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Mesolithic and Later Sites at Kinloch, Excavations 1984–86

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6 THE LITHIC ASSEMBLAGE: PRIMARY TECHNOLOGY

P ZETTERLUND

INTRODUCTION

Examination of the primary technology was concentrated on well-stratified mesolithic material from Trench AD. No unmixed neolithic contexts were discovered, but material from mixed mesolithic/neolithic contexts was examined to establish whether any technological differences could be determined over time. Work on the raw materials (Chapter 4) meant that bloodstone and flint could be differentiated for this analysis, so that the relative use of the two materials could also be assessed.

A technological study is concerned with the analysis of the techniques and methods used to reduce lithic material to blanks and tools (Callahan 1987). Specific definitions pertinent to work on the Kinloch assemblage are presented in Chapter 5. It should be emphasised, however, that exceptions to these definitions will be found in any assemblage: fracture morphology is not rigid in any material, so small assemblages may yield misleading interpretations.

SAMPLING THE MESOLITHIC MATERIAL

The mesolithic features in Trench AD comprised a series of pits (Chapter 4, Ill 10). Although three different phases were distinguished, the material was treated as a single unit for the technological analysis, so that overall patterns could be seen. In fact, the lack of erosion surfaces between fills suggests that there was little time separation between phases and, indeed, a general examination of the lithic contents of the different phases made after completion of the analysis did not reveal any significant differences between them.

THE ARTIFACTS EXAMINED

TYPES

The material included both modified and unmodified tools, as well as debitage. Although this analysis was concerned with the primary technology, the debitage was not considered because of time restrictions. Table 6 presents a breakdown by type of the artifacts used for the analysis. From this it is clear that there were so many regular flakes that not all could be studied. However, there were few primary or secondary flakes and, in order to obtain sufficient for analysis, all of these were included, but only 50% of the inner regular flakes (a 50% random sample from each context). The total sample of regular flakes amounted to 54%. This method of sampling was considered to be appropriate because the overall analysis was dependant on the recognition of general trends of attributes among the different artifact types. Furthermore, subsequent comparison of the sample with the remaining material did not reveal any significant differences, so that the material selected may be considered to be representative of the mesolithic assemblage as a whole.

RAW MATERIALS

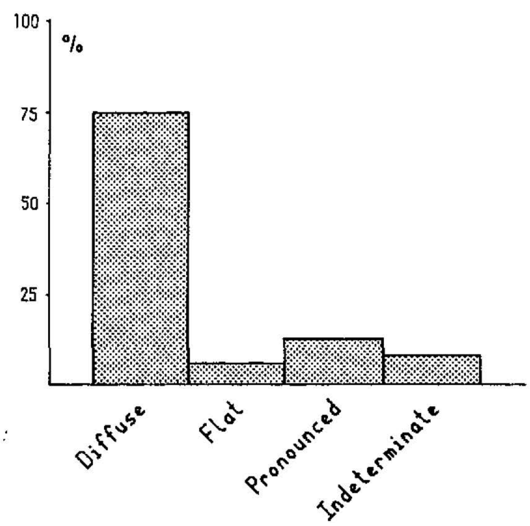
Only the flint and bloodstone artifacts were examined.

THE CONDITION OF THE ASSEMBLAGE

Many of the pieces showed severe surface alteration (mainly abrasion and loss of colour). It was almost impossible to recognise individual morphological and technological attributes on these pieces, and they were excluded

TYPE	TOTAL	% EXAMINED
CORES		
Platform	14	100
Bipolar	6	100
BLADES		
Decortical	6	100
Inner	263	100
REGULAR FLAKES		
Decortical	74	100
Inner	942	50
MODIFIED ARTIFACTS		
Microliths	113	100
Non-Microlithic	14	100

Table 6: Trench AD, mesolithic sample: lithic B.rtifacts used for technological analysis.



ILL 30: The lithic assemblage, mesolithic sample: bulb types.

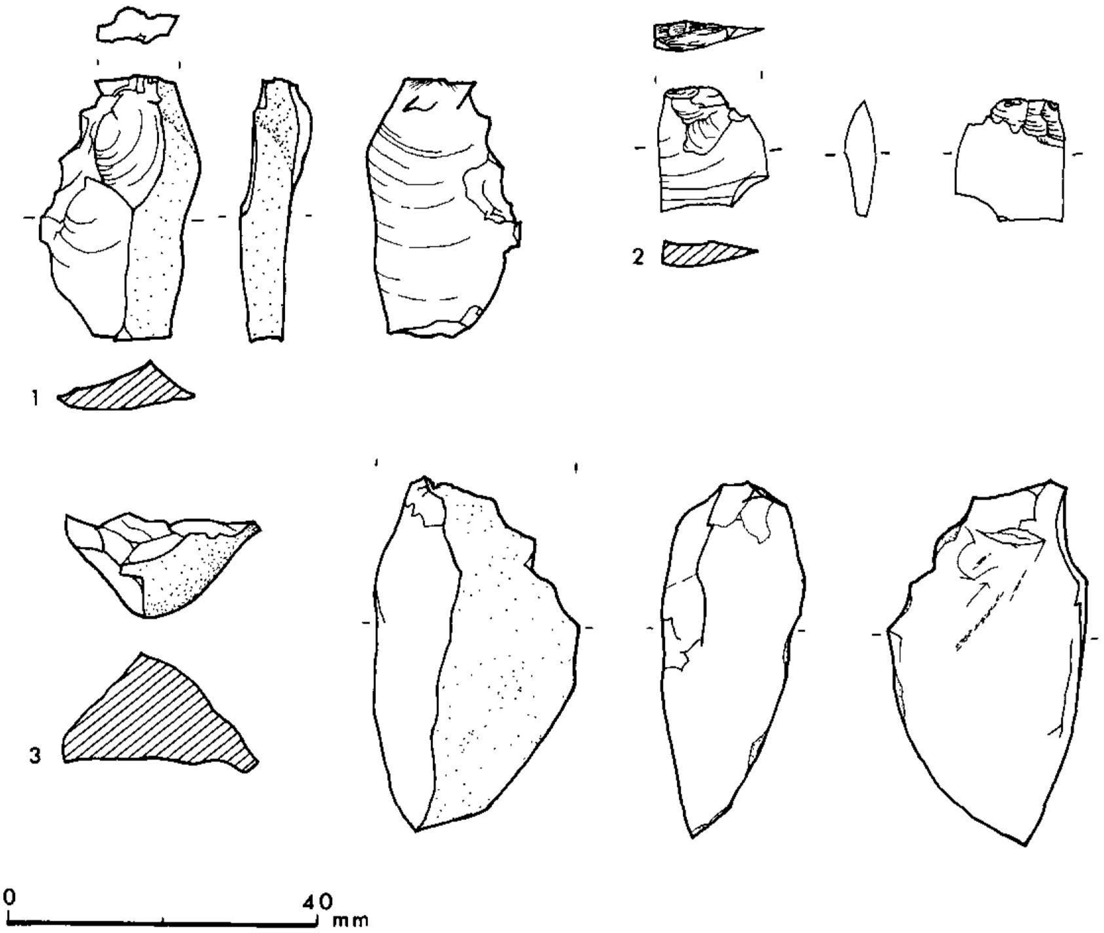
from the analysis. This comprised 27% of the blades; 31% of the sampled regular flakes; 4% of the cores; and 11% of the microliths, and it included all pieces of ambiguous material (Chapter 4). The condition of the retouched artifacts posed a problem as there were only fourteen in total, six of which showed some surface alteration. This group was so small that it could only be used for comparisons of artifact size.

THE ANALYSIS OF REDUCTION TECHNIQUES

There are several features which are commonly held to indicate the reduction technique used in the production of any lithic artifact. Bulb type, in particular, is often cited as distinctive of the way in which force is applied to the core. In the sample under examination, three kinds of positive bulbs were identified, and there were also a number of blades with unclassifiable bulbs in which platform crushing had removed a significant part of the bulb. Amongst the bulb types, diffuse bulbs predominated on both blades and flakes of flint and bloodstone (Ill 30). As both diffuse and flat bulbs generally indicate the use of soft percussion, the abundance of both point to this as the main reduction technique, and this is supported by the presence of a platform lip on a few pieces. Nevertheless, there were a number of pronounced bulbs in the assemblage, and these would usually be associated with the use of a hard technique. However, the relationship between the hard and soft techniques is both complex and varied, and the technological attributes once thought to be characteristic of the hard technique (Knutsson 1981; Madsen 1978) should be re-examined; not only are there always exceptions to the norm, but also bulb type is affected by many factors other than the type of percussor, eg:

- amount of force;
- flaking angle on impact;
- material structure;
- platform preparation on the core edge;
- platform size/mass at the proximal end of the removal.

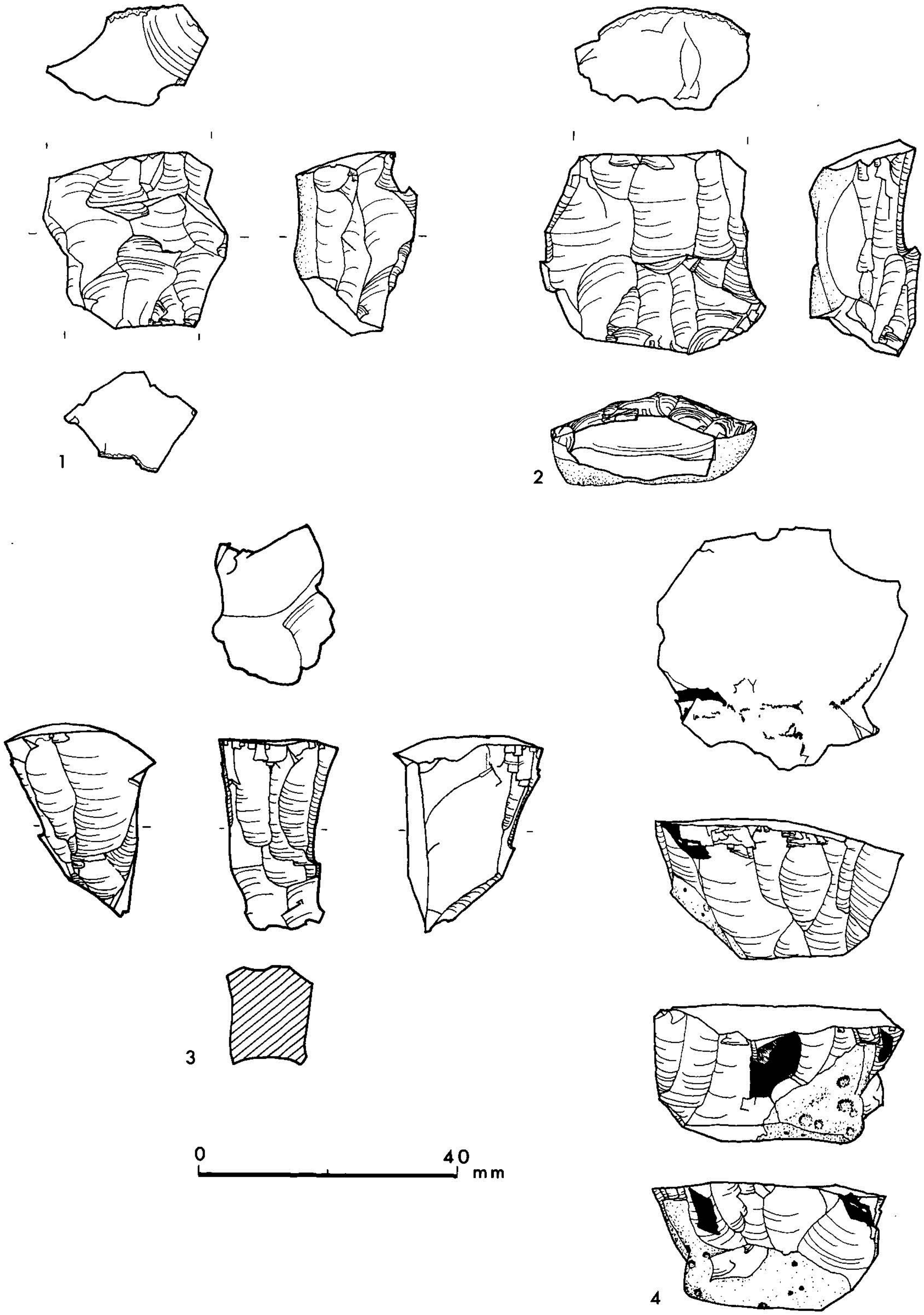
Of these, the first two are more or less impossible to register in any lithic assemblage. The ring cracks to be seen on 13 pieces in the sample may reflect increased force, but they do not correlate with a particular bulb type and so they are hard to interpret. The structure of the material is of more interest at Kinloch as two quite different materials were used, and the flint blades and flakes do show a significantly larger number of pronounced bulbs than do those of bloodstone. This may



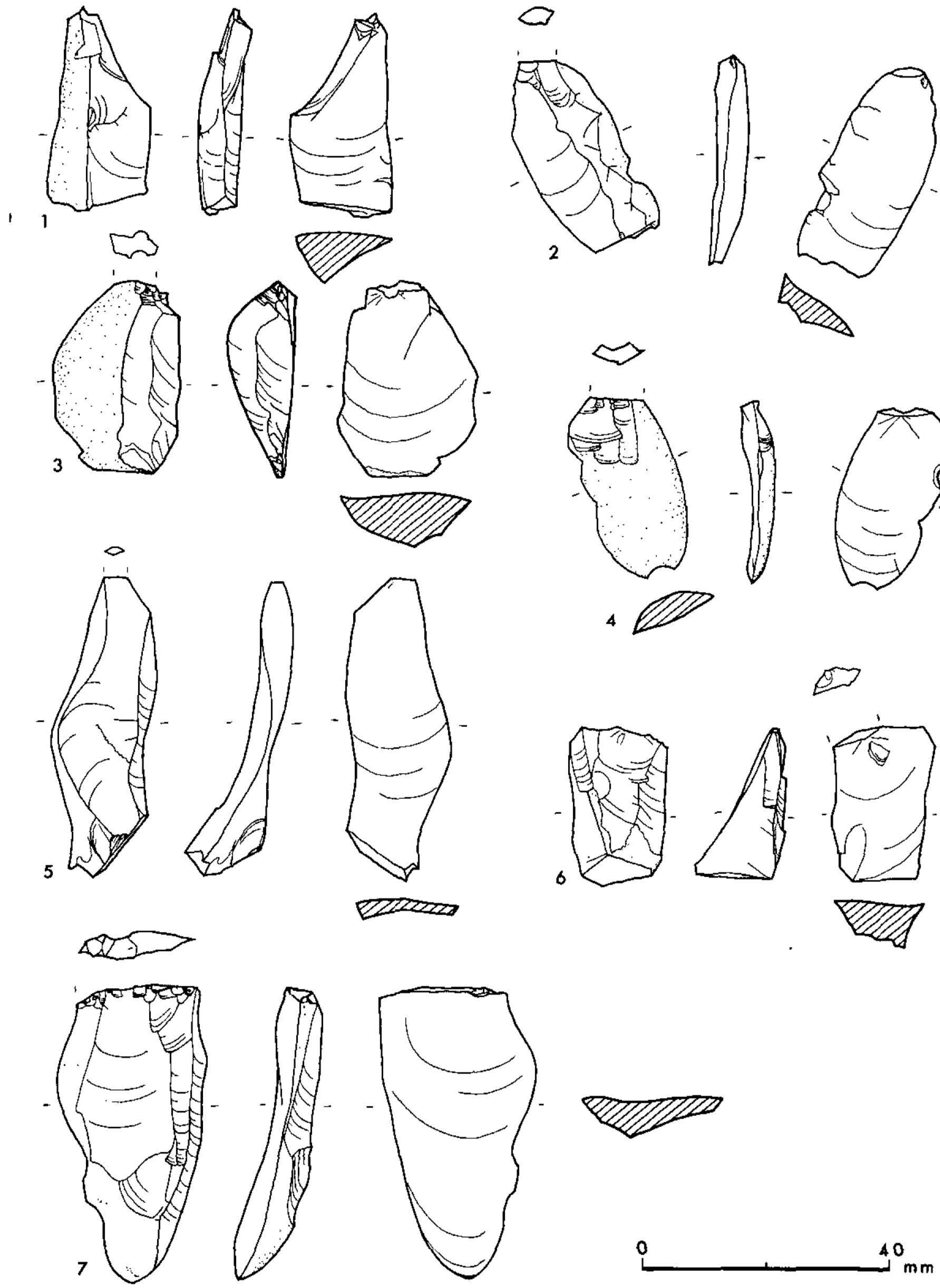
ILL 31: The lithic assemblage, mesolithic sample: flakes. 1 platform edge preparation: 2-3high speed fractures. 1 & 3 bloodstone: 2 flint. (Image by Marion O'Neil)

be due to the different fracture dynamics of bloodstone, but detailed experimental work is needed to clarify this matter and it was not possible within the project. The fourth factor (core edge preparation), is associated with the fifth (platform size/mass). Core edge preparation may result in a relatively thick proximal end (Ill 31.1) because a harder blow is needed to remove a flake from a prepared edge, and the point of impact must lie well back from the face of the core. If the mass of the platform edge is too great, or if the wrong flaking angle is used, then the force of the blow may disappear into the body of the core and split it with a plunging, overshot fracture. Bearing these factors in mind, the conclusion must be that soft percussion was used at Kinloch, and that this produced some attributes normally associated with hard percussion.

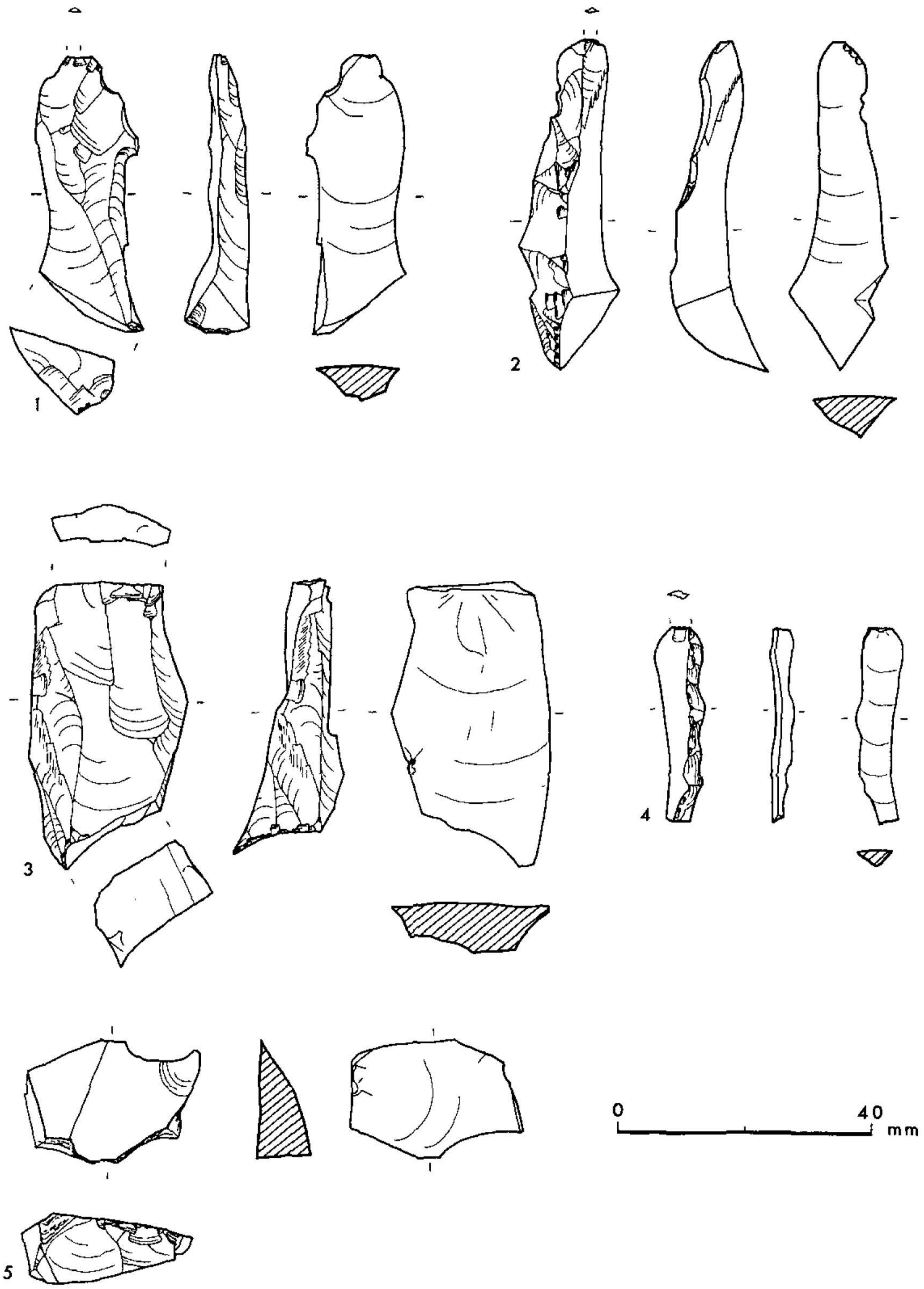
Soft percussion may be direct or indirect (in contrast to hard percussion, which is almost always direct), and it is difficult to determine whether a soft baton was used as a percussor (whether direct, or indirect in combination with a punch), or as a pressure tool. At Kinloch the morphology of the platform cores argued strongly against the use of pressure (Ill 32), and this is supported by the lack of typical pressure blades in the assemblage. As for the use of indirect percussion, there is no definite evidence of the use of punches in the assemblage. Much material is fragmented (c. 60% of both blades and flakes), and this may be caused by indirect percussion, but it could also result from other factors such as intentional breakage, use-wear, or post-depositional pressures. In general, therefore, the evidence suggests that both blades and flakes were produced by direct, soft percussion. This is supported by the small size of the surviving platforms, particularly on the blades. 76% of the blades and 30% of the flakes have platform remnants that are less than 1mm wide (Ill 33. 3–4): evidence that the platform was struck very close to the edge. In some cases the



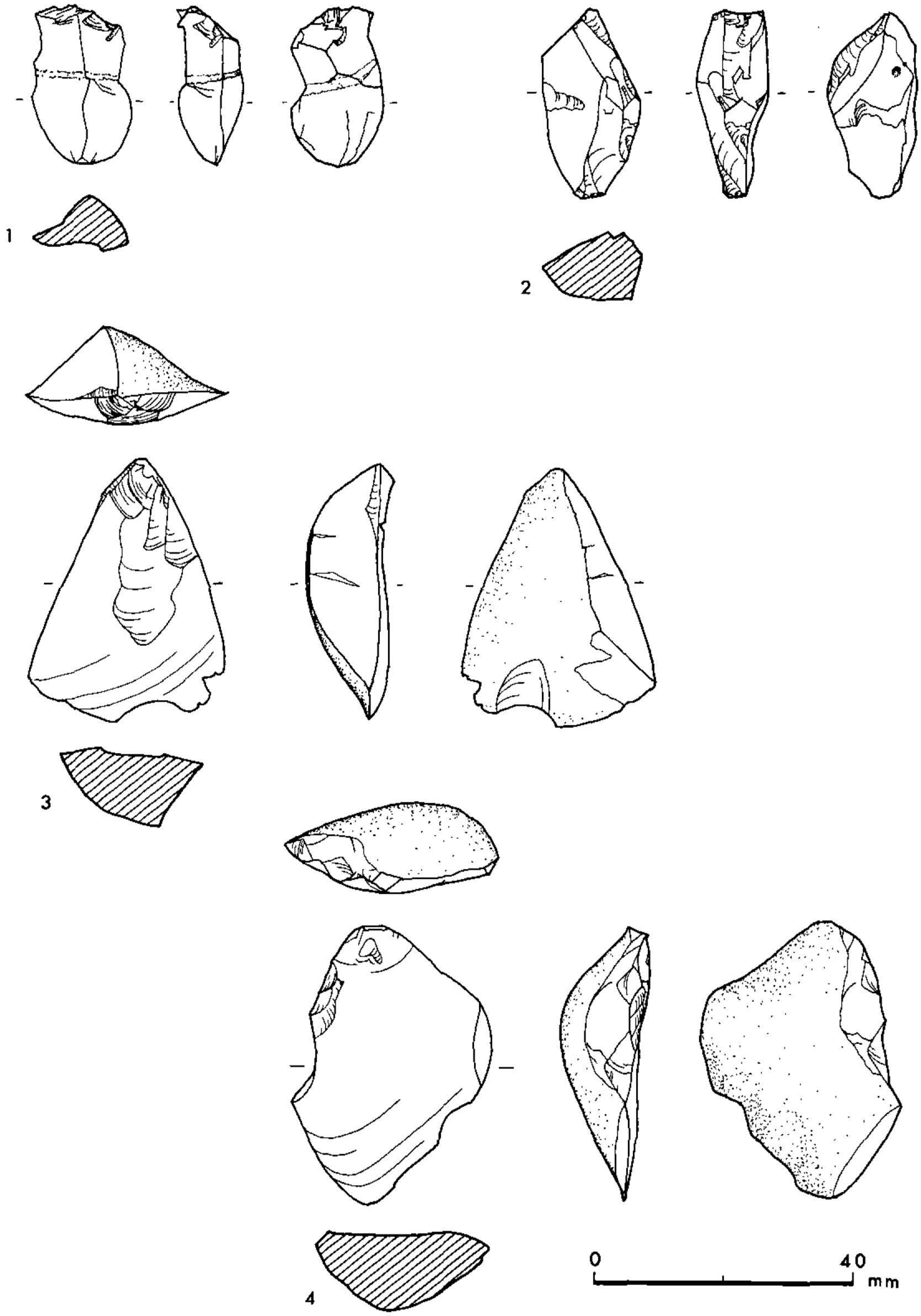
ILL 32: The lithic assemblage, mesolithic sample: platform cores. 1-2 double platformed cores: 3-4 conical platform cores. 4 bloodstone: 1-3 flint. (Image by Marion O'Neil)



ILL 33: The lithic assemblage, mesolithic sample: flakes and blades. 1-4 with prepared platform margin: 5-7 overshot blades. I. 4-5 bloodstone: 2-3, 6-7 flint. (Image by Marion O'Neil)



ILL 34: The lithic assemblage, mesolithic sample: flakes and blades. I & 3 removals with two platforms: 2 & 4 crested blades: 5 platform rejuvenation flake. 1 & 3 bloodstone: 2, 4-5 flint. (Image by Marion O'Neil)



ILL 35: The lithic assemblage, mesolithic sample: cores and flakes. 1-2 bipolar cores; 3-4 flakes with cortex platforms. t-3 bloodstone; 4 flint. (Image by Marion O'Neil)

platform had collapsed altogether, possibly because of deficient preparation as well as the impact of the force being too near to the platform edge. Collapsed platforms are a fairly common phenomenon when direct soft percussion is used.

The type of core preparation also supports the argument for soft percussion. Preparation consisted of the simple removal of the small overhang formed between detachments, and it is best described as a light retouching of the platform margin (Ill 33. 1–4). Furthermore, there are 8 high-speed fractures, where the removal (whether blade or flake) has been split down the flaking axis (Ill 31. 2–3). These are usually considered as indicators of the use of direct percussion. Given the evidence for the use of direct soft percussion, there are sandstone percussors from the site that may have been used (Chapter 9; Ills 79, 80). If so, the use of a medium-hard stone might explain the existence of some technological attributes more commonly considered to be indicative of hard percussion.

REDUCTION METHOD AT KINLOCH: THE MESOLITHIC EVIDENCE

The reduction method employed for the production of any lithic assemblage may combine a number of different reduction techniques. The technological attributes of the individual artifact types in the assemblage may be used as indicators of the various techniques used to make the different tool types.

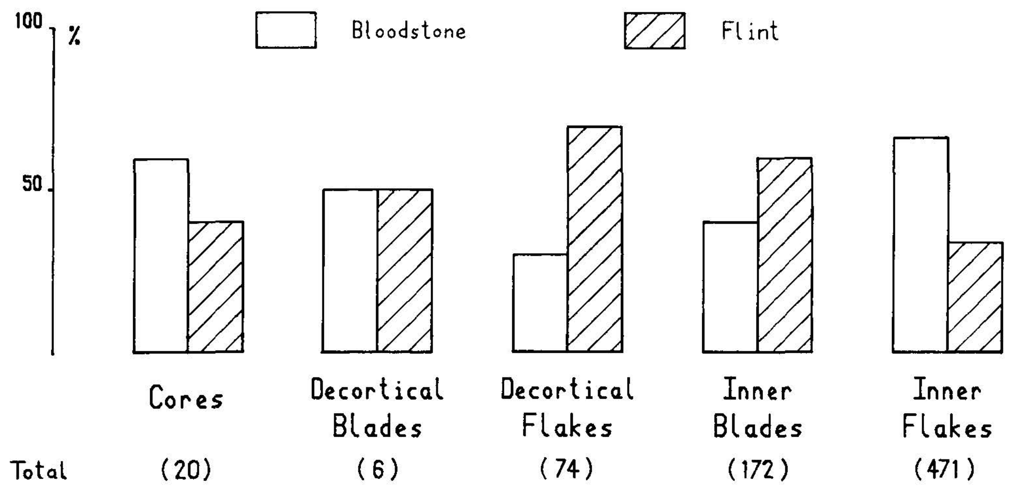
Both bloodstone and flint, were available on Rhum as beach nodules of varying quality (Chapter 4). The relationship between the two materials may be summarised as follows: the quality of flint was high, but the nodules were small; bloodstone was available in larger nodules, but they were generally of inferior quality. In practice this means that the manufacture of any artifacts longer than c.50mm was difficult.

TYPES

CORES

Flint.

There are no certain bipolar cores of flint. Six of the eight flint cores are platform cores. The other two cores are based on flakes; they have few removals, and it is possible that they were intended for further reduction by the bipolar method. Four of the platform cores were double platformed (Ill 32. 1–2), and the other two are conical blade cores (Ill 32.3). The platform cores all have evidence of platform preparation, and the mean flaking angle is 70°. Three were used for blades alone, and the others for a



ILL 36: The lithic assemblage, mesolithic sample: artifact types by material.

mixture of blades and flakes. All were abandoned because of knapping faults (the formation of step and hinge fractures); although, as they were of similar length when discarded (30mm), they may have been knapped to their limit.

Bloodstone.

There are seven platform cores and five bipolar cores of bloodstone. The platform cores are more varied than those of flint, and they have relatively large platforms in relation to their length (Ill 32.4). Although all of them have only one platform, some of the bloodstone flakes and blades indicate that cores with opposed platforms did exist (Ill 34.1–3). Only three platform cores show signs of platform preparation, but the mean flaking angle is still 70°. The majority of these cores were used for both blades and flakes, but some were apparently used to produce flakes alone. Most were abandoned when inclusions made further flaking impossible, and only one was discarded because of flaking fractures.

The five bipolar cores were all made of relatively high quality bloodstone. They are typical of this type of core (Ill 35. 1–2), and one is based on a flake (Ill 35. 2). Two were abandoned because of inclusions, the rest show no obvious flaws and had probably been worked as much as was practical.

DECORTICAL FLAKES AND BLADES

The sample contains a number of decortical flakes and blades. Those with platforms of cortex were detached at the beginning of reduction (Tixier *et al* 1980, 86) and they may be called 'nodule opening flakes' (Ill 35. 3–4). Other flakes with cortex originate from the removal of irregularities on the nodule and from the shaping of cores (Ill 33. 1–3). All tend to be large and thick, of concave profile, and of varying shape with large platforms and little edge trimming. There are many more decortical flakes and blades of flint, than of bloodstone (Ill 36). Decortical blades, of which there are only six, probably represent blades detached in the initial stages of reduction in order to create ridges for blade manufacture proper.

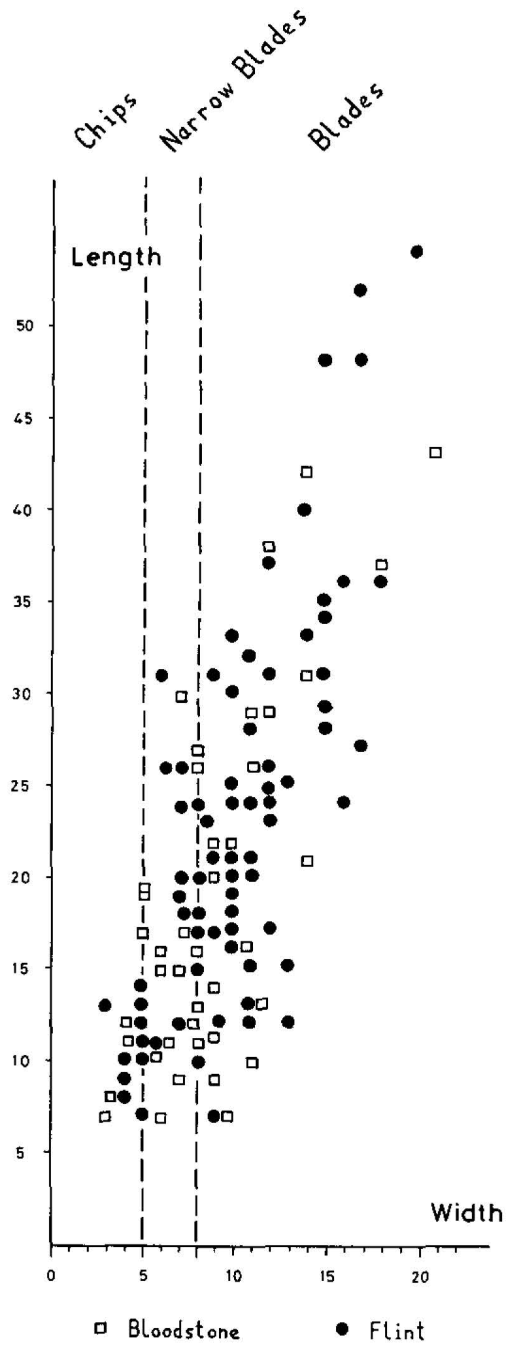
OVERSHOT FLAKES AND BLADES

Overshot flakes and blades may either be a deliberate feature of the core production process (Tixier *et al* 1980, 94) or they may be accidental (usually when the misdirection of the blow results in the removal of the base of an existing core). There are far more overshot blades and flakes of flint than of bloodstone, and most result from core shaping (Ill 33. 7). One removed a fracture to repair a core, and two appear to be knapping mistakes which have removed part of an opposed platform (Ill 33. 5–6).

The overshot blades are amongst the longest blades, and as such they may indicate the maximum length of prepared cores, ie 50mm for flint and 40mm for bloodstone.

CRESTED BLADES

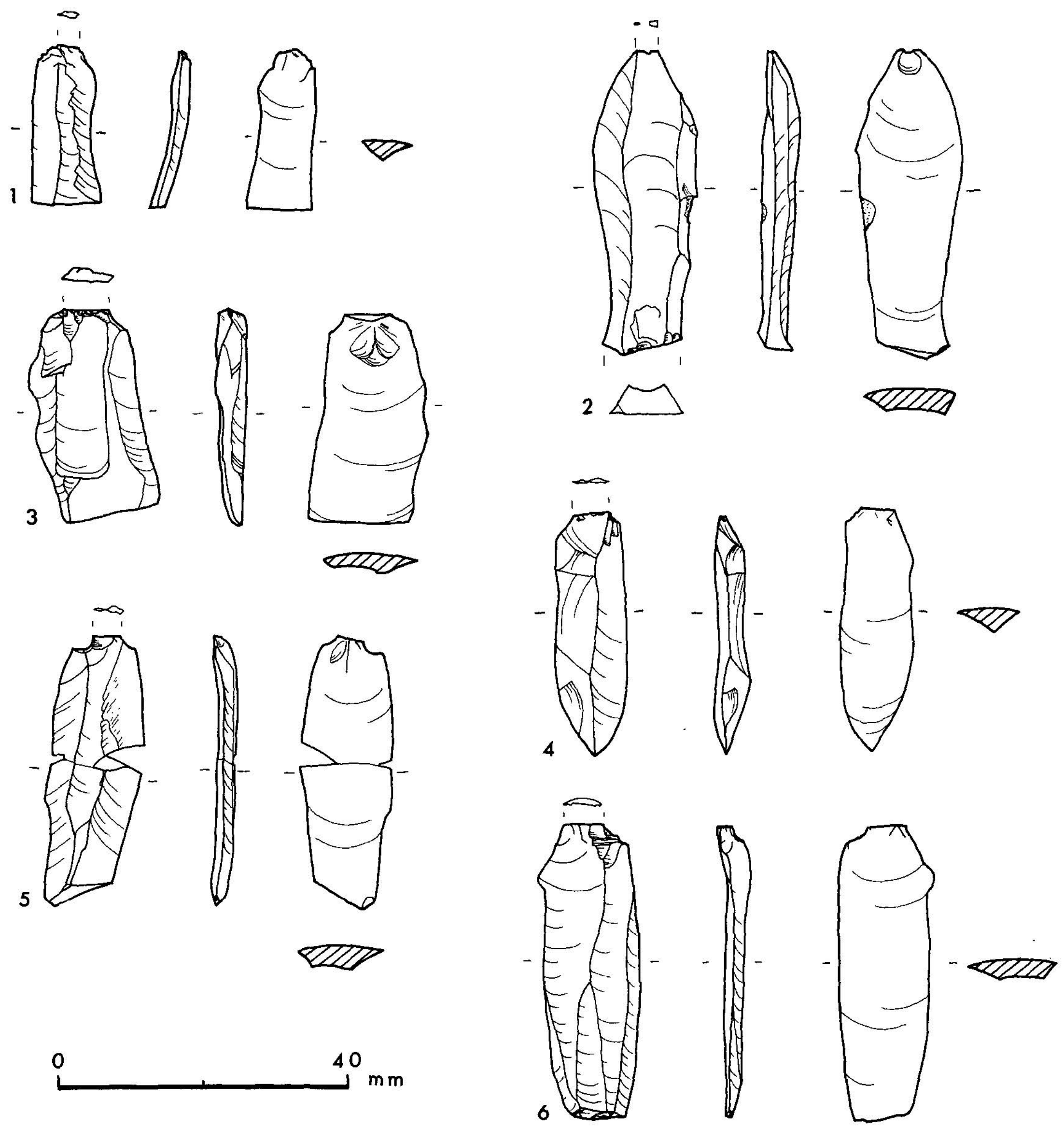
There are two crested blades, both of flint (Ill 34. 2 & 4). They were used to prepare ridges down the side of a core to guide blade production. Neither is a true crested blade (on which the ridge is formed by alternating flakes). Both have been produced to straighten a natural pre-existing ridge. One is overshot and was used to shape the base of the core as well as its sides. Both have platforms isolated by careful edge trimming.



ILL 37: The lithic assemblage, mesolithic sample: blade t)'pes. Dimensions in mm.

PLATFORM REJUVENATION FLAKES

There was only one platform rejuvenation flake within the sample (Ill 34.5); it was struck from the side of the core and reduced the core length by 10mm.



ILL 38: The lithic assemblage, mesolithic sample: blades. 2, 4, 5 bloodstone: 1, 3, 6 flint. (Image by Marion O'Neil)

BLADES

Blades have been divided into three groups (Ill 37) on the basis of the size of unmodified, as compared to modified, blades:

1 Blades with a width exceeding 8mm: blades
2 Blades of width between 5–8mm: narrow blades
3 Blades below 5mm in width: chips

1 Blades (Ill 38. 1–6):

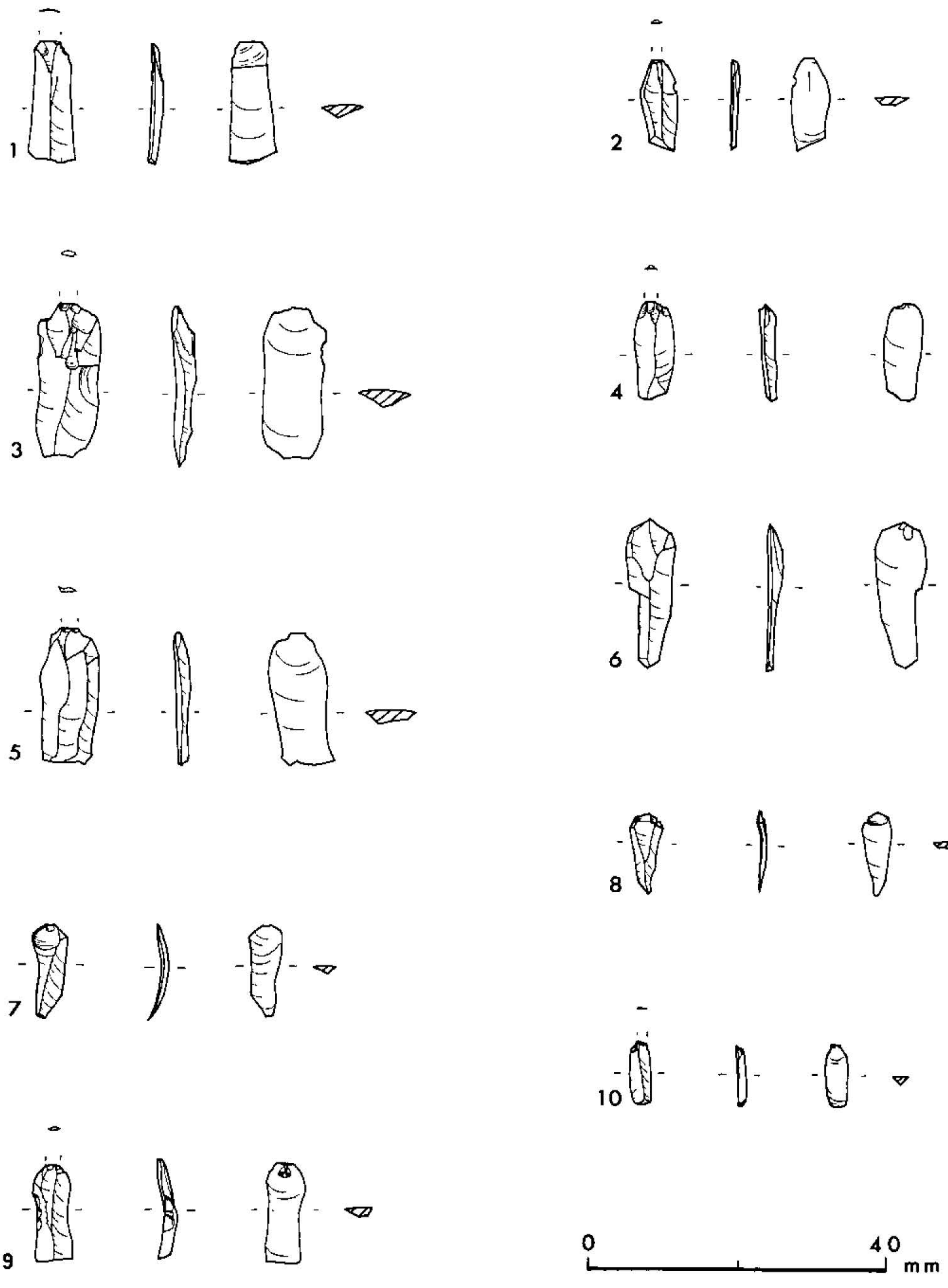
Blades are characterised by small elongated platforms (mean size 3mm × 1mm), careful platform preparation, platform isolation, parallelism, and low dorsal ridges. Most are straight, and the flaking angle varies between 70° and 80°. The size range of complete specimens is presented in Ill 37. There are more blades of flint than of bloodstone; many have resulted from the initial shaping of platform cores.

2 Narrow Blades (Ill 39. 1–6):

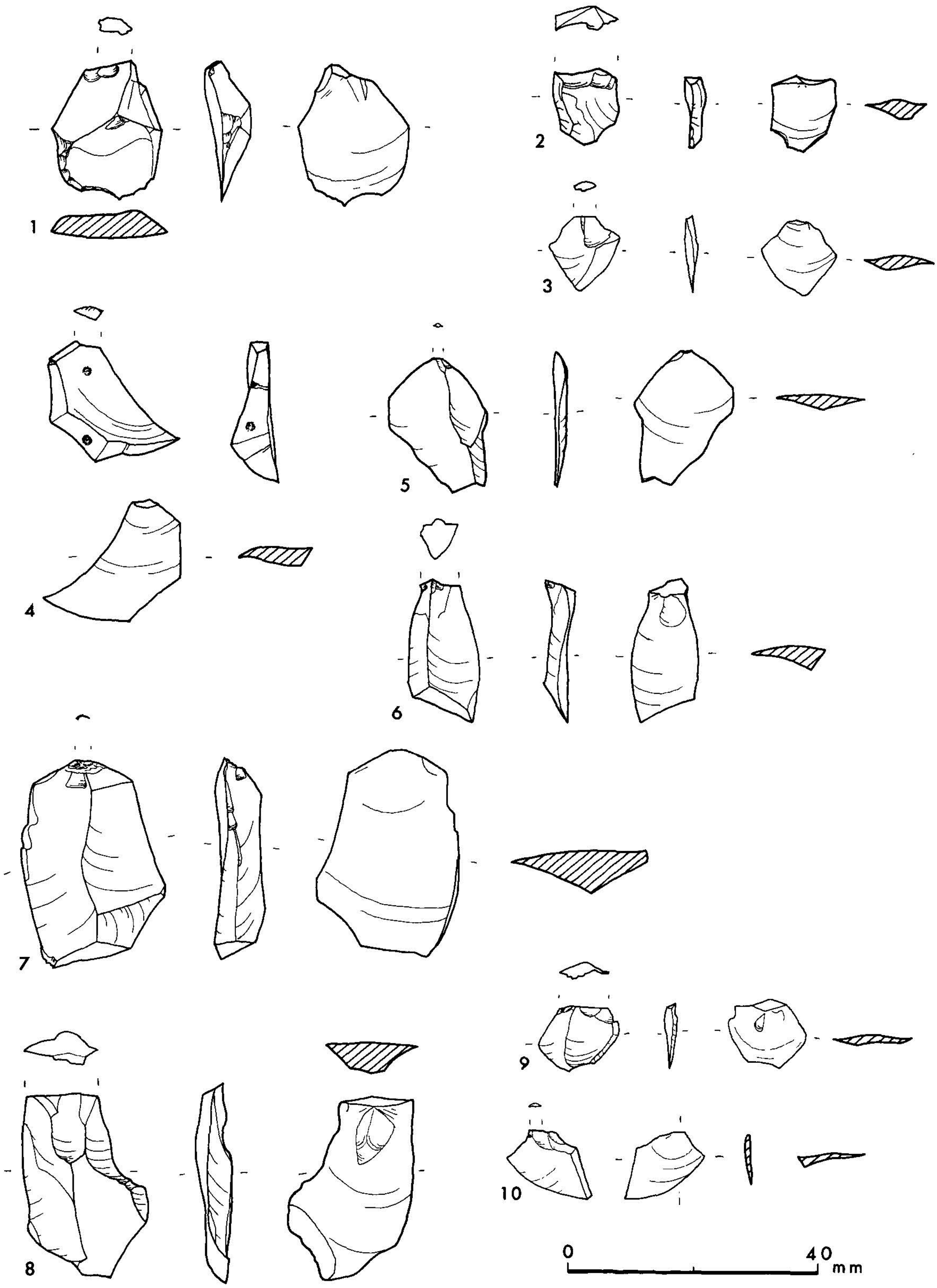
Narrow blades have the same morphological and technological properties as blades, though they tend to have fewer dorsal ridges. The size range is shown in Ill 37. There are more narrow blades of bloodstone than of flint in the sample.

3 Chips (Ill 39. 7–10)

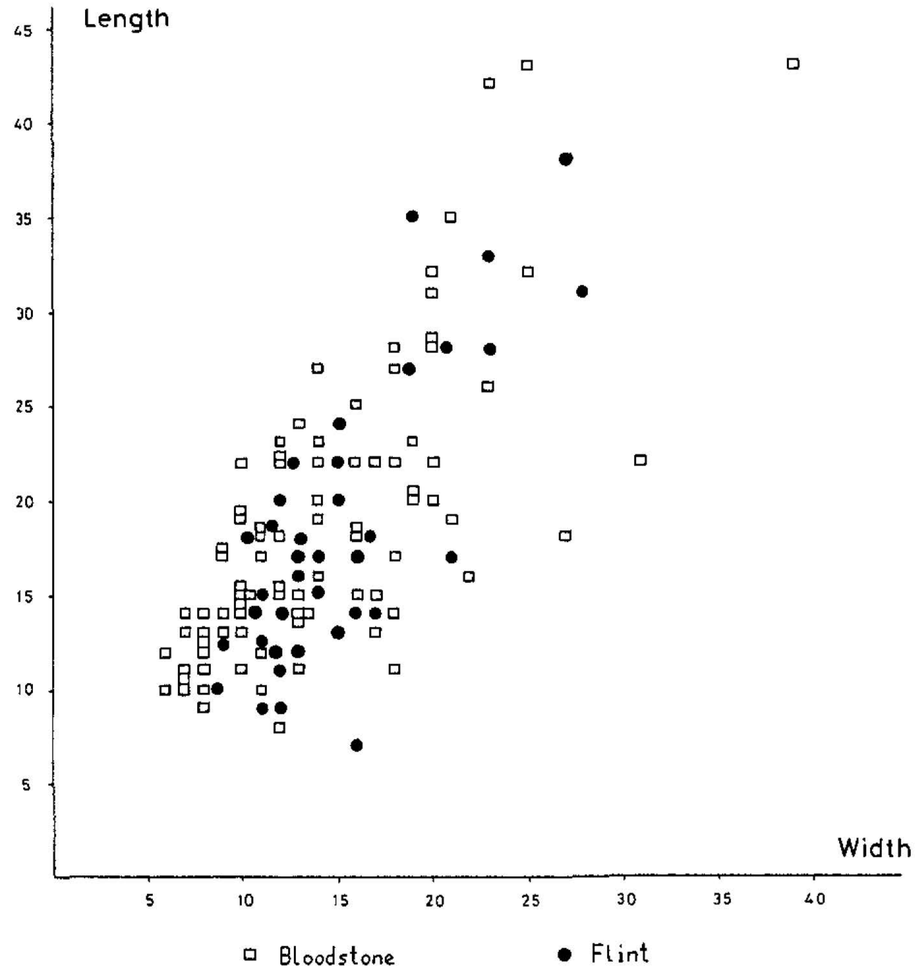
There are few chips. They exhibit the same characteristics as the other two groups, but are much smaller (Ill 37).



ILL 39: The lithic assemblage, mesolithic sample: narrow blades and chips. 1-6 narrow blades: 7-10 chips. I-3, 9-10 bloodstone: 4-8 flint. (Image by Marion O'Neil)



ILL 40: The lithic assemblage, mesolithic sample: flakes. 2-3, 5-6, 8 bloodstone: 1, 4, 7, 9-10 flint.
(Image by Marion O'Neil)



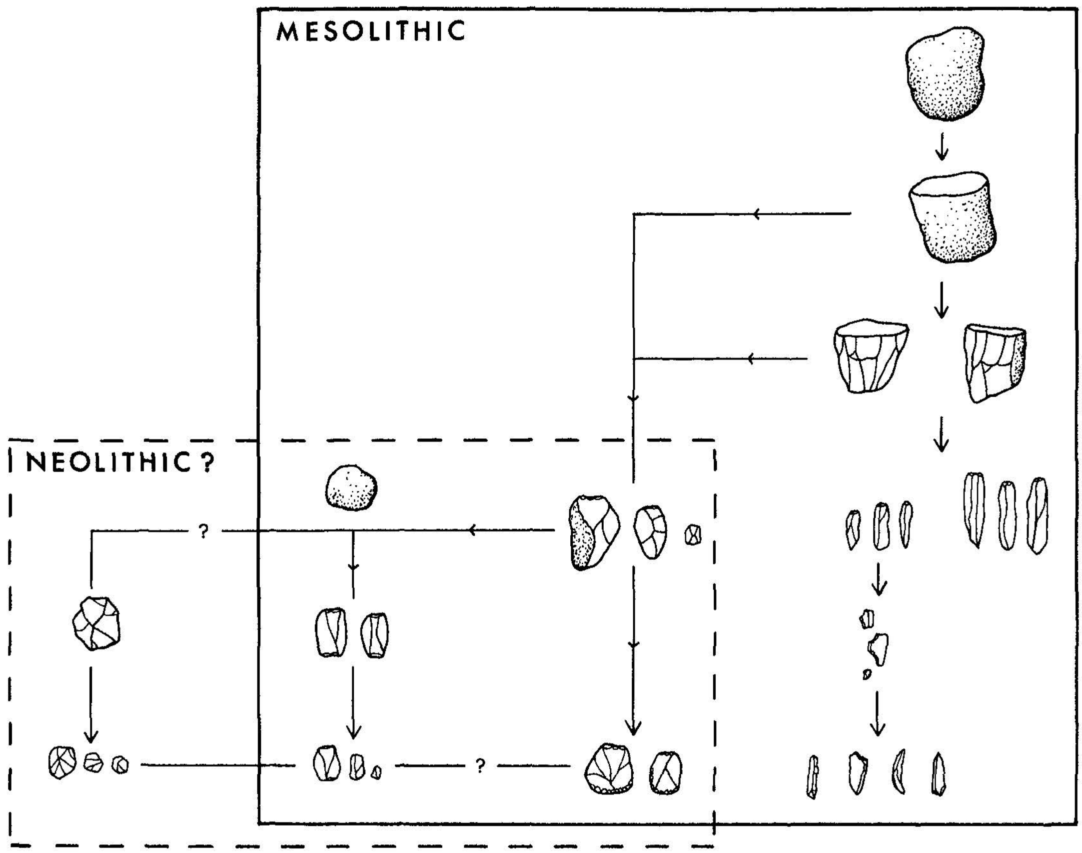
ILL 41: The lithic assemblage, mesolithic sample: complete inner flakes, length/width ratios. Dimensions in mm.

INNER FLAKES

There are more inner flakes of bloodstone than of flint (Ill 36). Most have small, flat, elongated platforms similar to those of the blades, but the flakes have wider terminations than blades and they exhibit no parallelism. In the consideration of any site with blade technology, the flakes are problematical, as it is not possible to determine with certainty whether they were manufactured deliberately or whether they are blade-making debris. At Kinloch, as few have been well prepared and many are small and thin (Ill 40. 1–10, 41), it seems most likely that the manufacture of flakes was related to the manufacture of the blades.

THE AIMS OF THE PRIMARY REDUCTION PROCESS IN THE MESOLITHIC

The mesolithic reduction process at Kinloch was geared to blade manufacture. This being the case it should be reflected in the general make-up of the assemblage, particularly if the site was one which specialised in blade making. By comparing the quantity of blades in the assemblage to that of flakes (the *lamellar index*: Bordes & Gaussen 1970), it is possible to measure the importance of blade manufacture on site. If the site specialised in blade making, then it is accepted that the ratio of blades to flakes must exceed 20%. In the sample under consideration the lamellar index is 24%. Thus, there is some evidence that the knappers at Kinloch were specialising in the manufacture of blades. The flakes in the assemblage constitute the debris from this process, and some were subsequently modified. Many pieces, both modified and unmodified, may have been used.



ILL 42: Comparative lithic reduction strategies.

Having established the presence of blade manufacture on site, it is necessary to examine why blades were made. Many, no doubt, were used without modification, but it would only be possible to detect these with use-wear analysis. However, the assemblage also contains a number of artifact types which are based on the modification of blades. The most numerous are the microliths, but within the sample there was also a borer, a burin and a scraper. Turning first to the wider category of blades, many of these were a by-product of the shaping of the platform cores, but some were used as blanks for modified (formal) tools. It is unlikely that these were blanks for microlith production, as this would have entailed reducing the width of the blade by over half (compare Ill 37 with Ills 61 and 62), but non-microlithic formal tools were made on the wider blades (Ills 54, 57).

In contrast to the wider blades, narrow blades are well suited to the production of microliths. Broadly similar blades seem to have been selected for the different microlith types, though the modification has led to shape differences (Ills 61, 62). The final group of blades were classified as chips; these are preparation chips, produced during the trimming of platforms (called core front chips by Newcomer & Karlin 1987), ie they were produced spontaneously rather than intentionally. As with all small debitage, these pieces may be used to indicate knapping floors, and they are so small that they often remain at the place of production (unless the knapping floor was cleared in some way, in which case debitage may have been dumped elsewhere).

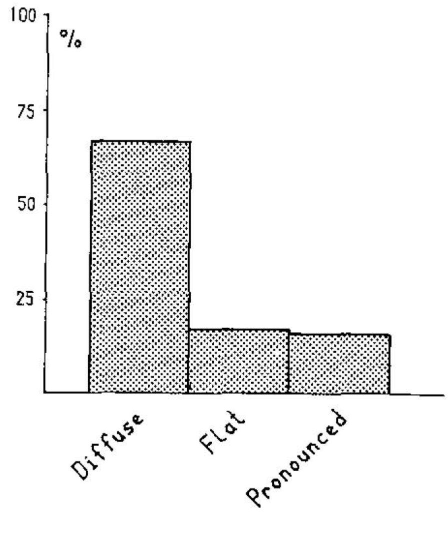
Although making flakes was not the primary goal of the knappers, there are many that would have been useful, and it is unlikely that these went to waste. Without further study it is impossible to identify those that were used unmodified. Some, however, were modified, eg most of the larger modified tools in the sample are on flake blanks. A comparison of the sizes of unmodified flakes with the modified artifacts (Ills 41, 52, 53) suggests that most of the unmodified inner flakes are too thin to have been made into some types (such as scrapers), but the cortical flakes were generally thicker and more suitable for blanks. An examination of the scrapers shows that the majority were made on flakes and many on inner flakes, so it may be that the more suitable inner flakes were removed from the unmodified assemblage in prehistory.

CONCLUSIONS: THE MESOLITHIC REDUCTION STRATEGY AT KINLOCH (Ill 42)

Of the two main materials (flint and bloodstone), the primary reduction of flint certainly took place on site, but this is not so certain for bloodstone. Although there is some waste from the primary reduction of bloodstone, the quantity of decortical flakes and blades is insignificant, and it seems likely that the majority of nodules were opened for testing and roughly shaped elsewhere, probably on the beach where they were collected. Further reduction was then carried out on both materials with direct, soft percussion, probably using medium-hard sandstone cobbles as hammers. In general, platform cores were prepared, though some bipolar cores were also used. Knapping was directed towards the production of blades of two specific types: blades and narrow blades. Blades were predominantly of flint and many were the by-products of the shaping of platform cores, though some were modified into formal tools, and others may well have been used without modification. The narrow blades are predominantly of bloodstone (this may well reflect the poorer knapping quality of the bloodstone), and they were apparently deliberately manufactured as blanks for microliths. In addition, tiny blades, classified as chips, were produced as part of the core preparation process. Flakes were a by-product of this reduction strategy, but they are present in large numbers and many would have been quite suitable for use, with or without modification.

TYPE	TOTAL	% EXAMINED
CORES		
Platform	15	100
Bipolar	16	100
Disc	4	100
BLADES		
Decortical	6	100
Inner	87	100
REGULAR FLAKES		
Decortical	54	100
Inner	628	53
MODIFIED ARTIFACTS		
Microliths	21	100
Non-Microlithic	8	100

Table 7: Trench AD, mesolithic/neolithic sample: lithic artifacts used for technological analysis.

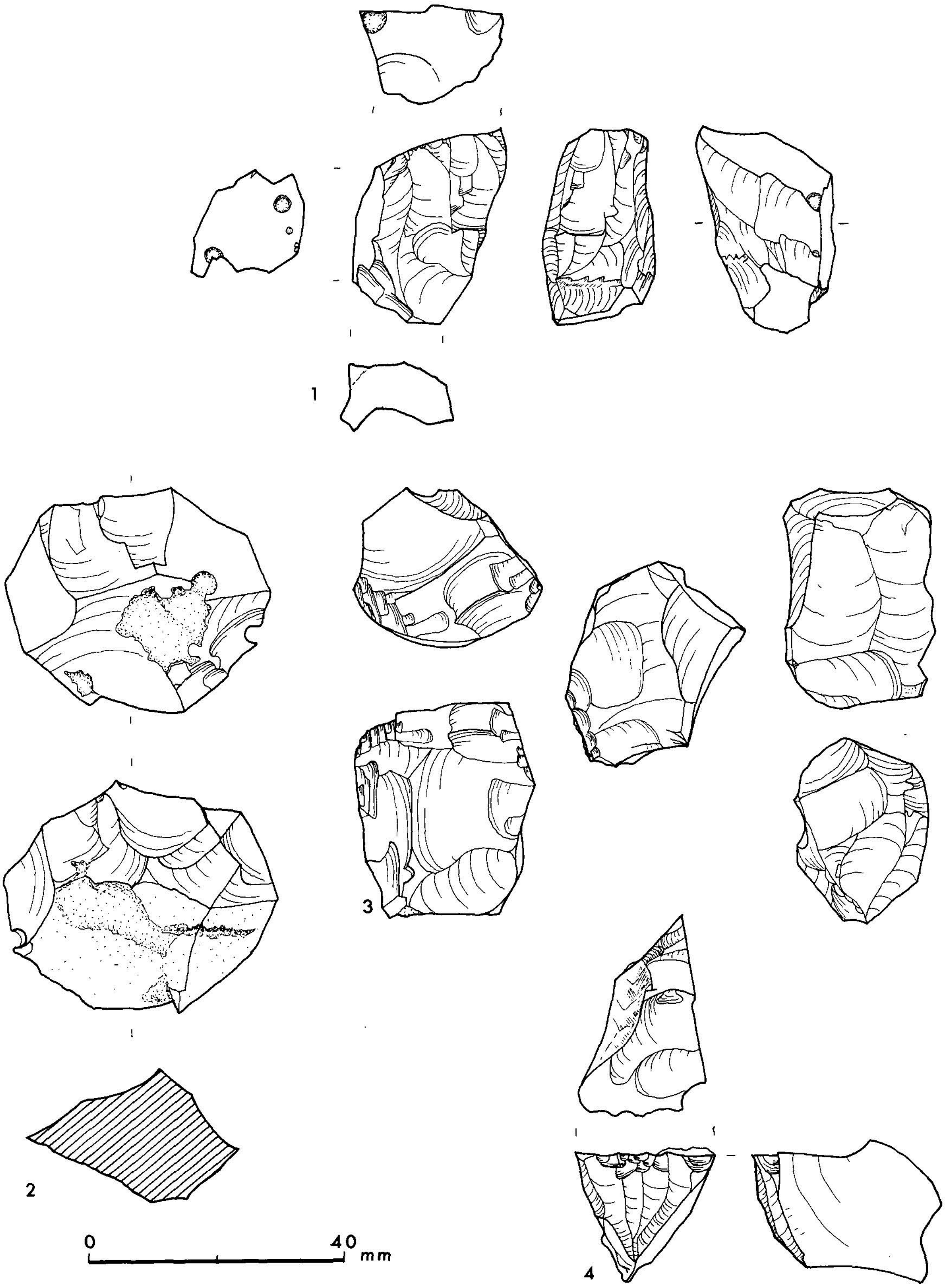


ILL 43: The lithic assemblage, mesolithic/ neolithic sample: bulb types

SAMPLING THE MIXED MESOLITHIC/NEOLITHIC CONTEXTS

In the fourth millennium BC the site was littered with debris from earlier occupation, and mesolithic material was incorporated into the fills of all the later features. Nevertheless, four of these mixed deposits were selected for comparison with the pure mesolithic material studied above. These areas comprised:

1 Peat: the peat that formed in the watercourse on the northern edge of the site.
2 Rocks and debris: a deposit of rocks together with organic material, pottery and lithics lying towards the eastern end of the peaty fill of the watercourse.



ILL 44: The lithic assemblage, mesolithic/neolithic sample: cores. 1-3 disc cores: 4 handle core. All of bloodstone. (Image by Marion O'Neil)

3 Small dumps: a series of matted rafts of wood and other material from the surface of the peat in the watercourse.
4 Basal peat: the peat below the deposit of rocks (Area 2 above).

Of these four deposits, 2 and 3 are associated with radiocarbon determinations (Area 2: 3890±65 BP, GU–2042; Area 3: 4080±60 BP, GU–2148). Area 4 contained so little lithic material that it was not included in the study after the initial classification of artifacts.

The aims of this analysis were twofold: to ascertain whether the primary technology differed in any way from that deduced from the uncontaminated mesolithic material; and to establish whether there were any differences between the four areas. At this point it should be stressed that none of the material under consideration lies in a primary context: at best 2 and 3 are rubbish dumps; at worst 1 and 4 comprise material that has accumulated within the growing peat beds. It should be remembered, however, that even the mesolithic material from Trench AD derives from a pit complex and as such has been deposited from unknown use-areas.

THE ARTIFACTS EXAMINED

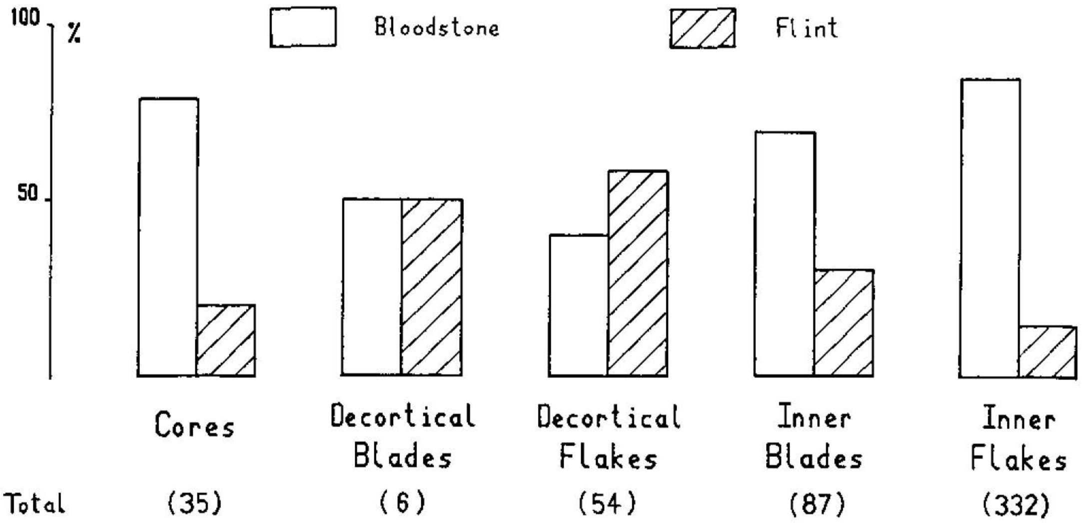
Types, Raw Material and Condition.

The sample for this analysis was derived in the same way as that for the analysis of the mesolithic contexts. It included flint and bloodstone cores, blades, regular flakes, microliths and retouched artifacts (Tab 7).

In contrast to the mesolithic sample, few pieces showed signs of surface alteration.

THE ANALYSIS OF REDUCTION TECHNIQUES (see definitions, Chapter 5)

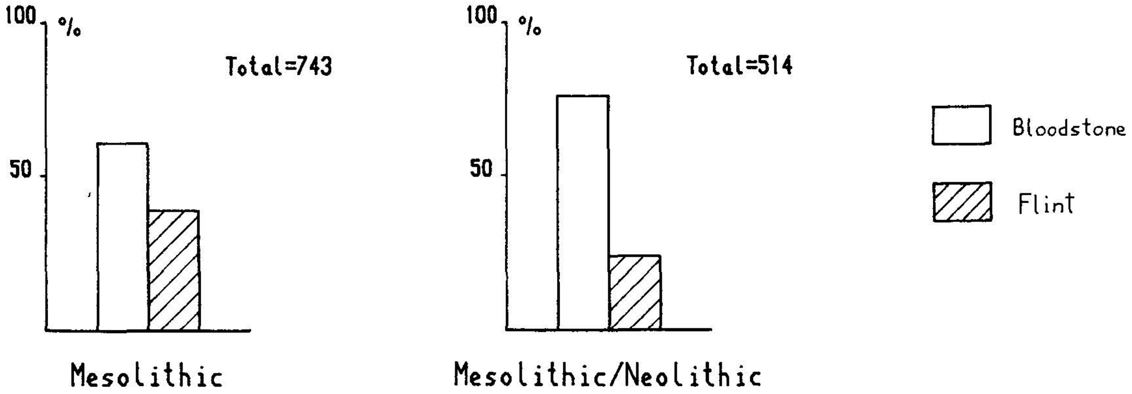
The features indicative of the methods used to apply force for the manufacture of flakes and blades were catalogued and analysed. As in the mesolithic sample, diffuse and flat bulbs were predominant (Ill 43), suggesting the use of soft percussion. This is supported by the other technological attributes. The presence of some attributes normally associated with hard percussion is best explained by the use of medium hard sandstone cobbles as hammers. The similarity of the technological attributes with those of the mesolithic assemblage suggests the use of direct percussion. One core may have been flaked with pressure (Ill 44. 4), but no generalisations can be drawn from a single artifact.



ILL 45: The lithic assemblage, mesolithic/neolithic sample: artifact types by material.

REDUCTION METHOD AT KINLOCH: THE LATER EVIDENCE

Both flint and bloodstone were present in the sample (Ill 45), but there is less flint amongst the later contexts than there was in the mesolithic material (Ill 46).



ILL 46: The lithic assemblage, samples used for technological analysis, by material.

TYPES

CORES (Ill 47)

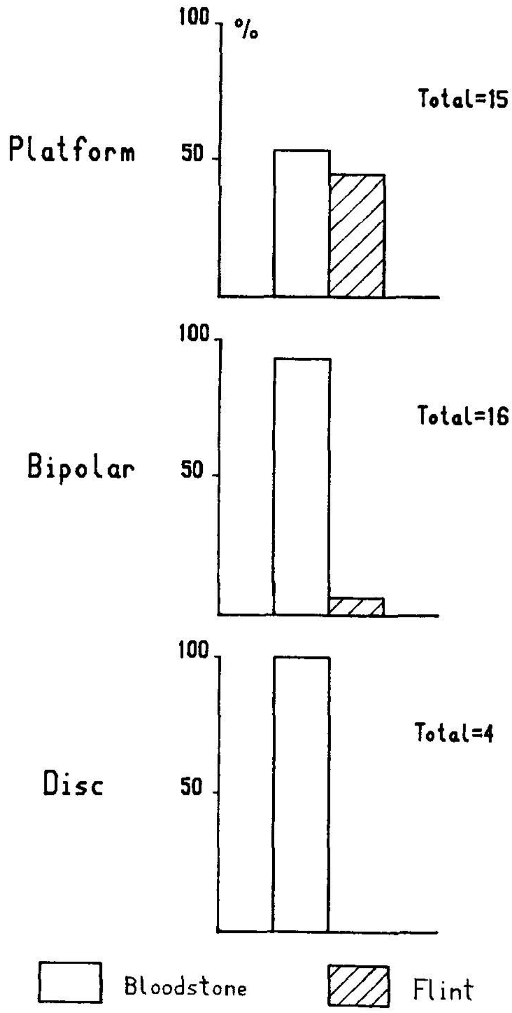
Flint.

There are seven flint cores in the sample, all but one of which are platform cores with a typical conical shape. Although these are all single platformed, there are blades and flakes that indicate the use of cores with opposed platforms. Most of the cores are unifacial, ie they have been flaked around one side only. They are similar to those used in the mesolithic contexts, and, like them, many were abandoned as a result of flaking fractures: the mean length at discard was 32mm. In addition, there is one bipolar core, from Area 2, made from a cortical flake but with few detachments.

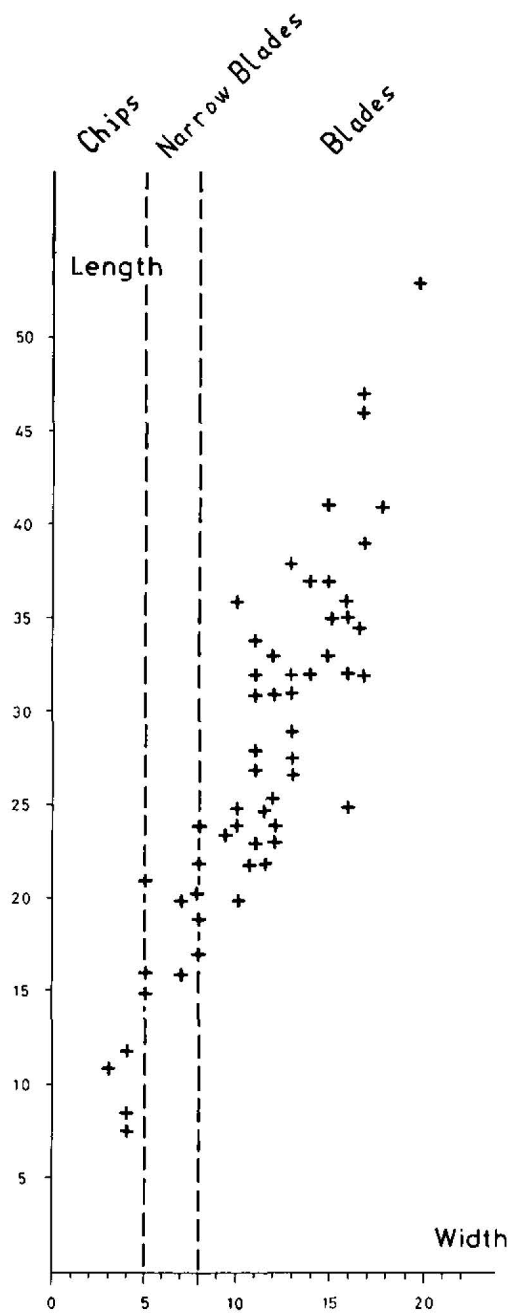
Bloodstone.

There are nine conical platform cores of bloodstone. They are relatively short and wide, and have removals all the way round. A few are wider than they are long. They were used for both blades and flakes, but flakes predominate. In contrast to those from Trench AD, there is less evidence of discard as a result of impurities in the stone, and more were apparently worked to exhaustion. One bloodstone platform core (from Area 2) is quite different from the others as it has clear evidence of microblade removal, possibly by pressure (Ill 44. 4), but so far this piece stands alone. Areas 2 and 3 are dominated by bipolar cores, all but one of which are of high quality bloodstone. All are typical bipolar cores, similar to those from Trench AD, but of more variable length.

Four bloodstone disc cores, a type not found in the mesolithic contexts, were also identified (Ill 44. 1–3). They were used in the production of flakes by a quasi-bifacial method, each removal utilising the negative scar from the previous flake as a platform. This is a complex way to make flakes and requires well planned work. It is reminiscent of levallois flaking as it relies on previous removals to control the size of the flakes produced. These cores may have been flaked to exhaustion as neither defects of raw material, nor



ILL 47: The lithic assemblage, mesolithic/ neolithic sample: cores by material.

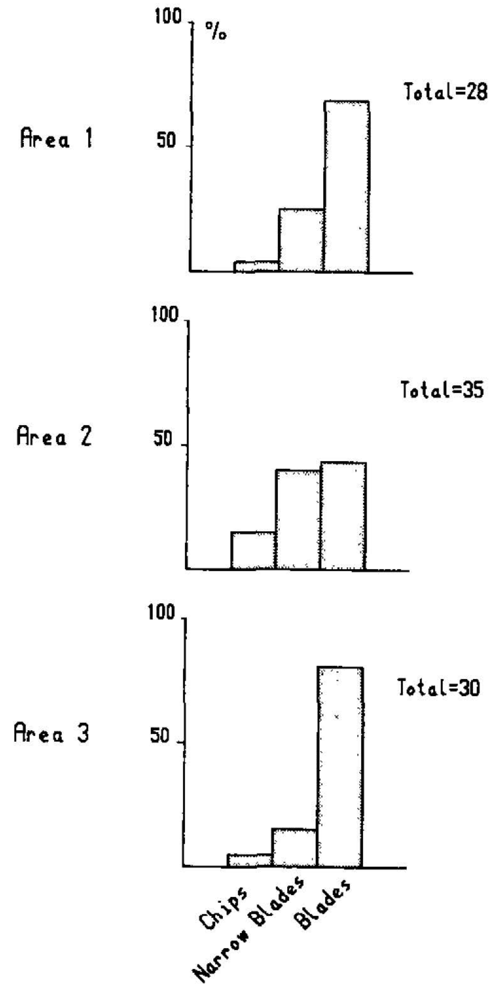


ILL 48: The lithic assemblage, mesolithic/ ncolithic sample: blade types. Dimensions in mm.

flaking fractures, led to their abandonment. In addition, there is one bloodstone core from Area 3 that seems to be a cross between a platform core and a disc core.

DECORTICAL FLAKES AND BLADES

There are a number of decortical flakes and blades in the sample: all represent the same reduction processes as those of the mesolithic sample and, like them, they are predominantly of flint (Ill 45).



ILL 49: The lithic assemblage, mesolithic/ neolithic sample: blade types by area.

OVERSHOT FLAKES AND BLADES

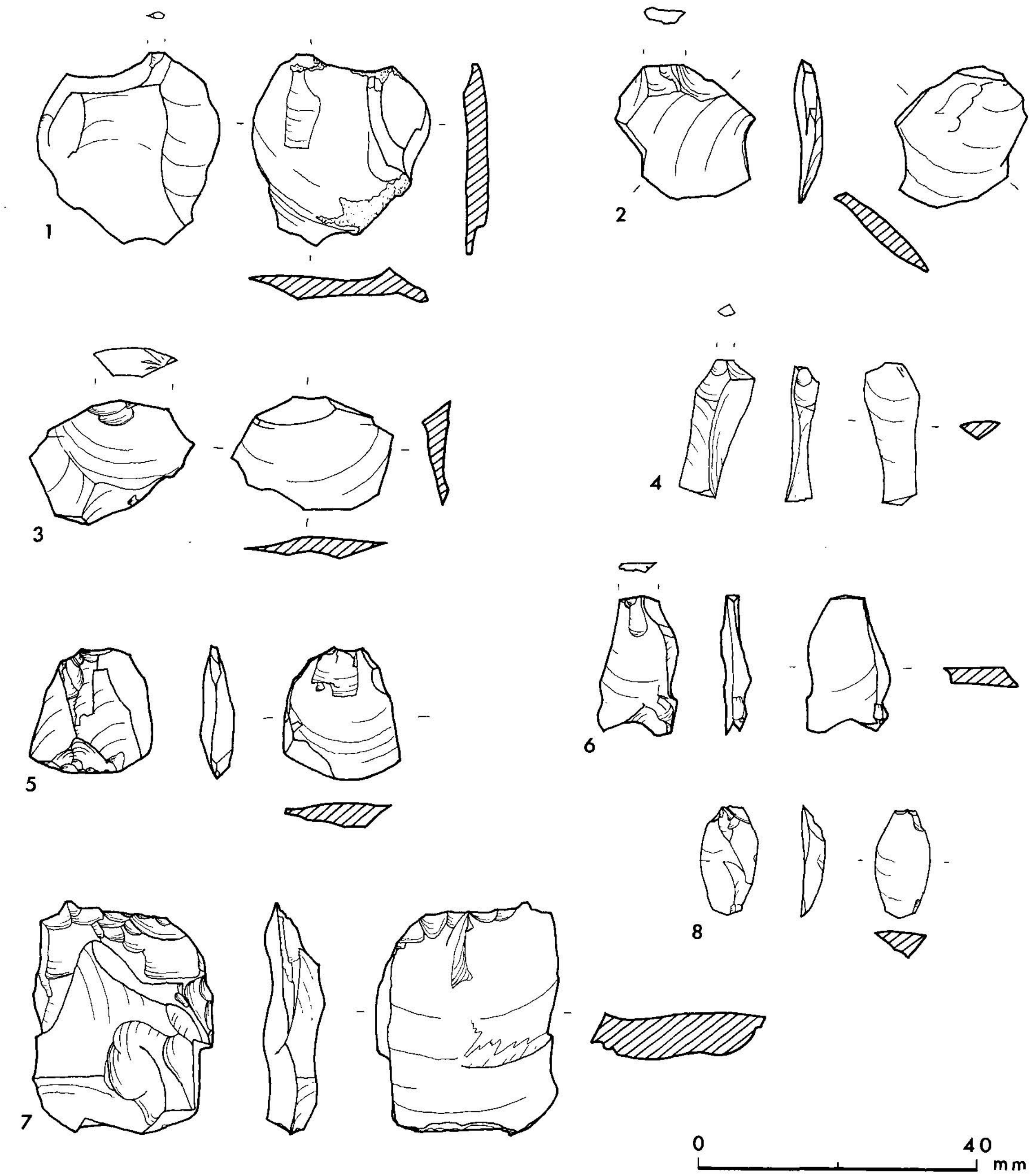
There are a few overshot flakes and blades; all present the same picture as those from Trench AD.

CRESTED BLADES

There are two crested blades, both of bloodstone. Like those from the mesolithic sample, the crests were formed from the accentuation of a pre-existing natural ridge. In contrast, however, neither had a prepared platform, and it should also be remembered that those from the AD sample are of flint.

BLADES

The blades from this sample are similar to those from the mesolithic sample (Ill 37); all three types are present (Ill 48). The wider blades are found predominantly in Areas 1 and 3 (Ill 49), whereas in Area 2 there are more narrow blades (and the majority of the microliths were found in Area 2). Area 2 also contained more chips. Although there

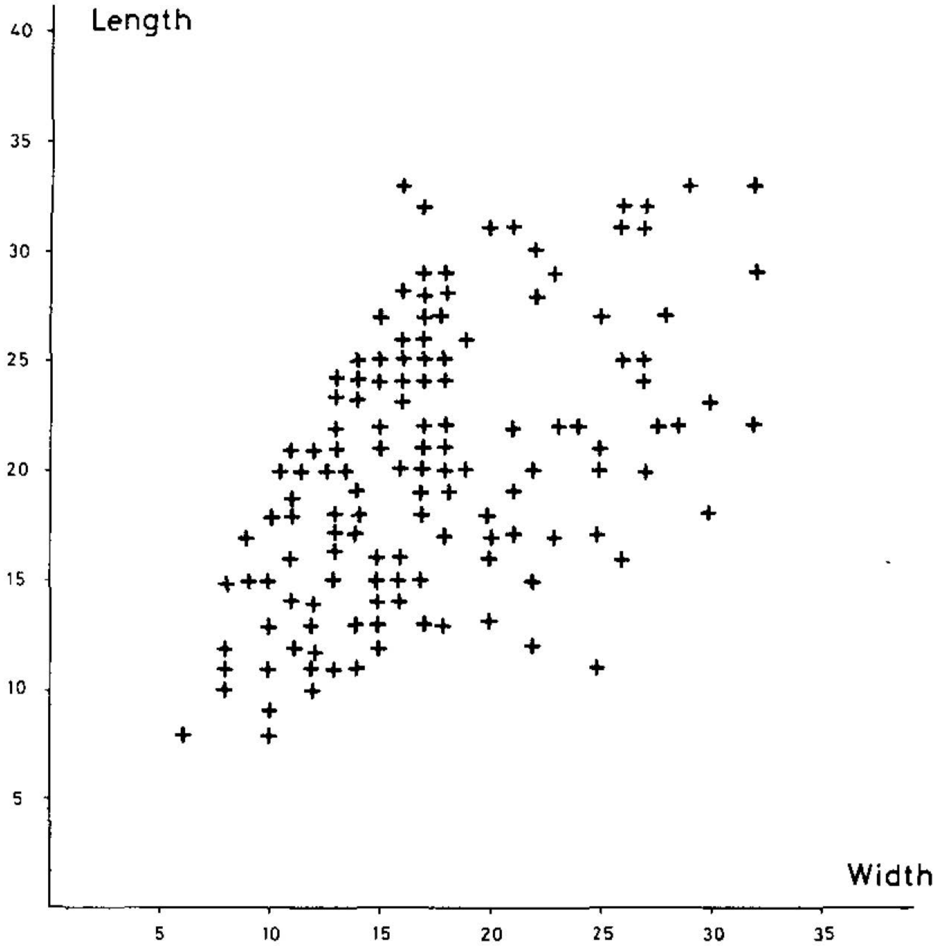


ILL 50: The lithic assemblage, mesolithic/neolithic sample: Flakes. 1-3 disc core flakes: 4-8 bipolar flakes. 1-4, 6-8 bloodstone: 5 flint. (Image by Marion O'Neil)

are no certain bipolar blades amongst this assemblage, a number of blades (bloodstone and flint) have crushed platforms, and these may well have resulted from the use of the bipolar method in the manufacture of blades.

FLAKES (Ill 50, 51)
As in the mesolithic sample there are more flakes of bloodstone than of flint (Ill 45). In contrast to the mesolithic sample, however, the dimensions and the detachment characteristics of the later flakes suggest that they were deliberately produced (although this is less certain in Area 2). This suggestion is strengthened by the evidence from the cores, all of which had apparently been used for flake production. Flakes were removed from both disc and platform cores as well as bipolar cores (Ill 50. 1-8), but the most regular flakes were produced from platform cores.

SCRAPER RESHARPENING FLAKES
Three small flakes (two flint, one bloodstone) appear to have resulted from the resharpening of scrapers (see Chapter 7). All retain truncated retouch scars from a scraper face, two come from Area 2 and one from Area 3.



ILL 51: The lithic assemblage, mesolithic/neolithic sample: complete flakes, length/width ratios. Dimensions in mm.

THE AIMS OF THE PRIMARY REDUCTION PROCESS IN THE LATER PERIOD

The assemblage comprised both flakes and blades, but the technological evidence suggested that the flakes were an end product in themselves (though the lamellar index is the same as that for the mesolithic sample: 24%). A number of formal tools were made on flake blanks: as in the mesolithic sample these blanks were selected by size and shape. There were also some modified tools based on blade blanks, notably the microliths, most of which were found in Area 2 (and may indicate contamination from earlier material).

CONCLUSION: THE REDUCTION STRATEGY IN THE LATER PERIOD AT KINLOCH (Ill 42)

The reduction strategy reconstructed for the later material is similar to that suggested for the mesolithic material, but there are important differences. Both bloodstone and flint were used, still from the same sources and still prepared in the same way, but (in contrast to the earlier assemblage), there is much less use of flint. Direct, soft percussion was still used to reduce the cores, and both platform and bipolar cores were prepared, but the knappers were now making use of a third type of core (the disc core), and their production was geared more to the manufacture of flakes. There were few modified tools in the later samples.

DISCUSSION

Although the basic reduction techniques were similar, there are a number of differences between the mesolithic assemblage and the later material. The later assemblage contains less flint; it includes disc cores, which do not occur in any mesolithic context on site; and, though both flakes and blades were present in both assemblages, the flakes in the later contexts are somewhat different. The characteristics of the 'later' flakes suggest that they were deliberately produced, unlike those from the mesolithic sample which were apparently a by-product of blade manufacture. The later material contains very few modified artifacts, but the same basic types are present in both samples. Both assemblages contain a range of microlithic and non-microlithic tools.

TYPE	AREA 1	AREA 2	AREA 3
CORES			
Platform	7	4	4
Bipolar	2	9	5
Disc	2		2
BLADES	28	35	30
FLAKES	101	501	80
MODIFIED ARTIFACTS			
Microliths	3	16	2
Non-Microlithic	4	3	1

Table 8: Trench AD, mesolithic/neolithic sample: lithic artifact types by area.

Within the later sample, material was derived from three distinct areas (1–3), and one objective of the analysis was to look for possible differentiation between these areas. Although there was evidence for all of the reduction methods in each area, Area 1 was dominated by platform cores, while Areas 2 and 3 contained more evidence of bipolar working. The majority of both narrow blades and microliths came from Area 2 (Ill 49). There are other mesolithic elements present in Area 2, and together they may indicate greater mesolithic contamination (there are no disc cores, and the flakes are more like those from the mesolithic sample). As all three areas were apparently re-deposited it is difficult to take analysis further and interpret the observed differences.

Finally, it is important to consider whether the differences between the mesolithic and the later material could represent any technological change through time. Studies elsewhere have observed a shift from blade to flake industries between the mesolithic and the neolithic periods (Pitts & Jacobi 1979) and so it is interesting to note that, though both blades and flakes are present in both assemblages, the evidence from the earlier period was geared to blades alone, while in the later period flakes were more important. However, the lamellar index was the same for both groups of material; perhaps the value of the index as a straightforward indicator of the presence of blade production should be questioned. At Kinloch it is likely that the later samples were contaminated with some mesolithic material and this will undoubtedly have affected the index for Areas 1–3, but it is clear that the index alone is not sufficient to indicate the importance of blade making.

In a consideration of technological change through time it is important to note that the individual reduction techniques used at Kinloch change hardly at all. The one exception is the introduction of reduction from disc cores in the later period. The disc core may be linked both to the increased importance of flakes as an end product in themselves, and to the decline in the amount of flint worked. The change in raw material is harder to explain. It may be the result of a drop in the quantity of available flint (certainly there are few pebbles of flint to be found around the coasts of Rhum today), or it may be linked to the lessening of the need to make blades. The whole reduction strategy is a complex system and it is impossible to pinpoint the reasons behind any change, or the stages at which stress entered to generate that change. Certainly, by the later period at Kinloch there was less emphasis on blade production and this is manifest in several ways: the different characteristics of the flakes present, the new type of cores and the decline in the use of flint. Why this change in emphasis took place it is impossible to say. As all of the later contexts still contained some blades (even if only by contamination), it is not possible to isolate blade technology as an exclusively mesolithic trait at Kinloch.