southern Islands.* Invercargill, William Smith.
——1908-1914. *Historical Records of New Zealand.* 2 vols. Wellington, John MacKay, Government Printer.
——1909. *Murihiku: A History of the South Island of New Zealand and the Islands Adjacent and lying to the South, from 1642 to 1835.* Wellington, Whitcombe & Tombs.
——1931. *The Old Whaling Days: A History of Southern New Zealand from 1830 to 1840.* Christchurch, Whitcombe & Tombs.

Meeson, John. 1889. The Newly Opened Grave at Sumner. *Trans. N.Zeal. Inst. 22*: 64-70.

Molloy, P. B. J. et al. 1963. Distribution of Subfossil Forest Remains, Eastern South Island, New Zealand. *N.Zeal. Journ. Botany. 1*: 68-77.

Oliver, W. R. B. 1949. The Moas of New Zealand and Australia. *Dom. Mus. Bull. 15.*

Otago Anthropological Society Fieldwork Group. 1960. Fieldwork in Otago, 1959-60. *N.Zeal. Archaeological Assoc. Newsletter 3* (3): 14-15.

Pybus, Thomas. 1954. *Maori and Missionary: Christian Missions in the South Island.* Wellington, A. H. & A. W. Reed.

Scarlett, R. J. 1955. Further Notes on Bird Remains from Pyramid Valley. *Rec. Cant. Mus. 6*: 261-264.

Shortland, Edward. 1851. *Southern Districts of New Zealand, a Journal with passing notices of the Customs of the Aborigines.* London, Longman, Brown, Green & Longman.

Skinner, H. D. 1921. Cultural Areas in New Zealand. *Journ. Polynesian Soc. 30*: 71-78.
——1923. Archaeology of Canterbury 1: Moa Bone Point Cave. *Rec. Cant. Mus. 2*: 93-104.
——1924. Results of Excavations at Shag River Sandhills. *Journ. Polynesian Soc. 33*: 11-24.
——(with Teviotdale, D.) 1927. A Classification of Implements of Quartzite and similar materials from the Moa-hunter Camp at Shag River Mouth. *Journ. Polynesian Soc. 36*: 180-193
——1937. Maori Use of the Harpoon. *Journ. Polynesian Soc. 45*: 39-42.
——1938. Maori Adzes from Murihiku Region, New Zealand. *Proceedings of the Third Congress of Prehistorians,* Singapore, 1938: 142-72.
——1942. A Classification of the Fish-Hooks of Murihiku with notes on allied forms from other parts of Polynesia. *Journ. Polynesian Soc. 51*: 208-221; 256-286.
——1943. *The Classification* of Greywacke and Nephrite Adzes from Murihiku, New Zealand. *Journ. Polynesian Soc. 52*: 65-85, 157-190.
——1946. Bowling Discs from New Zealand and other parts of Polynesia. *Journ. Polynesian Soc. 55*: 243-62.
——1948. Paddle Forms in Murihiku. *Journ. Polynesian Soc. 55*: 256-267.
——1952. A Medicine Bundle and two wooden Bowls from Inland Otago. *Journ. Polynesian Soc. 61*: 130-135.
——1953a. Notes on Two Harpoon Heads. *Journ. Polynesian Soc. 62*: 197.
——1953b. Stratification at Long Beach, Otago. *Journ. Polynesian Soc. 62*: 400-402.
——1956 (with B. Monheimer). A Maori Secondary Burial Place near Outram, Otago. *Journ. Polynesian Soc. 65*: 336-359.
——1958. 'David Teviotdale.' *Journ. Polynesian Soc. 67*: 321-323.
——1959. Murdering Beach: Collecting and Excavating, the First Phase 1850-1950. *Journ. Polynesian Soc. 68*: 219-238.
——1960. Excavations at Little Papanui, Otago Peninsula. *Journ. Polynesian Soc. 69*: 187-198.

Suggs, Robert. 1961. The Archaeology of Nuka Hiva, Marquesas Islands, French Polynesia. *Anthropological Papers of the American Museum of Natural History, New York. 49* (1).

Teviotdale, David. 1924. Excavations near the Mouth of the Shag River. *Journ. Polynesian Soc. 33*: 4-11.
——1932a. Material Culture of the Moa-hunters in Murihiku. *Journ. Polynesian Soc. 41*: 81-120.
——1932b. Reburial at Little Papanui. *Journ. Polynesian Soc. 41*: 238-239.
——1937. Progress Report on the Excavations of a Moa-hunter Camp at the Mouth of the Tahakopa River. *Journ. Polynesian Soc. 46*: 134-153.
——1938a. Further Excavations at the Moa-hunter Camp at Papatowai. *Journ. Polynesian Soc. 47*: 27-37.

——1938b. Final Report on the Excavation of a Moa-hunter Camp at the Mouth of the Tahakopa River. *Journ. Polynesian Soc. 47*: 114-118.
——1939a. Excavation of Maori Implements at Tarewai Point, Otago Heads. *Journ. Polynesian Soc. 48*: 108-115.
——1939b. Excavation of a Moa-hunters' Camp near the Mouth of the Waitaki River. *Journ. Polynesian Soc. 48*: 167-185.

TROTTER, Michael. 1955. First Excavation of a Moa-hunter Camp Site at Waimaitaitai Mouth, Katiki. *Journ. Polynesian Soc. 64*: 295-303.
——1956. Maori Shank Barbed Fish-hooks. *Journ. Polynesian Soc. 65*: 245-252.
——1959. Archaeological Investigations in North Otago. *N.Zeal. Archaeol. Assoc. Newsletter 2* (3): 10-13.
——1961. A Quartzite Source at Nenthorn, Central Otago. *N.Zeal. Archaeol. Assoc. Newsletter 4* (3): 29-32.
——1965a. Excavations at Ototara Glen, North Otago. *N.Zeal. Archaeol. Assoc. Newsletter 8* (3): 109-114.
——1965b. The Barbed Fish-hook: Its Place in the Murihiku Cultural Sequence. *Journ. Polynesian Soc. 74*: 347-354.

WARDLE, P. 1963. The Regeneration Gap of New Zealand Gymnosperms. *N.Zeal. Journ. Botany 1*: 301-315.

MANTELL, Walter. 1848. *Journal from Kaiapoi to Otago.* Microfilm 114, Hocken Library, Dunedin.

OTAGO ANTHROPOLOGICAL SOCIETY. 1929-1932. Records, Otago Museum.

OTAGO MUSEUM REGISTERS, 1929-1936. Otago Museum.

TEVIOTDALE, David, 1913-1923. *Field Notes made during archaeological digging on sites near the mouth of the Shag River.* Hocken Library, Dunedin.
——1922-1952. *Notebooks and Diaries relating to the excavation of Maori Camp Sites.* 10 Volumes: M1 500 A H, Hocken Library, Dunedin. (Includes photo-copies of Barwell diaries now in the Southland Museum.)