

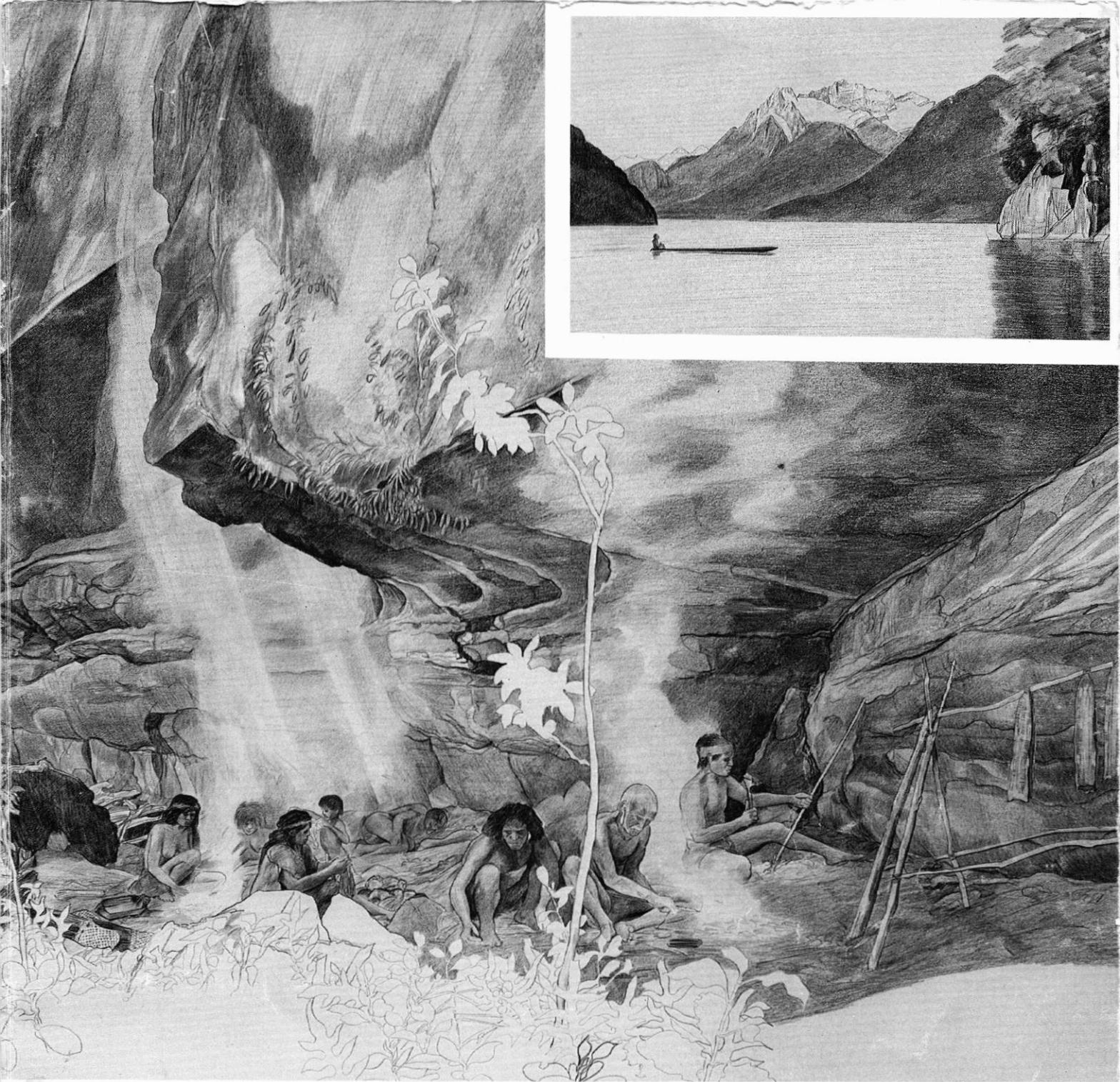


**NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION MONOGRAPH 18:
Atholl Anderson and Richard McGovern-Wilson (eds), *Beech Forest
Hunters***



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Beech Forest Hunters

Edited by
Atholl Anderson and Richard McGovern-Wilson

New Zealand Archaeological Association Monograph 18

IMPLEMENTS IN STONE AND BONE

Atholl Anderson

The Lee Island rockshelter excavations and surface collections produced a rich collection of stone artefacts; adzes and chisels in particular. The assemblage is the largest of its kind, in fact, which can be attributed to stratigraphically-controlled and dated circumstances from anywhere in the inland South Island, and it affords an opportunity, therefore, to consider the nature of the adze kit on the threshold of the late or Classic phase of Maori material culture. There were, in addition, some cores and used flakes, but not as many as were expected in the light of experience at other inland hunting sites, notably those concerned with moa hunting. Bone artefacts, as well, were scarce, but consistent with activities represented by the faunal remains.

THE ADZES AND PREFORMS

Adzes were found only in S131/4 and S131/6 and can be discussed in two groups: the non-nephrite pieces, and the nephrite pieces which were confined to the latter site.

The non-nephrite adzes

In this group are seven finished adzes and two preforms. Three other pieces, discussed amongst the non-adze lithics, might also have been preforms or parts of preforms. Detailed measurements are given in Table 3.1.

Adze 1 (Fig. 3.1) S131/4. The first adze found at Lee Island was recovered by Slater and Henderson (above). They picked it up carefully and the impression it made upon the topsoil was still clearly apparent in 1983. It was located about 4.5m

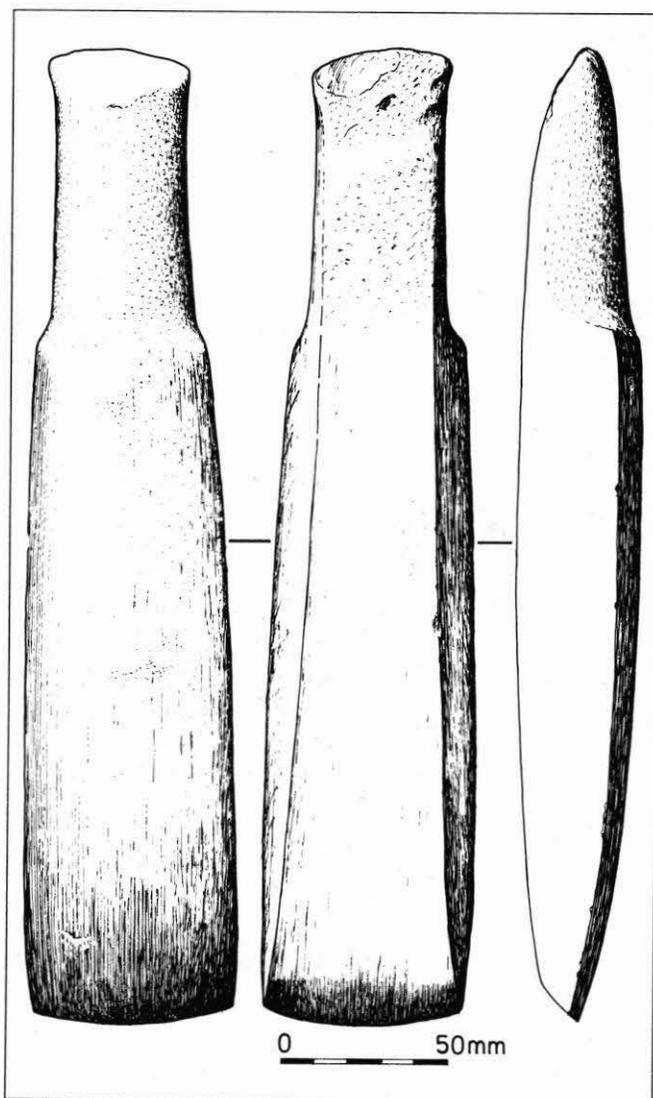


Figure 3.1. Adze 1, S131/4, Surface, found by Messrs Slater and Henderson.

Table 3.1. Measurements of finished adzes.

Notes: 1. measurements are mm or g; 2. cutting edge angles measured to ± 5 degrees; 3. for edge shape index see text.

Number (see text)	Edge shape index	Max. length	Max. width	Max. depth	Weight	Cutting edge width	Cutting edge angle
1	17	286	65	38	1166	59	58
2	15	159	33	34	273	13	60
3	16	80	64	13	77	61	50
4	-	-	-	-	-	36	60
5	21	76	38	15	152	38	45
6	9	81	23	19	54	21	40
7	14	82	28	19	71	27	65
8	50	76	12	11	16	4	45
9	10	60	40	10	37	40	55
10	-	77	21	7	24	19	-
11	-	97	18	15	40	13	35
12	36	81	30	12	47	27	37

south of the excavation near the top end of the shelter floor (Fig. 2.8) where it had lain, bevel down, with the blade pushed several centimetres into the ground and the rest of the adze lying upon the surface, almost covered by leaf litter. Test excavations at the point of recovery and nearby failed to reveal any other cultural material.

This unusually large and finely-crafted implement has been fashioned in a metamorphosed tuffaceous sandstone of a type found in the Mararoa district, Te Anau (note 1). Most of the surface is fully ground and polished, but there is pecking along the right margin of the face which has rounded most of that edge and there is some minor damage including the removal of a large flake from the back of the butt.

The shape of the adze does not readily conform to any of the Skinner (1974) or Duff (1977) types. It is nearest to Duff Type 1D, but lacks the long bevel or upraised bevel and butt shoulders. It is closer to the Thornbury example of the Skinner Type 1E (Skinner 1974:106), but lacks the long bevel and is transversely concave on the back surface.

All that may reasonably be said is that it clearly bears a family resemblance to a broad class of adzes which are almost entirely restricted to Otago and Southland and are represented by the Duff Type 1D and the Skinner Types 1D, 1E and 5. Our example shares with these: a well-marked grip, a quadrangular, front-wider-than-back cross-section with curved faces, a full-width cutting edge, and a lens-shaped longitudinal section which has been created by reduction of the butt. It differs from these in lacking a petaloid plan shape and upraised bevel or butt shoulders, in its very short bevel but long hollow-ground back, in possessing incipient lateral poll lugs, and in being moderately spade-shouldered. Examination of the adze collections in the Otago and Southland Museums disclosed no strikingly similar examples.

Adze 2 (Fig. 3.2) S131/4, Square -A7, Layer 2. This adze is made from hornblende microgabbro, a coarse-grained material, possibly originating in the Livingstone Range which is drained by the Eglinton and Upukerora Rivers flowing south-west into Lake Te Anau. It has been largely hammered into shape, and then ground on the distal parts of all the surfaces. It is another variant of the class of southern adzes referred to above, especially in longitudinal section where it is an almost symmetrical lens into which a grip has been fashioned. The only feature in which it is significantly different is in the narrow cutting edge and consequent coffin shape which lends it an appearance reminiscent of some of the trapezoidally cross-sectioned examples of Duff Type 3C.

In Figure 3.3 are two Southland adzes (from the Southland Museum collection) which help to define further the broad class in question. Figure 3.3A shows an adze (D46.1116) from the Colac Bay-Wakapatu district which has the characteristic

longitudinal lens shape and other attributes of the Duff Type 1D and Skinner Types 1D, 1E and 5. Lee Island Adze 1 may be regarded as a longer and more elegant variation, while Adze 2 is a shorter, deeper and narrower bladed variation. If shortness and depth were further emphasised, the result might be a Duff Type 1D of the stubby, thick-butted form from Colac Bay (B76.37) which is shown in Figure 3.3B.

The proposition I want to suggest here, then, is that there is a broad class of adzes, largely restricted to southern New Zealand, and exemplified by the Duff Type 1D and possibly 1E, and the Skinner Types 1D, 1E and 5, which may be labelled the Southern New Zealand class. The two Lee Island adzes above are examples of it.

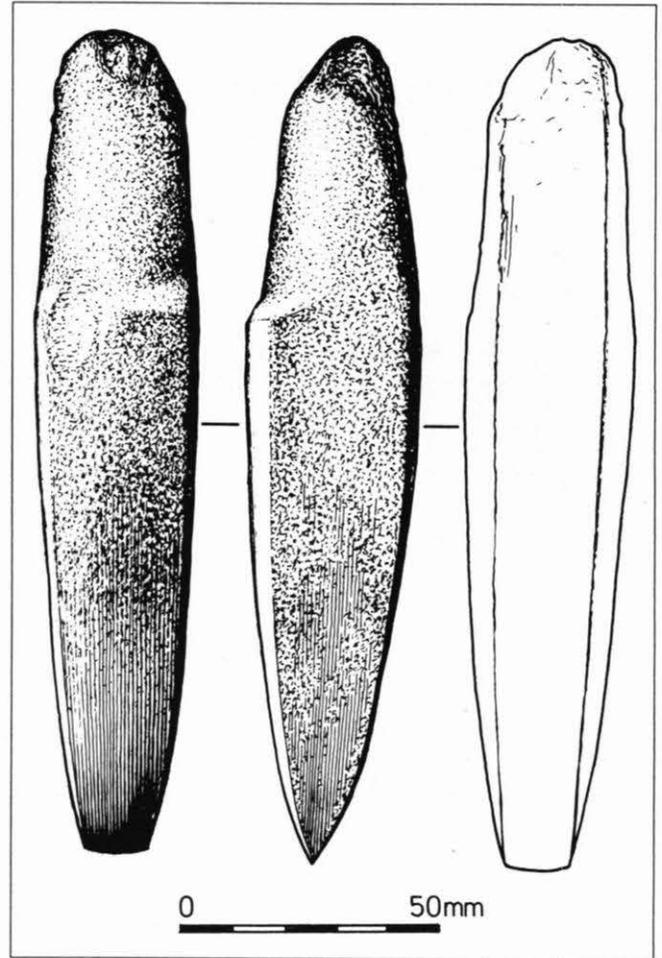


Figure 3.2. Adze 2, S131/4, Square -A7, Layer 2. Southern New Zealand type similar to Duff Type 3c.

Adze 3 (Fig. 3.4) S131/4, Square B8, Layer 2. The material of this adze is a fine-grained greywacke of a type which outcrops in the Torlesse Terrain and which is most nearly available in the Hawkdun Range of Central Otago. This small flake-adze has, on its faces, a number of potlid fractures which may have been caused by crystal wedging (G. Mason pers.comm.). The original flake was lightly ground on both faces at the narrow end, now the butt, as if the first thought was to create a cutting edge there, but it has been fully ground to an almost straight cutting edge at the broad end. This blade

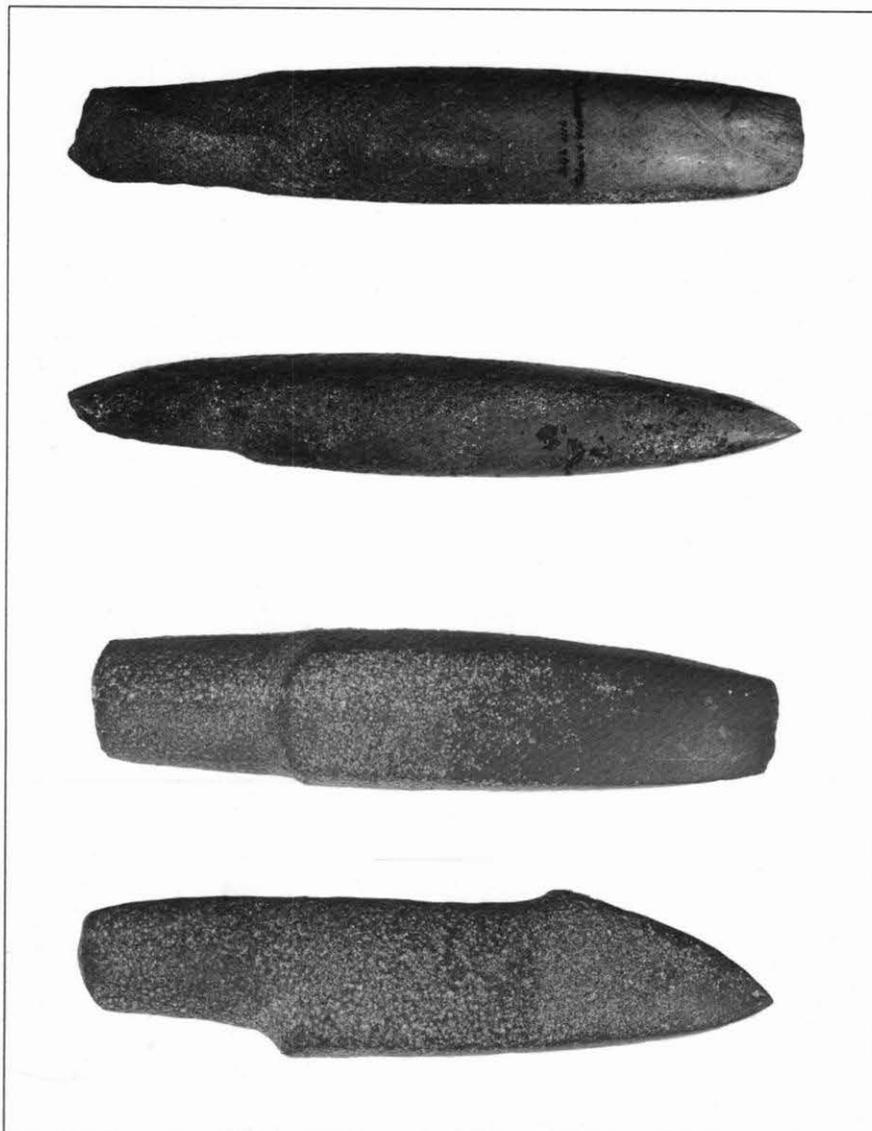


Figure 3.3. Adzes from the Southland Museum for comparison with Lee Island adzes. A: D46.1116 (length 220 mm); B: B76.37 (length 215 mm), both from Colac Bay near Riverton.

has rounded corners and a bevel on both faces. The sides have been lightly ground. The double bevel, rounded corners and side reduction are very reminiscent of an ulu which it might well be considered, but it can also be classified as an

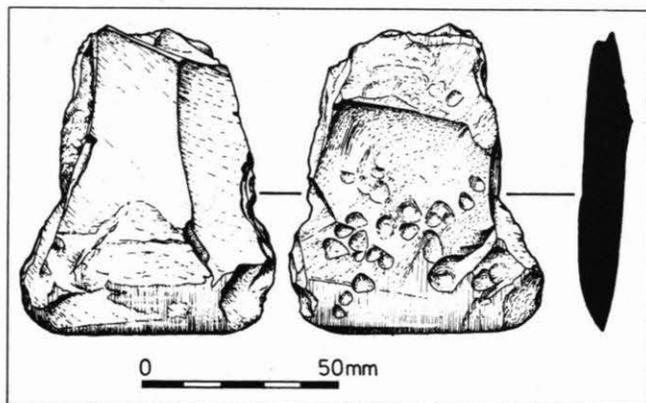


Figure 3.4. Adze 3, S131/4, Square B8, Layer 2. Possibly an implement of the ulu type.

informal example of the Duff Type 1B adze.

Adze 4 (Fig. 3.5) S131/4, Square -A6, Layer 2. This is the blade section, in three joining pieces, of a small quadrangular cross-sectioned adze made from a black aphanitic material, possibly indurated argillite. The front is wider than the back and there was probably no grip, unless there was a spade-shoulder. If it was gripless it would be a Duff Type 2A, otherwise a more formal example of his Type 1B.

Adze 5 (Fig. 3.6) S131/6, Square C4, Layer 2. This small adze is made on an elongated cortex flake struck from a boulder of coarse-grained, metamorphosed, tuffaceous sandstone, dark-green in colour. The sides have been flaked and then lightly hammer-dressed on the higher parts to straighten the edges. There is no evidence of hammering on the front or back. A short bevel has been ground on the original dorsal surface of the flake. The ventral surface has been ground to form the front of the adze. It is closest to Duff Type 2A.

Adze 6 (Fig. 3.7) S131/6, Square D3, Layer 2. This small adze is made from grey metasomatised argillite, probably from a Nelson-Malborough source. The adze has been flaked and then hammer-dressed over most of the surface to produce an oval cross-section.

However, subsequent grinding of the front, the bevel, part of the back, and lightly along the right side, has squared the cross-section of the blade half of the adze. It can be regarded as an unusually narrow and deep example of a Duff Type 2A.

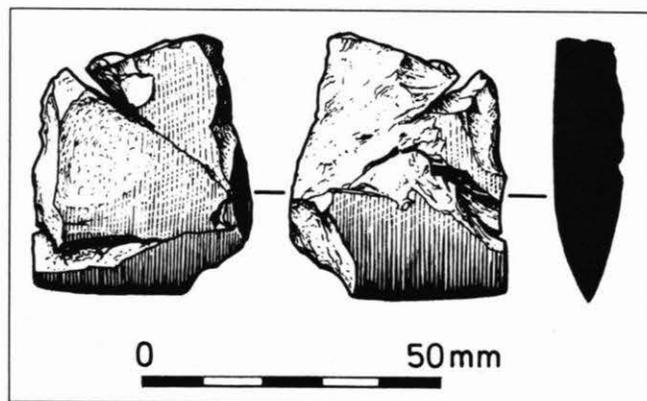


Figure 3.5. Adze 4, S131/4, Square -A6, Layer 2. Found in three joining pieces.

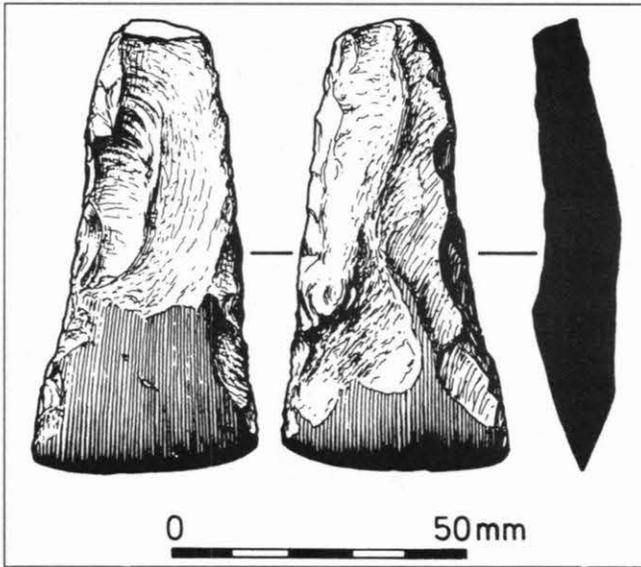


Figure 3.6. Adze 5, S131/6, Square C4, Layer 2. Closest to Duff Type 2a.

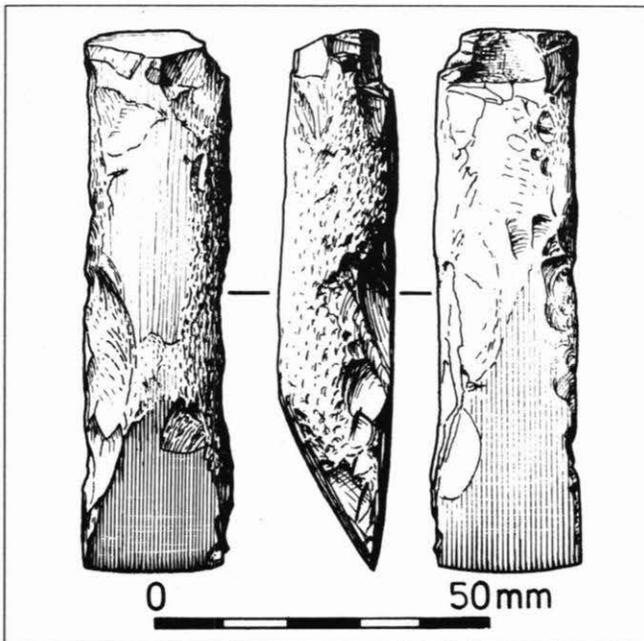


Figure 3.7. Adze 6, S131/6, Square D3, Layer 2. A Duff Type 2a in Nelson-Marlborough metamorphosed argillite.

Adze 7 (Fig. 3.8) S131/6, Square D4, Layer 2. This is a small adze in a dark-blue to black metasediment from the Caples Terrain of Fiordland. There is some evidence of hammer-dressing on the front of the butt section, and a large flake has broken from the back of the butt, but otherwise the adze is well-ground into an unusual form: a gripless, back-wider-than-front adze of Duff Type 2C.

Adze 13 (Fig. 3.9) S131/6, Square D5, Layer 2. This large preform has been shaped from a water-worn cobble or boulder of medium to coarse-grained micaceous sandstone, probably from the Caples Terrain. The original blank was flaked roughly into shape, and the cutting edge has been quite well formed except that it lies obliquely to the front. The

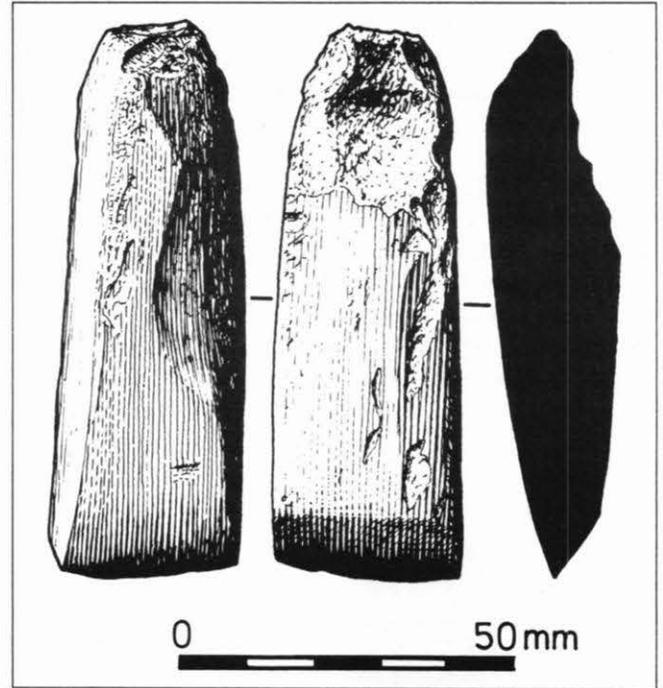


Figure 3.8. Adze 7, S131/6, Square D4, Layer 2. A Duff Type 2c adze.

subsequent hammering has concentrated upon the side and avoided the spine on the back and a middle strip along the front, thus giving the impression that an adze of triangular cross-section, apex down, was contemplated. However, where the work is most advanced, on the left side, the edges of a rounded quadrangular cross-section are emerging. Since the proximal end of the butt has

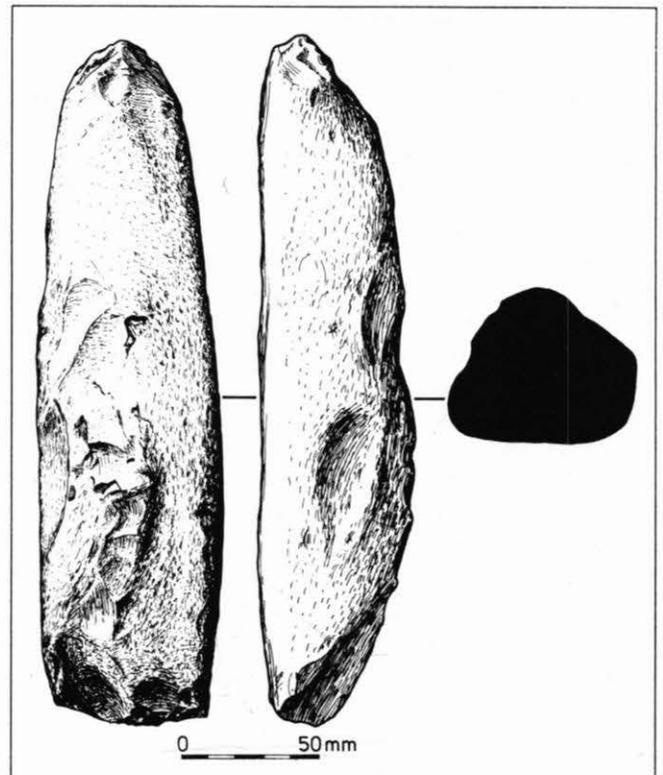


Figure 3.9. Adze 13, S131/6, Square D5, Layer 2. A large preform in sandstone.

been reduced on the back surface, a grip hammered into the front would produce the characteristic lens profile of the Southern New Zealand class. This final form is also indicated by the slightly petaloid plan shape.

Adze 14 (Fig. 3.10) S131/6, Square D2, Layer 2. A small preform in a dark grey, aphanitic material, probably metamorphosed argillite, this adze has been roughly flaked into shape, and hammering had just begun on the high points on the back, immediately behind the bevel. It would presumably have become a small Duff Type 2A (cf. Adze 5).

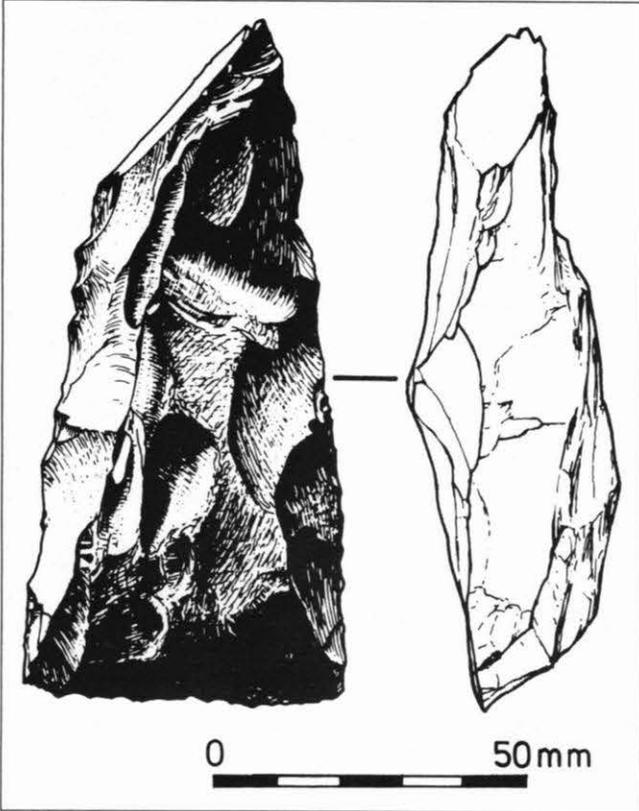


Figure 3.10. Adze 14, S131/6, Square D2, Layer 2. A small preform, possibly intended for a Duff Type 2a adze.

The nephrite adzes and chisels

All of these are from a small area of S131/6 (see Fig. 2.16). Russell Beck (pers.comm. 11 March 1985) comments on the material as follows, "all artefacts show heat treatment, making sourcing difficult, but as all are schistose in structure and do not show any of the inclusions indicative of Westland sources I would suggest that all are from the Wakatipu region...most look as if they have been re-ground [following heat treatment]". Specific comments on material and heat treatment (below) were also provided by Beck (pers.comm.).

Adze 8 (Fig. 3.11) S131/6, Square D5, Layer 2. This is a small chisel, nearly round in cross-section. The surface shows a small band of healed cross-fractures from heating.

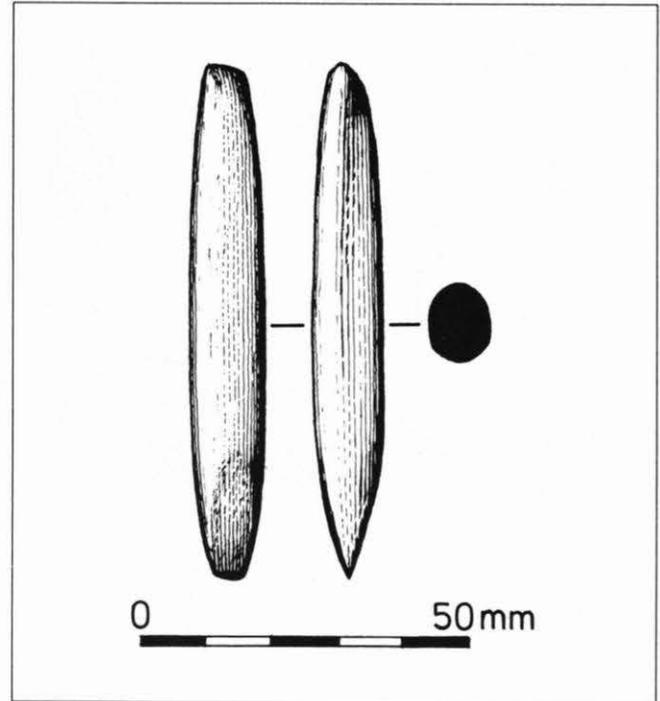


Figure 3.11. Adze 8, S131/6, Square D5, Layer 2. A small nephrite chisel.

Adze 9 (Fig. 3.12) S131/6, Square D4, Layer 2. This is a small, wide, blade produced upon a sawn blank, judging by the ridges left on the right side; the left side is a natural slickenside surface. The adze has been heated but not re-ground. It displays some unusual features. A second bevel has been ground on the front, apparently in an attempt to reduce the skew of the cutting edge which results from the fact that the blank is nearly twice as thick on the right side. There is a shallow, lens-shaped, hollow-ground area on each side of the front. These are too close to the cutting edge to serve any purpose in assisting hafting, but if that was their function then the blade must have been substantially longer at the time they were made.

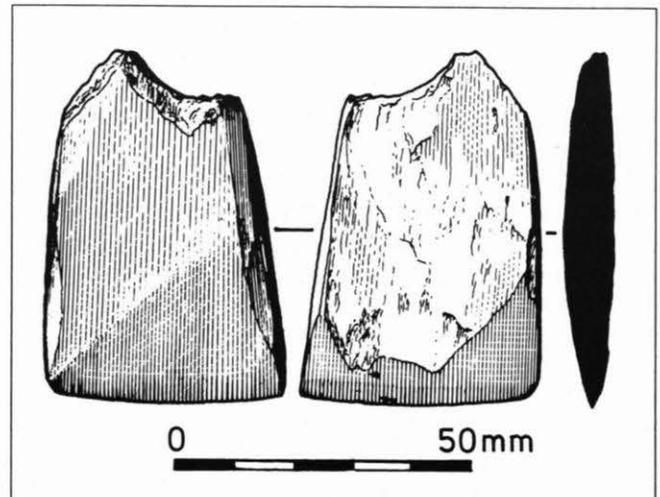


Figure 3.12. Adze 9, S131/6, Square D4, Layer 2. Broad nephrite blade, ground slightly skew.

Adze 10 (Fig. 3.13) S131/6, Square E4, Layer 2. This is a badly broken piece, rectangular in cross-section. The material has a strongly chatoyant schistose structure and discloses low temperature heating. Remedial grinding had begun to smooth the jagged edges of the gap on one side, and the double bevel had also been partly re-ground since the cutting edge was broken. The re-grinding occurred after heating.

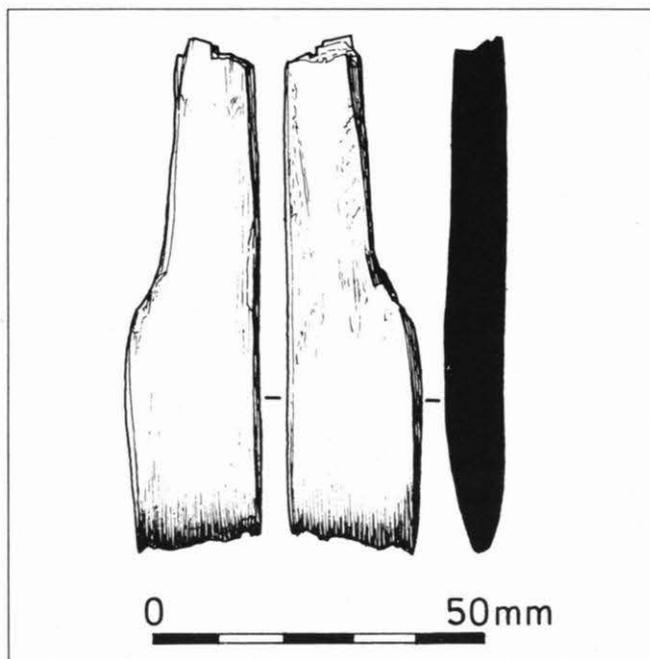


Figure 3.13. Adze 10, S131/6, Square E4, Layer 2. Damaged and partly re-ground nephrite adze.

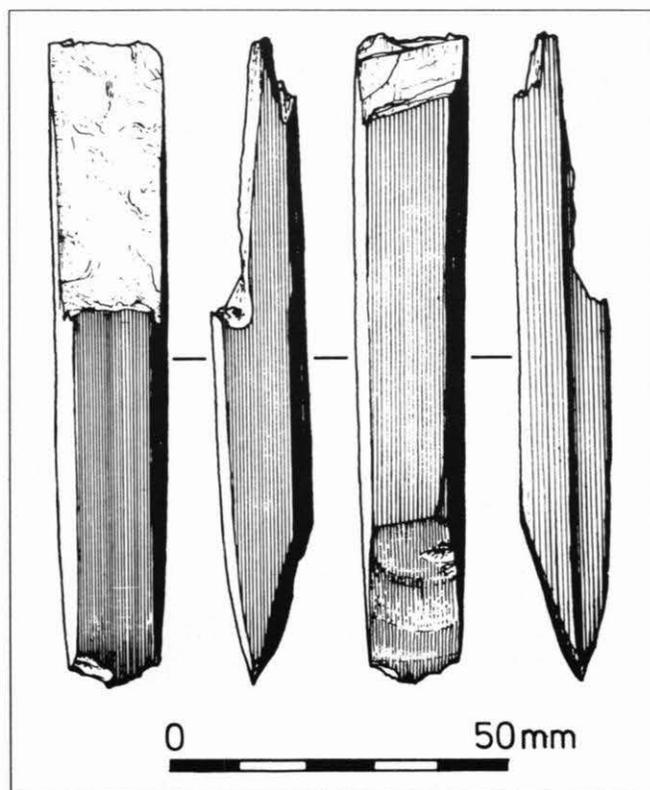


Figure 3.14. Adze 11, S131/6, Square D4, Layer 2. Nephrite adze, shattered at each end.

Adze 11 (Fig. 3.14) S131/6, Square D4, Layer 2. This quadrangular cross-sectioned adze has been made on a sawn blank (one groove remains along the left side). Initially, it probably had a bevel at the wider end, but that end has been badly shattered, presumably by use. The narrow end, which has also suffered some damage, perhaps as end-shock at the same time as the other end was broken, has been bevelled, but the cutting edge would still require some grinding to obtain a neat finish. The grinding occurred after heating, and some black material, bubbled by heat, adheres to the surface in places.

Adze 12 (Fig. 3.15) S131/6, Square D4, Layer 2. This is a small flat-sided adze with a rounded front face and a wide, curved, cutting edge. It had been heated more than the others and then ground to reveal the inner colour.

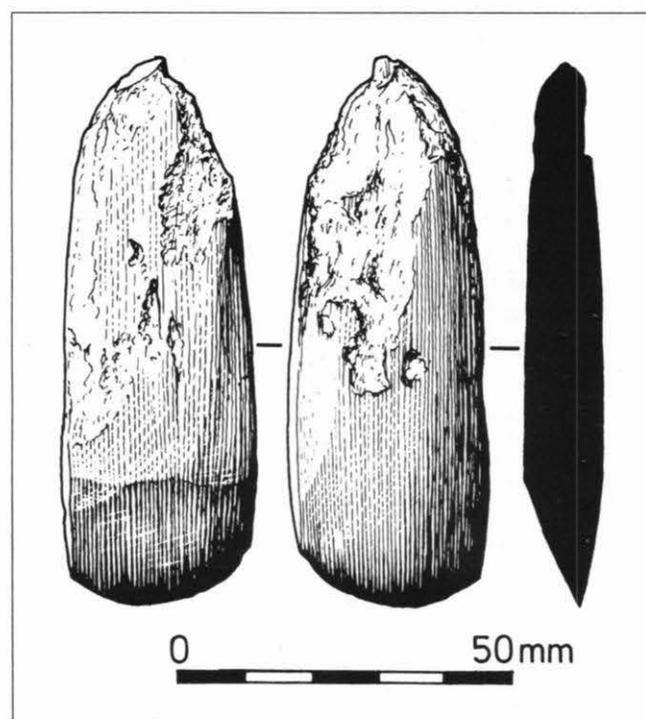


Figure 3.15. Adze 12, S131/6, Square D4, Layer 2. Nephrite adze with rounded cutting edge.

STONE ARTEFACTS OTHER THAN ADZES

In comparison with the adze assemblage, the other lithic remains are decidedly modest in range and quantity. They were mostly confined to S131/4. At this site all the pieces of stone which seemed as if they might have been culturally modified were collected, each in its soil matrix, and handled as little as possible by excavators and laboratory technicians wearing surgical gloves. The object of this extraordinary procedure was to avoid any possible contamination of the stone edges so that they might be examined for residues indicative of a cultural function.

In the event it proved impossible to undertake this research along with the other analyses, mainly because a suitable method has yet to be fully tested.

It was therefore decided to remove whatever residues there might be, and keep them for future work, so that the stone pieces could be otherwise examined. To this end, each flake was placed in a beaker, covered with distilled water, and given five minutes in an ultrasonic bath. The flakes were then dried in an oven at 40 degrees C and the water was transferred to labelled containers. Each dry flake was then put in a container, covered with dichloromethane (CH₂Cl₂), and given a further ten minutes in an ultrasonic bath. This solution was also transferred to vials and labelled. Both sets of extracts are now stored in a freezer (note 2).

Once the cleaned flakes were able to be examined it quickly became apparent that most were not, in fact, of cultural origin. Many were simply fragments of quartz which had entered the site as roof-fall debris. The cultural material, and that from S131/6, is discussed below.

Ground stone implements

Implement 15 (Fig. 3.16) S131/4, Square A8, Layer 2. This is a point of slate, probably from the Torlesse Terrain which outcrops in the Hawkdun Range. It is round in cross-section and tapers smoothly to a sharp point. It could have been part of a cloak pin, or an awl, or a spear tip, but it also resembles the pin securing one end of the totara bark basket from S131/5 (Fig. 5.2) and there is at least one other similar artefact in wood (Fig. 4.19).

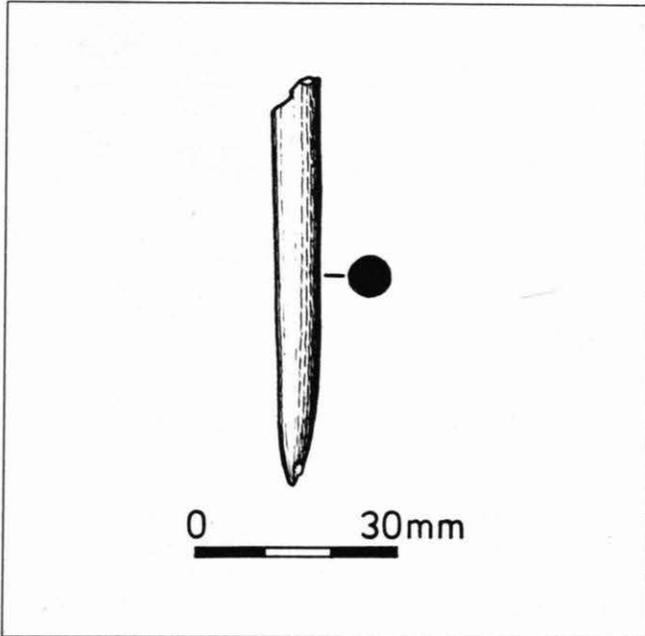


Figure 3.16. Stone implement 15, S131/4, Square A8, Layer 2. Slate point.

Implement 16 (Fig. 3.17) S131/4, Square A6, Layer 1. Made from a fine-grained greywacke or sandstone, this fragment is ground on one face and bevelled on the other. It may be a piece of an abradier or of an ulu-like implement.

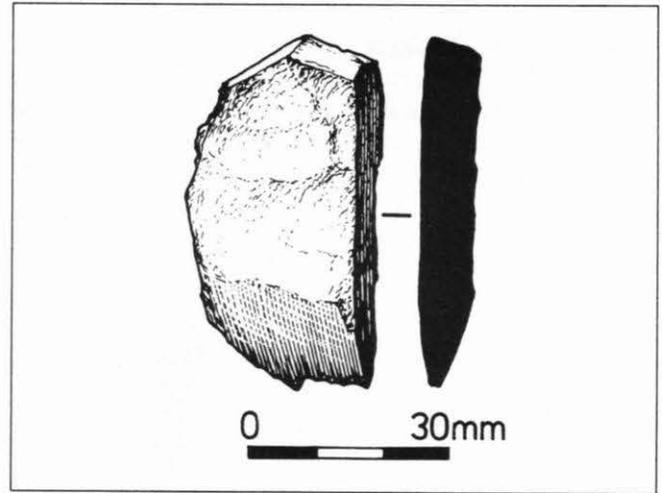


Figure 3.17. Stone implement 16, S131/4, Square A6, Layer 1. Section of possible ulu.

Fabrication implements

Implement 17 (Fig. 3.18) S131/6, Square D4, Layer 2. Found on the surface of the site, this is a grindstone of coarse, angular, arkosic sandstone. It has been well used and is deeply faceted by grinding on each of its seven surfaces.

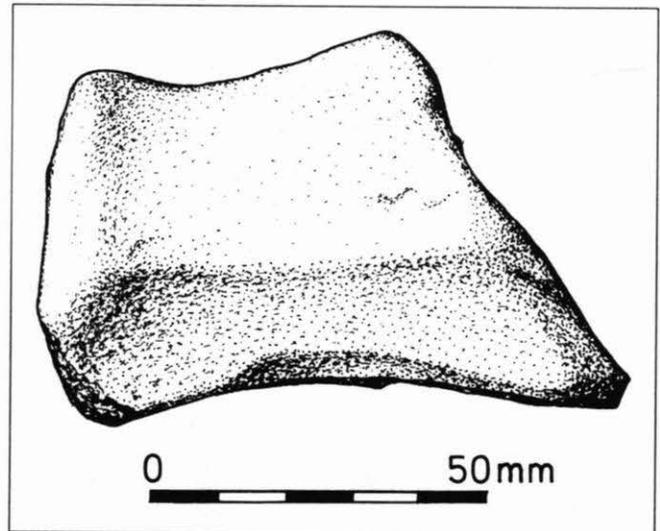


Figure 3.18. Stone implement 17, S131/4, Square D4, Layer 2. Sandstone grinder.

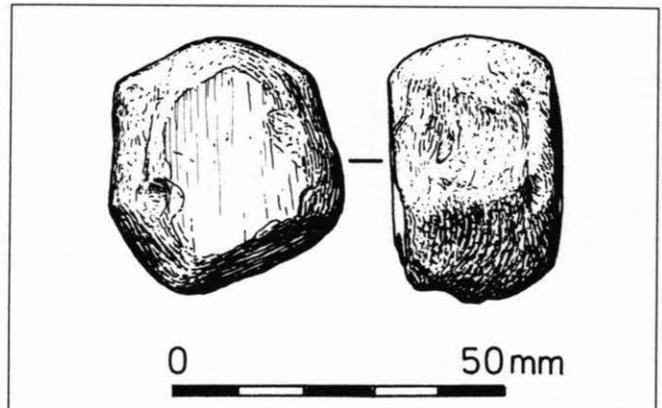


Figure 3.19. Stone implement 18, S131/6, Square D4, Layer 2. Hammerstone in hydroglossular garnet.

Implement 18 (Fig. 3.19) S131/6, Square D4, Layer 2. This is a small, well-used, hammerstone which was found close to the grindstone. It is a hydroglossular garnet, probably obtained from Riverton Beach.

Cores

Implement 19 (Fig. 3.20) S131/4, Square C3, Layer 1. This core of green metamorphosed argillite is probably from the Riverton quarry. It is made from a water-rolled cortex flake which has been trimmed over most of the dorsal surface to remove the cortex. A number of large flakes have been struck from the ventral face. One of these was found in an adjoining square.

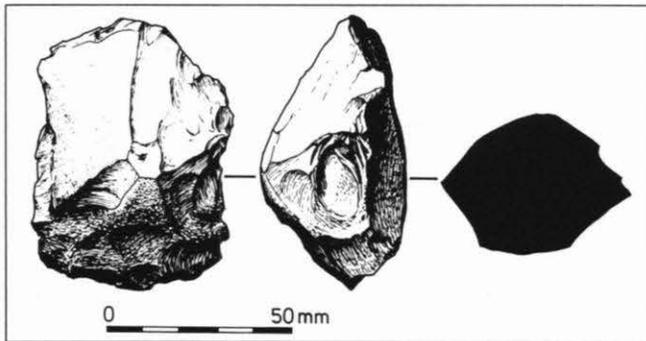


Figure 3.20. Stone implement 19, S131/4, Square C3, Layer 1. Metamorphosed argillite core.

Implement 20 (Fig. 3.21) S131/4, Square B-1, Layer 2. This comprises two joining pieces of green metamorphosed argillite, possibly from the Mararoa source. The implement is triangular in cross-section, and has been hammered along two edges and part

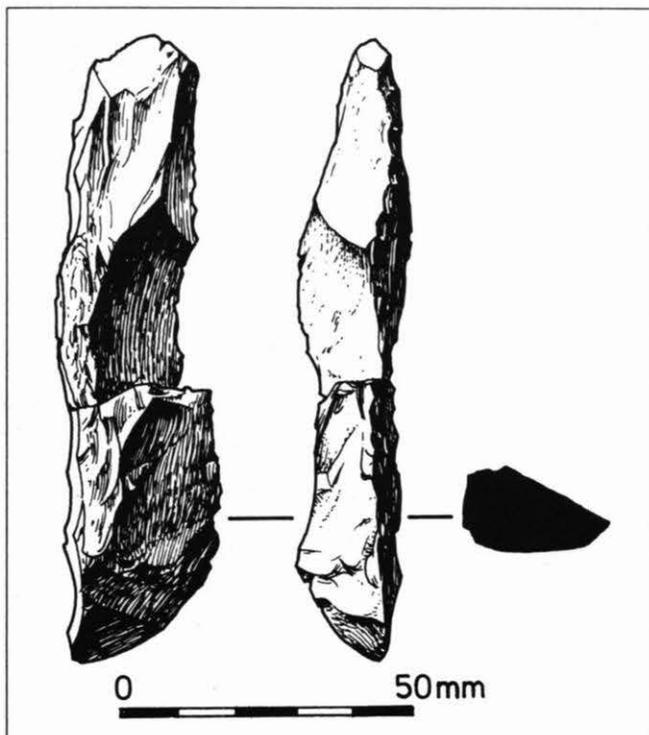


Figure 3.21. Stone implement 20, S131/4, Square B-1, Layer 2. Metamorphosed argillite core or preform.

of a third. It might, in fact, be a small trilateral adze preform (cf. Leach and Leach 1980:119).

Implement 21 (Fig. 3.22) S131/6, Square C3, Layer 2. Another metamorphosed argillite core, this is lenticular in cross-section and flaked into a shape which suggests that it may have been intended as an adze preform.

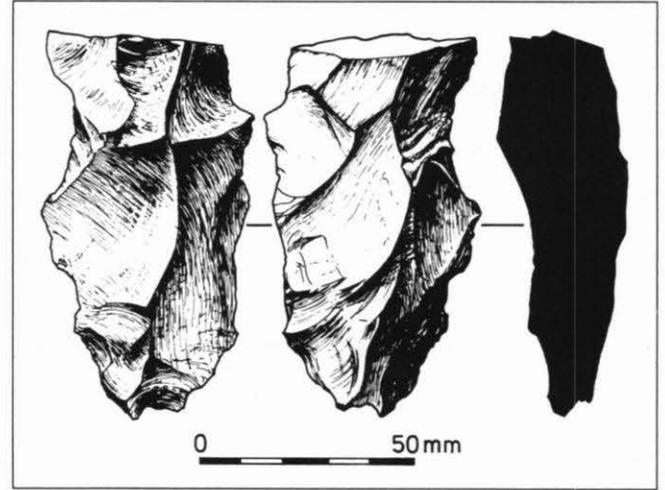


Figure 3.22. Stone implement 21, S131/6, Square C3, Layer 2. Metamorphosed argillite core or preform.

In S131/4 (C5, Layer 1) was a silcrete pebble which had been split and had about seven flakes removed.

Adze flakes

There is a small, dark-grey, metamorphosed argillite flake (S131/6, E3, Layer 2), which has one slightly polished facet and has probably been struck from an adze. In the same site (S131/6, C4, Layer 2), was a large flake of black metamorphosed argillite which has fine flaking and hammer-dressing on the dorsal surface. It seems to be a trimming flake from the side of a large quadrangular adze preform. Neither of these flakes comes from any of the adzes which were recovered.

Use-damaged flakes

Only two flakes exhibit clear evidence of use-damage in the form of micro-chipping, although other flakes may well have been used without exhibiting evidence of this kind. One flake (S131/4, C1, lens B), has been struck from a silcrete pebble (not the one above). Much of the used edge has been broken off, probably as a result of the severe burning to which the flake had been subjected after use. The stretch of original edge which remains is divided between a 15 mm length of bifacial retouch and, adjacent to it, a 15 mm length of unifacial damage comprising small scalar flakes and crushing. The other implement is a baked mudstone flake (S131/4, C9, Layer 2), exhibiting a 13 mm length of unifacial crushing. Both implements have clearly been used in a scraping mode, and the type of damage suggests use against a resistant material such as wood.

Other flakes

In Table 3.2 is a list of the flakes, including the used flakes above, showing the materials and their probable sources. The obsidian identification procedure is described in Seelenfreund (1985). She found that our green obsidian was clearly from Mayor Island. The grey obsidian was not from Mayor Island or Northland, but she was unable to rule out Coromandel, Hauraki Gulf or inland North Island sources.

Table 3.2. Lee Island stone flakes.

Provenance	Material	Probable source
S131/4		
-A7 Layer 2	Porcellanite	Central Otago
-A8 Layer 2	Limburgite	Central Otago
B1 Layer 2	Silicified mudstone	Local
B3 Layer 1	Silicified argillite	Local
B3 Layer 2	Metamorphosed argillite	Riverton
B6 Surface	Metamorphosed argillite	Western Southland
B7 Layer 2	Porcellanite	Central Otago
B7 Layer 2	Limburgite	Central Otago
B7 Layer 2	Indurated siltstone	Local
B8 Layer 2	Grey obsidian	See text
C1 Layer 2	Silcrete	Central Otago
C1 Layer 2	Metamorphosed argillite	Mararoa
C2 Layer 2	Chalcedony	Coastal Otago
C2 Layer 2	Silicified mudstone	Local (2 pieces)
C3 Layer 2	Green obsidian	Mayor Island
C3 Layer 2	Porcellanite	Central Otago
C3 Layer 2	Silicified mudstone	Local
C4 Surface	Silicified mudstone	Local
C5 Layer 1	Chert	North Otago
C7 Layer 1	Porcellanite	Central Otago
C9 Layer 2	Baked mudstone	Ohai
D5 Layer 2	Metamorphosed argillite	Local
S131/6		
C4 Layer 2	Metamorphosed argillite	Western Southland
C4 Layer 2	Indurated siltstone	Unknown
D3 Layer 2	Aphanitic ?volcanic	Unknown
E3 Layer 2	Metamorphosed argillite	Western Southland

BONE ARTEFACTS

There were two bird spear points recovered in the excavations at Lee Island, both from S131/4 - one is almost complete and of the other only a fragment remains. The more complete point (see Fig. 3.23), from Square A8 Layer 2, is 86.5 mm long, solid oval in cross-section and up to 6.9 mm wide (excluding the barbs). It has four barbs, is made from either sea-mammal or moa bone (G. Mason and B. Kooyman pers. comm.) and is what Leach (1979:104-107, Fig. 19) would classify as a Type A spear point. The point has three notches to facilitate attachment to the spear - two are towards the base and the third is just above the lowest barb. The spear fragment, from Square B9 Layer 3, is 23.1 mm long with a solid oval cross-section and the beginning of a barb.

The only other bone artefact was a curiously fashioned piece of bone from S131/4, Layer 2 (Fig.

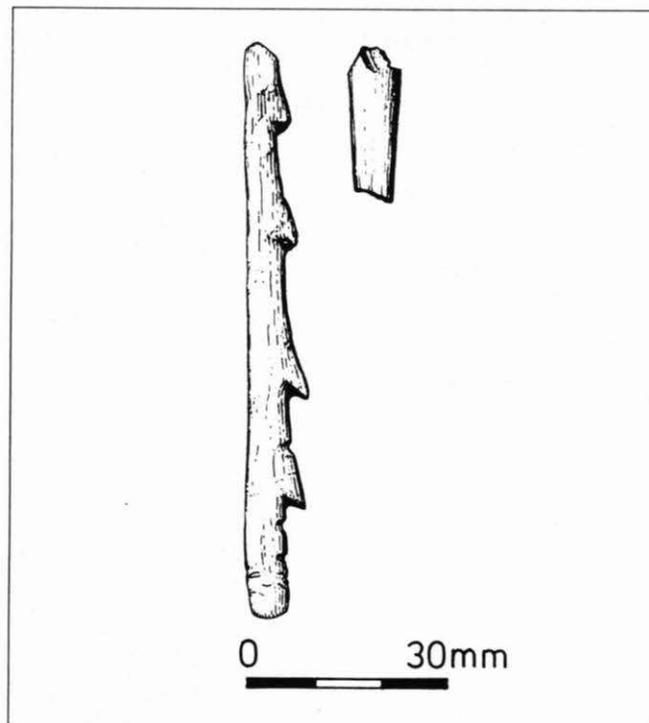


Figure 3.23. Bird spear points from S131/4, Layer 2. The complete point is from Square A8, the fragment from Square B9.

3.24) which may have been in the process of being turned into a pendant. There are, at any rate, reminiscent shapes amongst southern pendant forms (e.g. Skinner 1974:58 Figs. 4.38-40). The origin of the bone could not be identified but it may be part of a mammalian mandible.

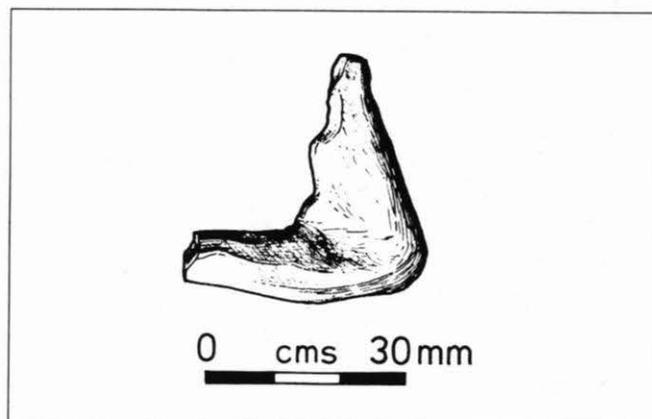


Figure 3.24. Bone artefact of unknown type or function from S131/4, Layer 2.

DISCUSSION

Table 3.1 shows the main dimensions of the finished adzes. There is clearly considerable variety, but some generalisations can also be derived. Firstly, most of the adzes are small. Eight of the 11 which can be reasonably measured are less than 100 mm in length and less than about 150 g in weight. Within this group (Adzes 3-12), the principal variation is in the width of the cutting edge (4-61 mm), although seven fall within the approximate

range 20-40 mm. Secondly, there is some significant variation in edge shape. The index for this (Table 3.1) was obtained as follows. The maximum distance to which the cutting edge projected beyond a line joining the two corners was divided by half the cutting edge width and the result turned into a percentage. Thus a semi-circular edge would score 100 and a straight edge 0. As can be seen, slightly curved edges predominate, but two implements had markedly curved edges (8 and 12). Thirdly, there is some minor variation in the edge angle (the angle between the front face and the bevel), although an angle of about 50 degrees was clearly preferred. Fourthly, all the finished adzes which were in working order had sharp, almost unblemished, edges.

Considering all the finished adzes as two site assemblages, it is apparent that there are quite marked differences. In S131/4 are the two comparatively large examples of the Southern New Zealand class and a possible ulu. In S131/6 all the finished adzes are small, and most are made from nephrite. No raw materials are shared between the two assemblages and only one type (Duff 2A). It may also be observed that while the S131/4 adzes are either intact and in working order or, as in the case of Adze 4, have shattered, presumably during work on the site, in S131/6 there are two preforms at an early stage of working and two other adzes on which repairs were still some way from completion.

These differences suggest that the assemblages are genuinely distinct and not merely the result of a more or less random distribution of a single assemblage between two contemporaneously occupied sites. But to what are the differences attributable?

The most obvious possibility is cultural age. Thus it might be argued that the Southern New Zealand class represents a regional style derived from the early east Polynesian kit of large gripped adzes which persisted up to about the 16th century in southern New Zealand and thereafter was replaced by small, mainly Duff Type 2, adzes and chisels, especially examples in nephrite. In this sequence the Southern New Zealand class might occupy the later Archaic part of the sequence between the typical early East Polynesian types and the typical Classic types.

This argument could derive some support from the radiocarbon estimates, which give approximate mean dates of A.D. 1600 for S131/4 and A.D. 1670 for S131/6. Furthermore, the difference, though small in years, might have been accentuated by covering the period of greatest diffusion or replacement of types. Thus it could be argued that the period A.D. 1600-1650 was the most probable time during which clans of what later came to be called Kai Tahu undertook the first significant invasion of southern New Zealand (Anderson 1982, 1983).

Against this proposition is the inadvisability of distinguishing so clearly amongst radiocarbon

estimates which all overlap at one standard error of the mean, and the fact that much of the difference is accounted for by nephrite implements which, though not represented at S131/4, were certainly being made and used at sites of that time elsewhere in southern New Zealand (e.g. Dart Bridge, see Anderson and Ritchie 1986). In addition, the large preform at S131/6 (Adze 13), was very probably in the process of being fashioned into a typical Southern New Zealand adze.

A second proposition could be that the differences relate to the functions of the sites. The problem here is that while some indication of the range of woodworking tasks is apparent at S131/4, there is no such evidence at S131/6. Yet this, in itself, might provide a clue to the functional difference; that is to say, the S131/4 assemblage can be regarded as an on-site working kit, while the S131/6 assemblage is a cached kit of adzes and blades, some in the process of being refurbished, which was intended for use sometime in the future, and not necessarily at Lee Island.

In support of this proposition is some evidence that Adze 2 was used in the manufacture of wooden artefacts found at S131/4 (Anderson, Foster and Wallace, this volume), and the fact that Adze 4 had broken on-site, presumably by use. Conversely, there is no evidence of on-site usage at S131/6 nor that the damaged adzes were broken in that site. There is only evidence, in the hammerstone, grindstone and preforms at S131/6, that secondary manufacture and repair were being carried out. Against the proposition is the weakness of negative evidence. There is, after all, precious little evidence of the use of specific adzes at S131/4.

Another problem in trying to interpret the assemblages lies in the discard behaviour. The distribution of adzes at S131/6 suggests caching, but at S131/4 the situation is more difficult to understand. Adze 2 may have been cached near the shelter wall, but Adze 1 must have been lying in full view on the surface at the time it was discarded. It seems incredible that this splendid implement should be cast aside, apparently so carelessly. If the occupants of that site were so confident about the inviolability of their property, why did they conceal any of it? And why was material possibly cached at S131/6? If they felt their belongings were not secure why leave the best of them, at any rate to modern eyes, lying on the surface? The problem of adze discard behaviour is often raised in connection with caching or unblemished adzes lying in rubbish heaps and other apparently inappropriate contexts, and it is a matter worthy of systematic study.

The same conclusion might be adopted more generally for the Lee Island adze assemblages. There are intriguing pointers to the nature of a regional tradition of adze forms, to the chronological significance of spade-shouldering and the use of nephrite, to the nature of adze kits and so on, but a much broader pool of comparable archaeological

facts is needed to explore these issues more satisfactorily.

Turning to the non-adze assemblage, it is apparent that flake implements were not an important component of the tool kit (see Table 3.2). There are comparatively few of them and very little material is from distant sources. Most of the stone is either local (a range of silicified or metamorphosed sediments originating in the Caples Terrain), or from western Southland sources including the metamorphosed argillites of Mararoa and Riverton and baked mudstone, probably from Ohai. There is some material from the eastern districts of Otago and inland Southland, such as porcellanite and silcrete, and a few pieces must have come from coastal Otago. Overall the assemblage suggests a journey from western Foveaux Strait by people who also possessed a few pieces of foreign materials such as cherts and obsidians.

The scarcity of readily observable use-damage on the flakes as well as the scarcity of flakes in general, suggests that the tasks for which they were normally used either did not exist at these sites or were already accommodated by alternative artefacts. In particular, the woodworking functions were probably carried out largely by adze and chisel and small-scale butchery may have required few flakes and insufficient force to produce micro-chipping damage.

Discovery of bird spear points was predictable in view of the faunal remains. They are, as well, more common in southern sites from about the 14th century onward, by which time moa-hunting had declined significantly, than in earlier sites (Anderson 1983:27). They have been recovered from several sites in Otago including Ototara, Shag Mouth, Long Beach, Murdering Beach, Little Papanui and one or two of the Catlins sites (Anderson 1982:51-52; Davidson 1984:72).

Notes:

1. All the lithic descriptions in this paper, except those for obsidian and nephrite are by Graeme Mason (Anthropology Department, University of Otago) and they arise from hand specimen identification under X10-30 microscopic analysis. The identifications for Adzes 2 and 3 were checked by Professor D.S. Coombs (Geology Department, University of Otago).

2. The method was devised by Dr B. Fankhauser (University of Otago) and Dr S. Lewis (University of Canterbury).

REFERENCES

- Anderson, A.J. 1982. Maori settlement in the interior of southern New Zealand from the early 18th to the late 19th centuries A.D. *J.P.S.* 91:53-80.
- Anderson, A.J. 1983. *When All the Moa Ovens Grew Cold*. Otago Heritage Books, Dunedin.
- Anderson, A.J. and N.A. Ritchie, 1986. Pavements, pounamu and ti: the Dart Bridge site in Western Otago, New Zealand. *N.Z.J.A.* 8:115-141.
- Davidson, J.M. 1984. *The Prehistory of New Zealand*. Longman Paul, Auckland.
- Duff, R. 1977. *The Moa-Hunter Period of Maori Culture*. Government Printer, Wellington.
- Leach, B.F. 1979. Excavations in the Washpool Valley, Palliser Bay. In B.F. and H.M. Leach (Eds.), *Prehistoric Man in Palliser Bay*, pp. 67-136. *National Museum Bulletin* No. 21.
- Leach, H.M. and B.F. Leach, 1980. The Riverton site: an Archaic adze manufactory in Western Southland. *N.Z.J.A.* 2:99-140.
- Seelenfreund, A. 1985. The exploitation of Mayor Island obsidian in prehistoric New Zealand. Unpublished Ph.D. dissertation, Anthropology Department, University of Otago.
- Skinner, H.D. 1974. *Comparatively Speaking*. University of Otago Press, Dunedin.