

GLENTAGGART, SOUTH LANARKSHIRE — DISCUSSION OF A SCOTTISH CHERT ASSEMBLAGE AND ITS ASSOCIATED TECHNOLOGY

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ABSTRACT

In 2001, CFA Archaeology Ltd. recovered a substantial chert assemblage from a site at Glentaggart in South Lanarkshire, southern Scotland. As the entire southern quarter of prehistoric Scotland was dominated by the use of chert as a raw material for lithic tools, and as no Scottish chert assemblages, excavated and recorded according to modern standards, have been published fully, the authors took this opportunity to present and discuss one such assemblage in detail. The main purposes of this paper are to characterise and date the assemblage, and increase our understanding of how the inherent properties of chert, affected the knappers' operational schema and influenced the morphology of their lithic products.

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Keywords: Assemblage, chert, Glentaggart, lithic, Mesolithic, operational schema, raw material, Scotland, Southern Uplands, technology.

INTRODUCTION

This report describes the excavation and analysis of a lithic assemblage recovered from a site at Glentaggart, near Glespin in South Lanarkshire (NS 7989 2663, Figure 1). At present, little is known about the chert industries of southern Scotland, as only one other chert assemblage has been presented and discussed in any detail (Woodend Loch; Davidson *et al.* 1949), with other known chert assemblages forming part of summary accounts of the industries of interior east (Morrison 1982; Finlayson 1990) and west (Callander 1927; Mulholland 1970) southern Scotland. The purpose of this report is therefore to characterize the Glentaggart chert collection, with special reference to raw materials, typological composition and technology, and the operational schema (*chaîne opératoire*), distribution, and date of the assemblage are also discussed. An important aim of this discussion is to test whether the lithic finds represent one or more prehistoric visits to the location, and whether or not the material is chronologically mixed. The evaluation of the lithic assemblage is based upon a detailed catalogue of all the lithic finds from Glentaggart, and the artefacts in this report are referred to by their number (CAT no.) in this catalogue.

CONTEXT OF DISCOVERY

In September 2001 CFA Archaeology Ltd. carried out excavation of a horseshoe-shaped turf-banked structure at Glentaggart, near Glespin (Figure 1), as part of the mitigation measures in advance of opencast coal mining. The structure was identified during a walkover survey

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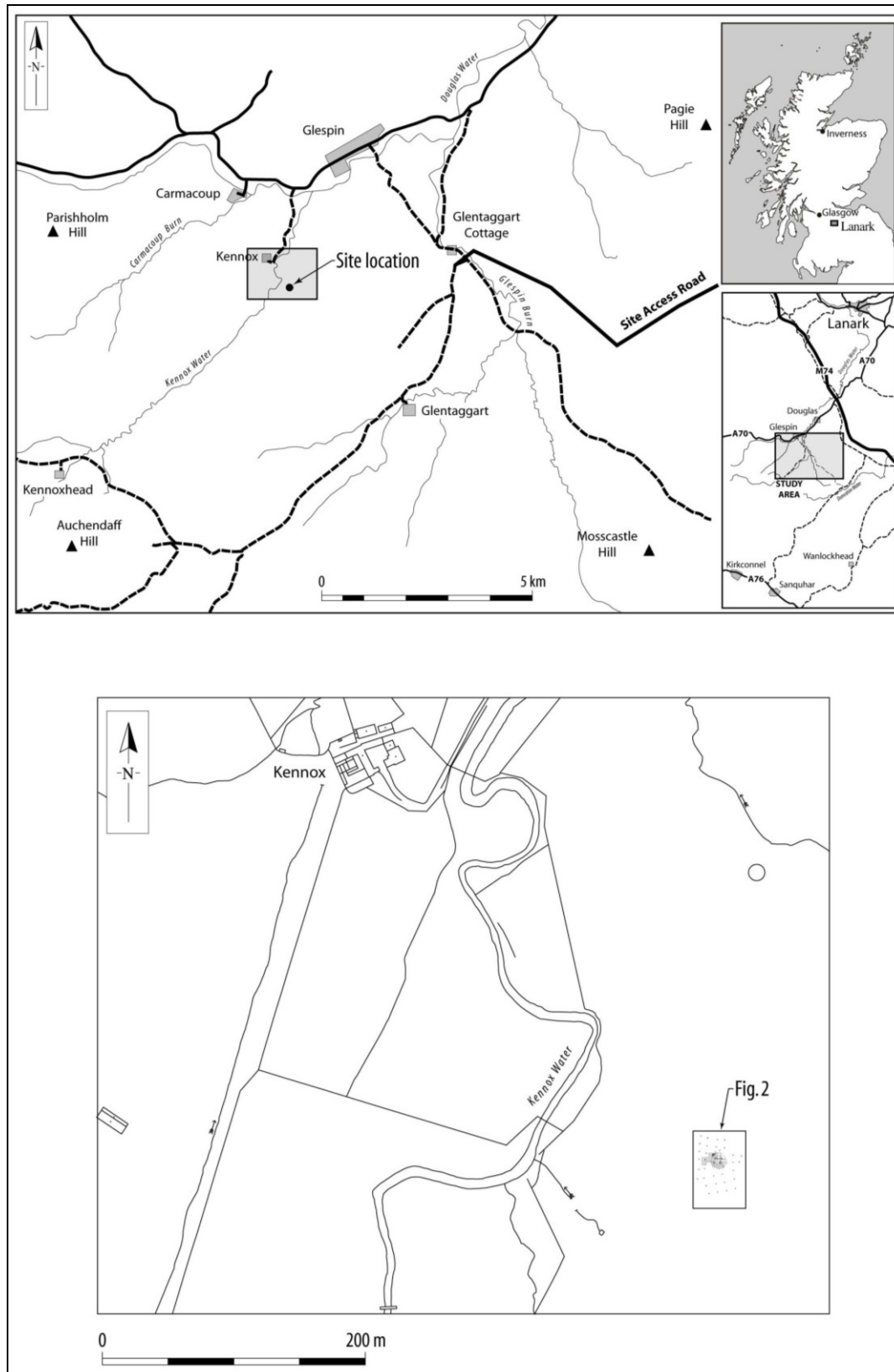


Figure 1: Location map

(Neighbour & Cameron 2001) and then evaluated (Mitchell 2001). Full excavation (Mitchell 2001) revealed a horseshoe-shaped structure measuring approximately 12m N–S by 6m E–W,

with turf banks upstanding to *c.* 1m, an entrance facing north and a large central pit (Figure 2, see Johnson forthcoming for full excavation report).

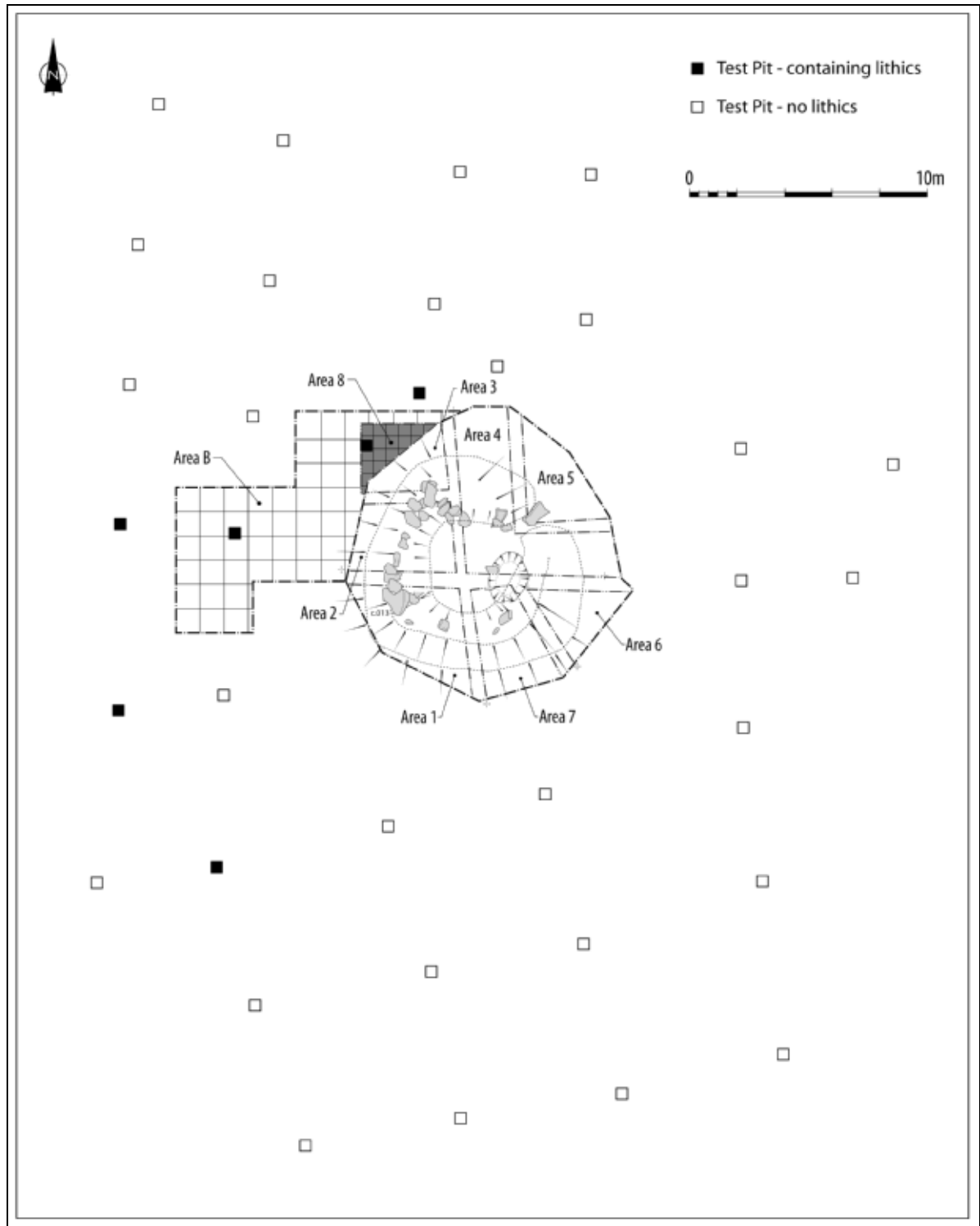


Figure 2: Site plan showing features and locations of test-pits

Chert artefacts, believed at the time of excavation to be either Mesolithic or Neolithic, were recovered from within the matrix of the collapsed turf banks, concentrated mainly in the north-western part of the site. It was suspected that the lithics pre-dated the structure by some

millennia. Radiocarbon dating has confirmed this: samples of charcoal from the central pit have been dated to 420–660 AD (Poz-10277-9, Poz-10281-3).

It is apparent that the site is a palimpsest of occupation, with a chert knapping site present on the same site as a later turf-banked structure. It would appear that the presence of lithic objects within the structure is the chance outcome of the construction of the banks, using soil and turf from the site's immediate surroundings. This process displaced the lithics a short distance, and they were incorporated into the banks.

The archaeological investigations and the post-excavation work were sponsored by Scottish Coal Company Ltd.

METHODOLOGY FOR RECOVERY OF LITHICS

Once it became apparent that a sizeable, probably chronologically 'clean', chert assemblage was present on the site, a series of test-pits were excavated and bulk samples were taken to ensure recovery of the lithics. The test-pits were excavated in a 5m x 5m grid system set out around the site. Each test-pit measured 0.5m x 0.5m and was excavated to the subsoil. The soil removed from the test-pits was dry-sieved on site to recover lithic artefacts. All the chert fragments recovered at this stage were from test pits to the north and west of the site, prompting the extension of the excavation into this area (Area B: Figure 2).

The principal trench was numbered Areas 1–7, with each area corresponding to a segment of the site as divided by baulks (Figure 2). The lithics were primarily hand-retrieved from these areas. Areas 1 and 2 were sampled in a 0.5m x 0.5m grid system to allow the recovery of lithic artefacts through wet-sieving, with 6 litre bulk soil samples taken from each grid. Area B, the extension of the trench to the north-west, was hand-excavated in a 1m x 1m grid system to assess the spatial distribution of lithics within the topsoil (see distribution section). Within Area B, a small area adjacent to Area 3 (Area 8, shaded on the plan: Figure 2) was then targeted for more detailed sampling due to the concentration of lithics here; a 0.5m x 0.5m grid system was used, but here the soil removed from each grid was 100% bulk sampled. Ninety-two bulk samples were wet-sieved through a 1mm mesh and then sorted in order to retrieve their content of lithic artefacts.

THE ASSEMBLAGE

From the excavations at Glentagart 1,008 lithic artefacts were recovered (approximately 1,000 unworked pieces (sand-, gravel- and pebble-sized) were discarded). They are listed in Table 1.

The definitions of the main lithic categories are as follows:

Chips: All flakes and indeterminate pieces, the greatest dimension (GD) of which is ≤ 10 mm.

Micro-chips: In the present report, the distinction between chips and micro-chips is a practical one, in the sense that débitage retrieved by sieving through a 4mm mesh was defined as chips, and débitage retrieved by sieving through 1mm and 2mm mesh-sizes were defined as micro-chips. Proper flakes (GD > 10mm; below) recovered by sieving, were removed from the residue and characterized in detail, like other flakes, whereas chips and micro-chips were only counted per grid unit.

Flakes: All lithic artefacts with one identifiable ventral (positive or convex) surface, GD > 10 mm and L < 2W (L = length; W = width).

	<i>I</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>B</i>	<i>U</i>	<i>Total</i>
Débitage											
Chips	1	2	10	10				40		1	64
Micro-chips	28	20						279		27	354
Flakes	30	44	56	35	5	6	6	93	10	17	302
Blades	8	5	8	3	1		4	16	2	1	48
Microblades	4	2	3	6	3		1	14	1		34
Indeterminate pieces	12	10	9	4	1		2	15	1	7	61
Crested pieces	2		2	2			1	5	1	2	15
Platform rejuvenation flakes			2	2			1				5
Total débitage	85	83	90	62	10	6	15	462	15	55	883
Total débitage, excluding micro-chips	57	63	90	62	10	6	15	183	15	28	529
Cores											
Core rough-out	1							1			2
Single-platform cores		6	1		1		2	1	1	5	17
Opposed-platform cores						1				2	3
Cores with 2 platforms at an angle	2	3	2								7
Irregular cores	1	2	2	2	1	1	1	2	3	4	19
Total cores	4	11	5	2	2	2	3	4	4	11	48
Tools											
Scalene triangles		1									1
Truncated microblades									2		2
Edge-trimmed microblades		2							1		3
Microburins		1									1
Short end-scrapers		5	2		1		1	1		1	11
Blade-scrapers			1								1
Side-scrapers		1									1
Scraper-edge fragments								1			1
Burins and ?burins		1	1	1				1			4
Piercer-burins	1										1
Pieces with convex truncations		1		1							2
Pieces with curved truncations			1						1		2
Pieces with oblique truncations			1								1
Pieces with straight truncations									1		1
Pieces with retouched notch(es)								1		1	2
Pieces with edge-retouch	4	11	7	1	2		3	4	2	7	41
Ochre	1	1									2
Total tools	6	24	13	3	3		4	8	7	9	77
Total	95	118	108	67	15	8	22	474	27	74	1008
Total, excluding micro-chips	67	98	108	67	15	8	22	195	27	47	654

Table 1: General artefact list: artefacts by sector (1–8, B, U(nstratified))

Indeterminate pieces: Lithic artefacts which cannot be unequivocally identified as either flakes or cores. Generally the problem of identification is due to irregular breaks, frost-shattering or fire-crazing. Chunks are larger indeterminate pieces, and in, for example, the

case of chert, the problem of identification usually originates from a piece flaking along natural planes of weakness rather than flaking in the usual conchoidal way.

Blades and microblades: Flakes where $L \geq 2W$. In the case of blades $W > 8\text{mm}$, in the case of microblades $W \leq 8\text{mm}$.

Cores: Artefacts with only dorsal (negative or concave) surfaces — if three or more flakes have been detached, the piece is a core, if fewer than three flakes have been detached, the piece is a split or flaked pebble.

Tools: Artefacts with secondary retouch (modification).

Raw materials

Apart from one core rough-out [CAT 509] and one possibly natural flake [CAT 317] in chalcedony, all lithic artefacts are in chert. Chert is closely related to flint. Both are composed of silicon dioxide, but where flint derives mainly from Upper Cretaceous chalk, British chert is primarily associated with Carboniferous limestone (Hind 1998), though it is also found in some earlier and later sedimentary formations (Wickham-Jones & Collins 1978: 12–18). In American terminology, ‘... *chert* is used as the general term for all sedimentary rocks composed primarily of microcrystalline quartz, including flint, chalcedony, agate, jasper, hornstone, novaculite, and several varieties of semiprecious gems’ (Luedtke 1992: 5). In south-west England chert may be found in Cretaceous contexts, although largely limited to the Upper Greensand (Edmonds *et al.* 1975: 68). In Scotland, chert is found throughout the country (*ibid*: Illustration 2), but it is particularly common in the Midland Valley and in the Southern Uplands zone, where it dominates many inland assemblages (e.g. Callander 1927; Mulholland 1970; Finlayson 1990; Saville 1994).

Southern Uplands chert occurs in many colour variations, with black, blue–green/grey–green and brown/brown–green being the most common varieties. Though closely related to flint, it is easily distinguished from this raw material. Where flint has a vitreous lustre, chert has a more waxy lustre, like chalcedony (Pellant 1992). Though banding does occur, most of the Glentagart chert is plain or speckled, blue–green, radiolarian chert. With its red colour, crested flake CAT 635 may be a red chert, or it may be jasper (red chalcedony).

The local chert is riddled with fissures and planes of weakness, which seriously affect the flaking properties of this resource (see Débitage and Technology sections below). A number of chert artefacts have distinctly abraded edges, which may be due to post-depositional action. In connection with the discussion of the lithic finds from Meldon Bridge (Ballin 2000: 82) it was observed that only the chert had abraded edges, whereas the flint had not, and it was suggested that Southern Uplands chert may be considerably softer than other lithic raw materials.

The cherts of southern Scotland were procured from primary as well as derived sources (Saville 1994: 59): at Meldon Bridge in Peeblesshire, chert was most likely procured from the local boulder clay (Ballin 2000: 82), but in later years several quarry sites have been reported (brief entries by M. Clifford, T. Cowie, B. Finlayson, R.D. Knox, J.C. McKean, and A. Teale [Discovery & Excavation in Scotland 1989: 8]). Approximately one-quarter of the present assemblage (excluding micro-chips) is corticated, and the dominating fresh (powdery) cortex suggests that most of this material was acquired from primary sources (in the present paper cortex is defined as the unaltered outer surface of, for example, flint and chert. The cortex may be fresh and powdery (as on nodules quarried from chalk), or it may be abraded (as on beach pebbles). A piece with any form of cortex is referred to as corticated). A small number of pieces with abraded cortex indicate replenishment from pebble sources. At Glentagart,

assessment of cortication was complicated by the fact that many surfaces associated with the above-mentioned planes of weakness are coated, and they may (incorrectly) be perceived as corticated.

The small number of primary pieces (three), combined with the character of the cortex, suggests that partial decortication took place at a quarry some distance from Glentagart. Samples of raw rock with similar fresh cortication were collected from areas around the archaeological site, but they were all identified as forms of mainly igneous rock. No pieces were identified as fire-crazed, but the authors' experiments with burning of natural chert resulted in crackling and disintegration of the pieces in a manner that could not be distinguished from the naturally fissured local chert. No discolouration was noticed, but it is possible that discolouration of chert takes place some time after burning, and further experiments are recommended.

Débitage

During the excavation at Glentagart, 883 pieces of débitage were retrieved: 64 chips, 354 micro-chips, 302 flakes, 48 blades, 34 microblades, 61 indeterminate pieces, and 19 preparation flakes (crested pieces and platform rejuvenation flakes). The chip ratio of *c.* 10% is extremely low and probably mainly reflects the fact that most of the topsoil, and the re-deposited turf of the horseshoe-shaped structure, was not sieved. As demonstrated in Ballin (1999 & 2003), the chip ratio of sieved assemblages from settlement sites usually varies between *c.* 30% and 55%. The many micro-chips, most of which were found in Area 8, demonstrate that knapping definitely took place at the location.

The débitage (excluding micro-chips) is heavily dominated by flakes (57%), most of which are fairly squat and robust (average dimensions: 19mm x 17mm x 6mm; Figure 3). The blades and microblades, on the other hand, are relatively narrow and thin, but as only *c.* 10% of all blades are intact it is meaningless to calculate the average dimensions of these pieces in the traditional manner (in Ballin (1999) the assemblage from Lundevågen 21 was chosen for testing, and the total blade material and the intact blades (12%) were compared. This examination showed that the intact blades were simpler at all levels. The intact blades were broader and thicker, and they had fewer dorsal ridges, more cortex, more acute angles of percussion, more direct-percussion indicators, and simpler preparation of platform-edge and -surface. Based on these results, it must be assumed that the intact blades were also the shortest. Or in other words: *as the narrower and thinner blades tend to break before the more robust pieces, the average dimensions of intact pieces from a heavily fragmented blade assemblage will present a heavily biased, and coarsened, picture of that assemblage*). The average length of all *surviving* blades is 28mm (varying between 12mm and 44mm), and the average width and thickness of the entire blade assemblage are 9mm and 3mm. With a lamellar index of 16%, the Glentagart assemblage has fewer blades than the 20% recommended as necessary in order to define an assemblage as the product of a specialized blade industry (e.g. Bordes & Gaussen 1970). However, the blades and microblades from this site are regular and parallel-sided, with parallel dorsal arrises, and there is no doubt that these blanks are the products of highly schematized blade production (see Technology section). In this case, the low lamellar index is most likely to be a product of the relatively poor raw material and its high fragmentation rate.

Figure 4 shows the distribution of the widths of all blades and microblades from Glentagart and, in most circumstances, the authors would interpret the presence of two main peaks as an indication of the settlement being a multi-occupation site (based on the measurements and

analysis of numerous Norwegian, Danish and British assemblages; e.g. Ballin 1999 & 2004; also see discussion in this paper's Dating section below).

The blanks were largely detached by the application of hard percussion (mostly flakes), with some blanks having been manufactured in soft percussion (mostly blades and microblades; Table 2). A small number of flakes were made in soft percussion (probably intended, but failed, blades), and a small number of robust blades were made in hard percussion (possibly intended flakes). No bipolar technique was used.

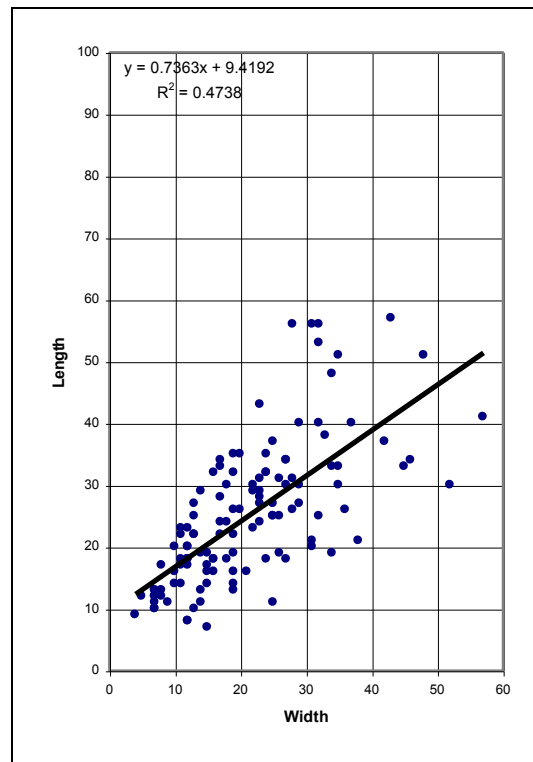


Figure 3: The length (mm): width (mm) of all intact flakes

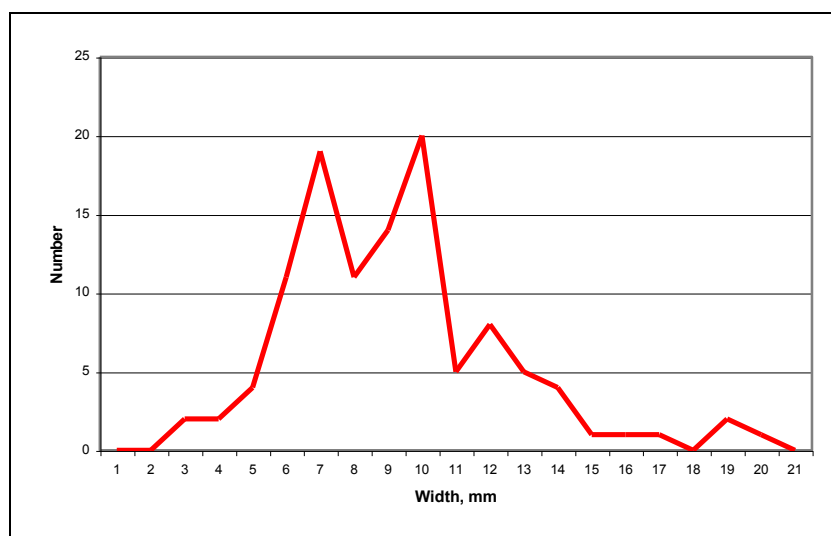


Figure 4: The widths (mm) of all blades and microblades

Evaluation of the percussion techniques was complicated by the fact that the common technological indicators ('bulbs' and 'lips') are less pronounced in this relatively soft raw material, which also explains the relatively large group of blanks detached by the application of indeterminate platform technique (almost a quarter of all flakes and blades). The many blanks (*c.* 10%) with collapsed platform remnants may also be explained by the attributes of the raw material: the collapsing platforms are not so much the results of inherent fissures (which would usually cause the blank to break by forming a step fracture), but the soft and brittle character of the chert. Most pieces suffering from platform collapse are hard-hammer flakes and, in the present case, the likely cause of this feature is the combination of a violent percussion technique and brittle raw material.

	<i>Number</i>	<i>Percent</i>
Soft percussion	30	11.4
Hard percussion	138	52.7
Indeterminate platform technique	59	22.5
Platform collapse	28	10.7
Bipolar technique	0	0.0
Uncertain	7	2.7
Total	262	100.0

Table 2: Applied percussion techniques (intact flakes and blades and proximal flake and blade fragments)

The latter suggestion is supported by the complete lack of bipolar technique in a region where the use of bipolar technique is otherwise prolific. A similar phenomenon was noticed during one of the authors' examination of Norwegian Mesolithic and Neolithic flake and blade populations (Ballin 1999): during the Early Neolithic of SW Norway, rhyolite was the preferred raw material, but bipolar flakes were almost exclusively produced from flint cores whereas rhyolite cores were almost solely worked in platform techniques. Ballin (1999) suggested that this was due to the brittleness of the rhyolite, just as the complete lack of bipolar technique at Glentagart may be due to the brittle nature of Southern Uplands chert.

The 61 indeterminate pieces (average diameter: 29mm x 19mm x 11mm) are closely linked to the chert's inherent fissures and planes of weakness, and the tendency of this raw material to disintegrate during production.

A relatively large number of preparation flakes (unilateral crested pieces and platform rejuvenation flakes) indicate the application of careful core preparation (a unilateral crested flake has had the crest formed by removing small flakes to one side of the crest, whereas a bilateral crested flake has had the crest formed by removing small flakes to either side of the crest (Ballin 1996: 10)). It is frequently meaningful to distinguish between 'true' crested pieces, or guide ridges, and detached platform-edges, which are typically failed platform rejuvenation flakes. However, in the present case the two categories are likely to form one functional group. Most of the 15 crested pieces from Glentagart are probably 'true' crested pieces (Figure 9), in the sense that they were intentionally formed to guide detachment of the first blade of a blade series. However, the relatively numerous detached platform-edges (maybe one-third of all crested pieces) may not have been *formed* as guide ridges, but they most likely *functioned* as such. Practically all detached platform-edges were struck off by a blow precisely at the end of that particular platform-edge, suggesting that the core had been re-orientated and the platform-edge re-functioned (from platform-edge to guide ridge). Five platform rejuvenation flakes (Figure 11) demonstrate how it was frequently attempted to

repair or adjust a platform before it was abandoned and the core re-orientated. Five tools are on crested flakes [CAT 538, 545, 560, 574, 602], and four tools are on platform rejuvenation flakes [CAT 525, 562, 591, 609].

Cores

A total of 48 cores were recovered from the site: two core rough-outs, 17 single-platform cores, three opposed-platform cores, seven cores with two platforms at an angle, and 19 irregular cores. No bipolar cores were found.

Core rough-outs

Two core rough-outs were recovered from Glentagart. They are both fairly small and slender (average diameter: 41mm x 25mm x 19mm), and the resultant cores would have been regular, conical microblade cores (the dimensions (L x W x T) of cores are measured in the following ways: in the case of platform cores, the length is measured from platform to apex, the width is measured perpendicular to the length with the flaking-front oriented towards the analyst, and the thickness is measured from flaking-front to the often unworked/corticated 'back-side' of the core. In the case of bipolar cores, the length is measured from terminal to terminal, the width is measured perpendicular to the length with one of the two flaking-fronts oriented towards the analyst, and the thickness is measured from flaking-front to flaking-front). One [CAT 649; Figure 9] is in fairly homogeneous chert, whereas the other [CAT 509] is in homogeneous grey chalcedony. The former has a prepared platform with some trimming and, at one point, fine faceting of the platform immediately adjacent to the platform-edge. From platform to apex it has two unilateral, diagonally positioned crests. It appears that an attempt was made to detach one of those, but a short flake was struck off next to the ridge instead of detaching a crested blade and, consequently, the rough-out was abandoned. CAT 509 has a plain platform and one shaped unilateral crest, as well as one natural crest on the opposite side of the pre-form. This piece was probably abandoned due to irregular flaking properties revealed during the creasing process, and no blanks were struck from the rough-out.

Single-platform cores

Though single-platform cores are usually associated with some degree of regularity, the present group of cores is quite heterogeneous. Many of the single-platform cores are relatively large or medium-sized, but smaller cores are present as well (average diameter: 40mm x 40mm x 31mm; GD 30mm–60mm; Figure 5). It is possible to morphologically sub-divide the category, but as most of the sub-types are the artificial results of attempts to get the most out of a flawed resource (for example by continuously re-shaping and repairing the cores), rather than intended shapes, this would be meaningless *per se*. However, some sub-types will be presented below to give the reader an impression of the formal variation, as well as explaining some of this variation.

One meaningful distinction is that of whether a core has a corticated or decorticated platform, with cores of the former group [CAT 529, 594] being amongst the most irregular single-platform cores. CAT 529 and 594 both have untrimmed platform-edges and they were both abandoned after the production of a number of squat flakes.

Most of the single-platform cores probably started their 'lives' as relatively big cores (such as CAT 536: GD 60mm; Figure 10) to allow an anticipated large number of repairs and adjustments. The reason for the small sizes of rough-outs CAT 509 and 649, apart from their being intended for microblade production, is most likely the fact that the raw material of these two pieces is relatively homogeneous and, in both cases, the knapper may have hoped that it

would be possible to avoid multiple repairs. CAT 536 is intact, and has its original pointed apex.

Soon after production starts, the chert cores begin ‘shrinking’ at a dramatic pace. The main reasons for this are: 1) the inherent fissures and planes of weakness, causing frequent step fractures and detachments (‘snap-offs’) of apexes; and 2) an apparent tendency for Southern Uplands chert to produce seriously plunging flakes and blades, typically removing significant parts of the core apex. As many as eight single-platform cores [CAT 521, 532, 535 (Figure 10), 551 (Figure 11), 598 (Figure 11), 611, 615, 647] have lost their apexes due to planes of weakness, whereas cores CAT 581 and 614 have been affected by plunge fractures. In some cases, the ‘snapping-off’ of apexes resulted in the creation of exceedingly squat cores and, for example, CAT 532 is approximately twice as broad as it is long. The influence of planes-of-weakness on core-shape is demonstrated further by the fact that most of the cores (10) have flat natural ‘back-sides’.

A number of single-platform cores have more idiosyncratic shapes. CAT 588 has its flaking-front at one narrow end and, combined with its marked keel, this defines it as a handle-core. CAT 622 has a very narrow flaking-front at one end (18mm, with length and thickness being 45mm x 43mm), and it probably represents an expedient attempt at producing a small number of long blades and microblades. CAT 581 has an unusually broad flaking-front (width x thickness = 49mm x 17mm, with the length being 42mm), and at one end a bilateral crest was formed to allow continued production along the principles described in connection with CAT 622; however, this crest was never detached.

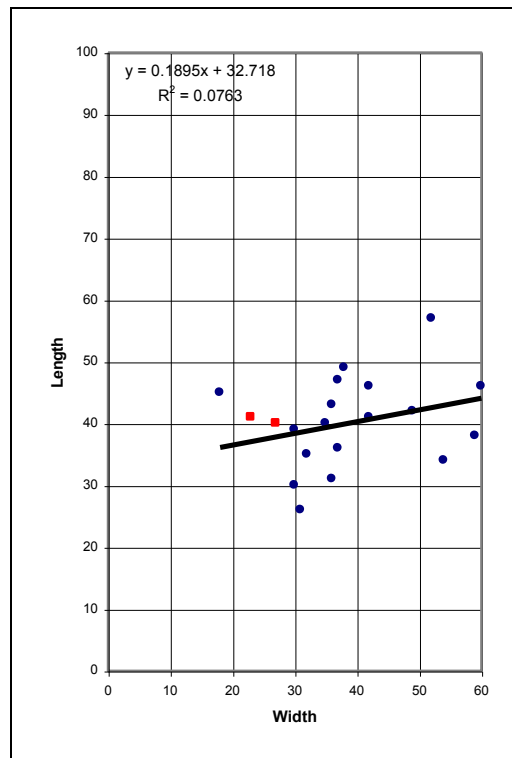


Figure 5: The length (mm): width (mm) of core rough-outs (squares) and single-platform cores (dots)

A large proportion of the single-platform cores have had their platforms or platform-edges carefully prepared. The most regular twelve cores have had parts of their platform-edges trimmed, removing salient points, whereas two cores [CAT 521, 588] have had their

platforms finely faceted immediately behind the platform-edge. Slightly crude faceting was applied to adjust the platforms of CAT 530 and 532.

It is not possible to sub-divide the single-platform cores into blade and flake cores, as frequent and comprehensive repairs would soon transform cores intended for blade or microblade production into flake cores. Surviving individual blade-scars suggest that, most likely, blades or microblades were struck from the majority of these cores, before they were ‘re-assigned’ to flake production, apart from the above-mentioned cores with corticated platforms which may have been intended exclusively for expedient flake production.

Opposed-platform cores

This small, relatively homogeneous group only includes three pieces [CAT 585 (Figure 9), 612, 617], as the favourite choice, when a second platform had to be added, was to transform the core in question into a core with two platforms at an angle (see below). The three cores are of approximately the same size and shape (average diameter: 43mm x 38mm x 29mm) but do represent two different sub-types. In the case of CAT 585, production was continued on the same flaking-front, but from the opposite end of the core, whereas, in the case of CAT 612 and 617, a second flaking-front was added on the face opposite the original flaking-front (the core’s ‘back-side’). CAT 612 and 617 show the same tendency to exaggerated plunging and, as a consequence, the knapper of CAT 617 chose to let the distal end of a series of plunging blade scars form the second platform (Figure 6).

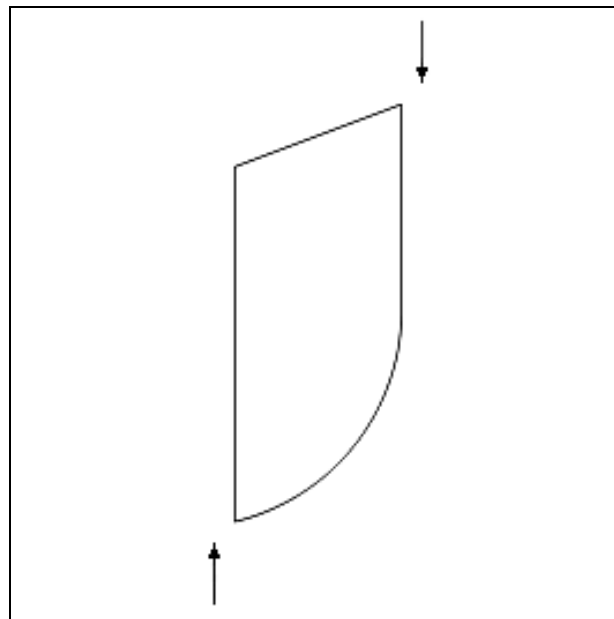


Figure 6: Formation of a secondary platform on the distal end of a series of plunging blade scars [CAT 617]

In all three cases, the secondary platform was abandoned after a few unsuccessful attempts at detaching flakes. Though blades were definitely detached from CAT 585 and 617, only the former has a partially trimmed primary platform-edge. This does not mean that trimming was not applied during the production of these blades — only that no trimmed platform-edges survive (there is no reason to re-trim a platform-edge when it has been decided to discard the core). The main platforms are generally plain, but the primary platform of CAT 585 is partially corticated.

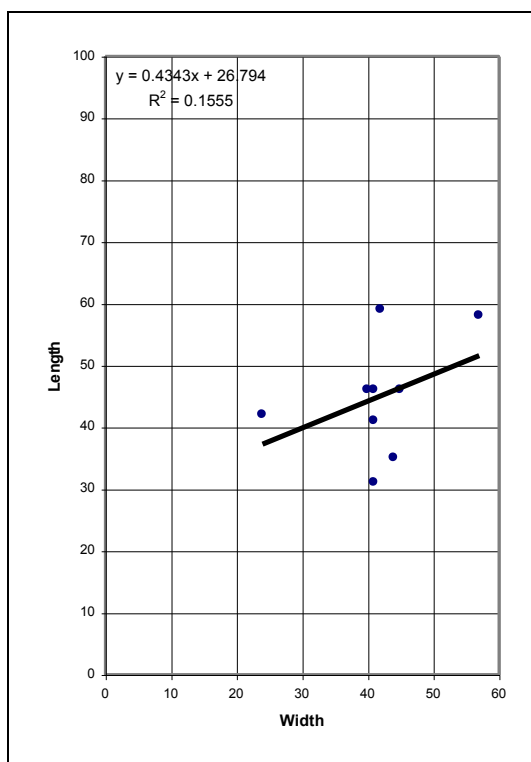


Figure 7: The length (mm): width (mm) of cores with two platforms at an angle

Cores with two platforms at an angle

This category includes seven cores (e.g. Figures 10.531, 10.548, and 11.556) and, due to the principle of forming a secondary platform perpendicularly to the original platform, most of these pieces have acquired an almost cubic shape (average diameter: 45mm x 42mm x 34mm; GD 41mm–59mm; Figure 7). Most of the cores in this group have well-developed secondary platforms. Of the fourteen platforms, 13 are plain and one is faceted. The platform-edges are equally distributed across trimmed and untrimmed forms. As mentioned in the presentation of the numerous crested pieces (see *Débitage* section), it was common practice at Glentagart to use platform-edges as ready-made crests, or guide ridges, when cores were re-orientated. CAT 531 (Figure 10) is a fine example of this tradition, as a blow perpendicular to an original platform-edge detached a short crested piece. Apparently, the intention was to produce a long crested blade, but, due to the application of insufficient force, combined with inherent flaws in the chert, the attempt failed, and the core was subsequently abandoned.

Though it has been possible to identify a small number of blade/microblade scars on these dual-platform cores, most scars are clearly from the detachment of flakes. This demonstrates how it becomes progressively more difficult to produce blade blanks as the cores are repeatedly re-orientated. The re-orientation of the cores makes them shorter and squatter until, in the end, only flakes can be manufactured from them.

Irregular cores

Nineteen irregular cores (e.g. Figures 9.616 and 9.646) were recovered during the excavation, with some being fairly large and some quite small (average diameter: 50mm x 43mm x 32mm; GD 31mm–78mm; Figure 8). It is apparent how the core categories become increasingly irregular with the increasing number of platforms. Where the cores with two platforms at an angle are slightly more irregular than the single-platform cores, the irregular cores (defined by having three or more platforms) include the most irregular specimens.

However, it is possible to subdivide the category into two main classes with one representing almost frantic and unschematic attempts at ‘squeezing’ yet another flake or two out of a disintegrating core [e.g. CAT 587, 608, 620], whereas others are relatively regular cubic cores with three, four or five platform-edges at perpendicular angles to each other. The former are usually associated with a complete lack of core preparation, while the latter cores, or some of their platforms, may have been trimmed. An increasing number of cores have corticated platforms and, though no examples were found of platform-edges having been used as ready-made crests, there are several examples of natural ridges having served in the same manner [e.g. CAT 587].

Tools

In total, 77 tools were recovered from Glentagart: seven microliths or modified microblades, 14 scrapers, four certain or probable burins, one piercer-burin, six truncated pieces, two notched pieces, 41 pieces with retouch, and two pieces of ochre.

The 77 tools correspond to a tool ratio of 12%, which is considerably higher than expected. As demonstrated in Ballin (1999 & 2003), the tool ratio of sieved assemblages rarely exceeds 4%, unless the site is a specialized camp where little or no knapping took place. In the present case, the high tool ratio is most likely the result of inconsistent sieving, in the sense that only the lower parts of Areas 1 and 2, and the entire Area 8 were sieved. Areas 3–7 and B, and the topsoil and re-deposited turf of Areas 1–2, were not sieved, and the loss of many chips from higher levels automatically causes the tool ratio to increase.

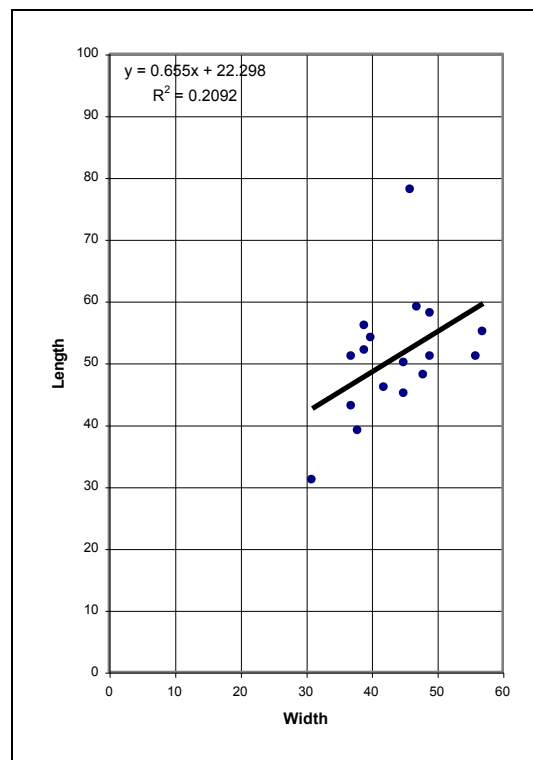


Figure 8: The length (mm): width (mm) of irregular cores

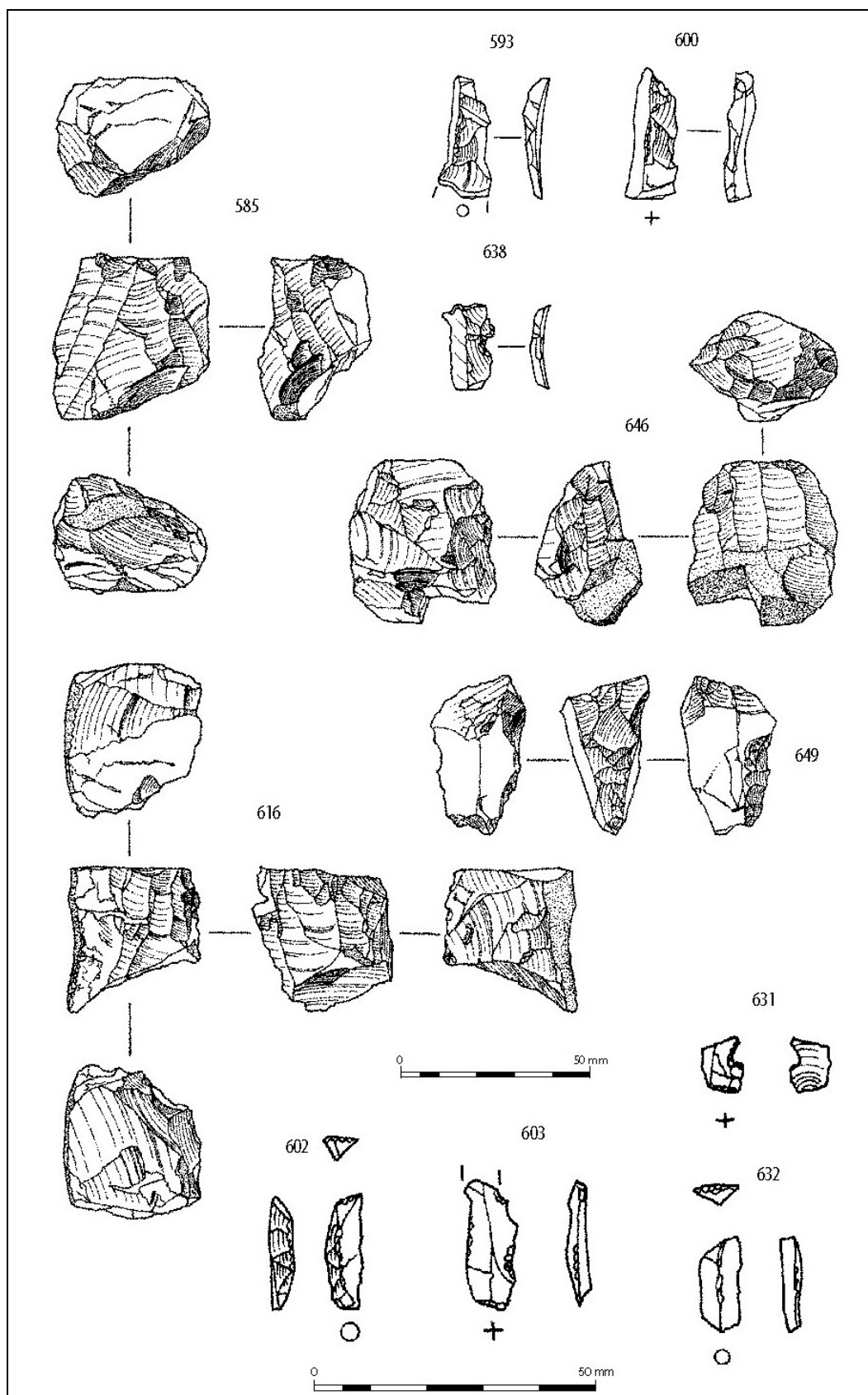


Figure 9: Artefact illustrations: cores and tools. Crested pieces (593, 600); core rough-out (649); opposed-platform core (585); irregular cores (616, 646); scalene triangle (632); truncated microblade (602); edge-trimmed microblade (603); microburin (631).

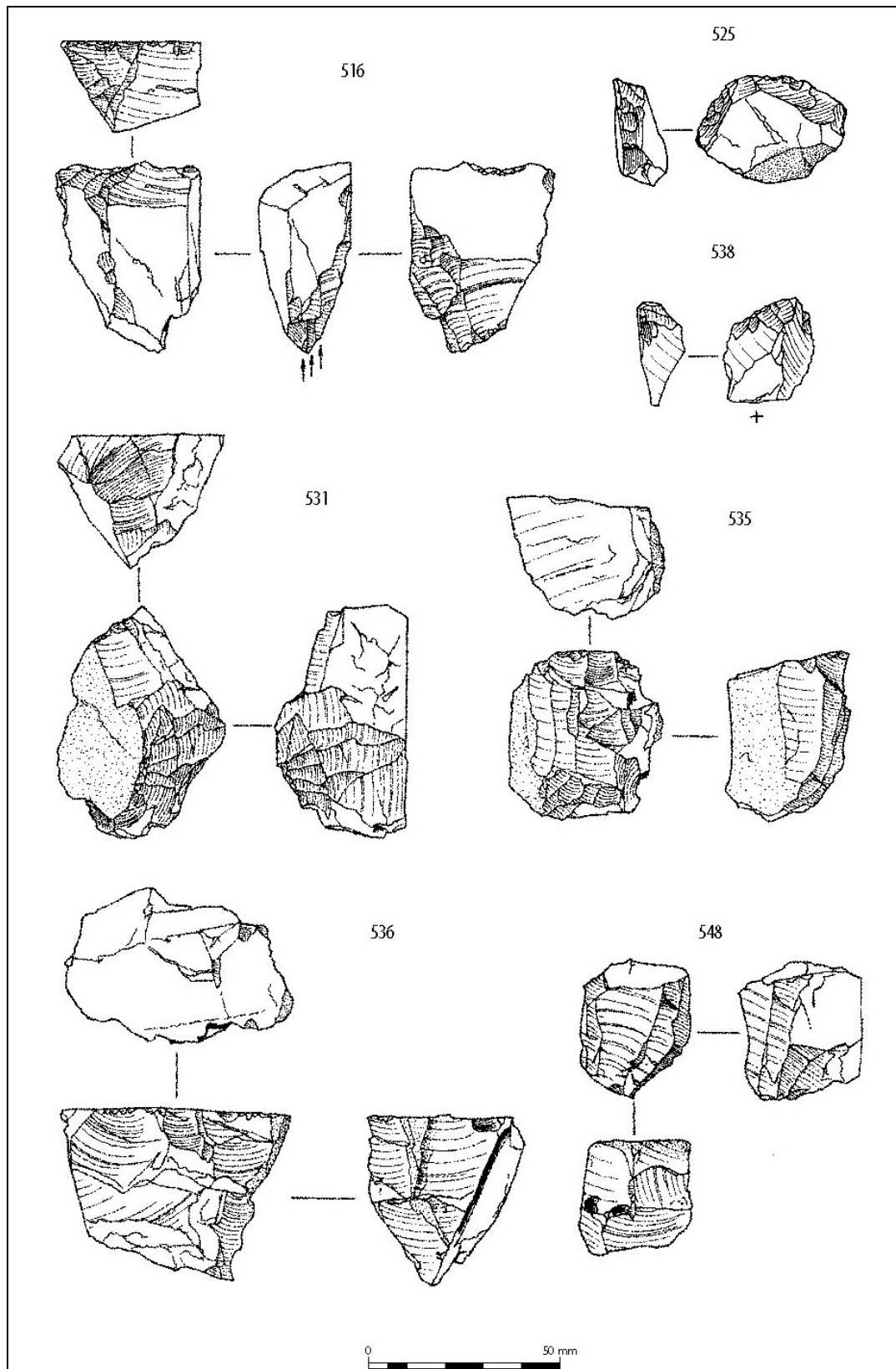


Figure 10: Artefact illustrations: cores and tools. Single-platform cores (535, 536); cores with two platforms at an angle (531, 548); short end-scrapers (525, 538); piercer-burin (516).

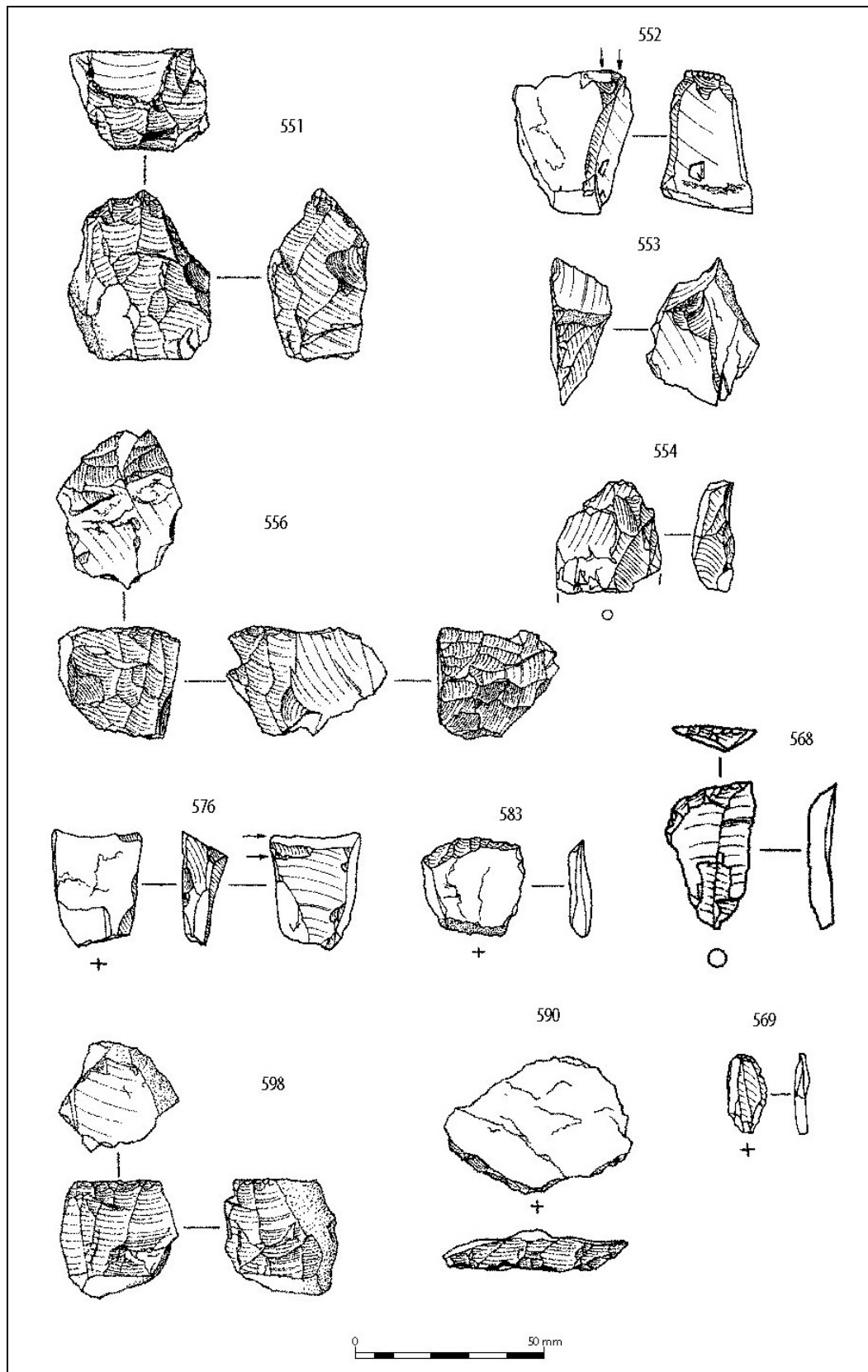


Figure 11: Artefact illustrations: cores and tools. Platform rejuvenation flakes (553, 590); single-platform cores (551, 598); core with two platforms at an angle (556); short end-scrapers (554, 583); blade-scraper (569); burins (552, 576); piece with a curved truncation (568); piece with notch (638).

Microliths and 'microlith-related implements'

In the present paper, microliths are defined as small lithic artefacts manufactured to form part of composite tools, either as points or as edges/barbs, and which conform to a restricted number of well-known forms (e.g. Clark 1933; Jacobi 1978; for an overview, see Butler 2005). Below, microliths *sensu stricto* and edge-trimmed and truncated microblades are treated as a group, as these types are thought to have had the same general function. At Glentagart, seven microliths and 'microlith-related implements' were retrieved, including one scalene triangle, two truncated microblades, three edge-trimmed microblades, and one microburin.

One scalene triangle was found [CAT 632; Figure 9]. This piece is based on a narrow microblade (9mm x 3mm x 2mm), and its distal end has broken off. The scalene form was achieved by the application of microburin technique by which the proximal end of the microlith was removed. Though the intention of breaking a blank in a microburin notch is to create a sharp oblique facet at the proximal end, CAT 632 snapped and left a blunt proximal fracture. The piece has additional sporadic retouch or use-wear of both lateral sides.

Two truncated microblades [CAT 602 (Figure 9), 604] were also recovered from the site. They have approximately identical dimensions (average diameter: 18mm x 7mm x 3mm). CAT 602 is a crested microblade with a collapsed platform remnant, whereas the proximal end of CAT 604 was removed by a snap-fracture. Both truncations are oblique to slightly oblique, and in both cases the retouch is very fine and expedient.

Three edge-trimmed microblades (average diameter: 21mm x 8mm x 3mm), form a relatively homogeneous group. They are all characterized by sporadic retouch of one lateral side, the aim of which was to remove salient points and blunt the edge. CAT 522 is missing its distal end and has sporadic blunting of the central part of the left lateral side; CAT 546 has lost its proximal end and has sporadic blunting of the central and distal parts of the right lateral side; and CAT 603 (Figure 9) has sporadic retouch of the distal and proximal parts of the right lateral side, and some use-wear on the left side.

CAT 631 (Figure 9) is a typical failed microburin (8mm x 7mm x 2mm) with a small notch in the right lateral side, proximal end. The piece broke without forming a proper microburin facet, like the scalene triangle described above.

Scrapers

The 14 scrapers embrace 11 short end-scrapers, one blade-scraper, one side-scraper, and one scraper-edge fragment. The scrapers form a fairly heterogeneous, expedient group of tools.

The 11 short end-scrapers (Figure 12) are quite unsophisticated pieces (30mm x 23mm x 11mm), and little time appears to have been invested in manufacturing these implements. Three end-scrapers [CAT 538, 554, 583 (all Figures 10–11)] have regular convex scraper-edges at their distal ends, and it is thought that CAT 592 may have belonged to this group; its distal working-edge is missing, but a small stretch of regular convex scraper-edge survives at the right corner of the distal break. CAT 642 may also have belonged to this category, but damage to the central part of the distal scraper-edge has given its working-edge a more wavy delineation. Two scrapers [CAT 525 (Figure 10), 526] have oblique convex scraper-edges at the distal ends. The remainder of the short end-scrapers [CAT 537, 547, 565, 623] have simpler scraper-edges shaped by more sporadic retouch [CAT 537, 547, CAT 565, 623].

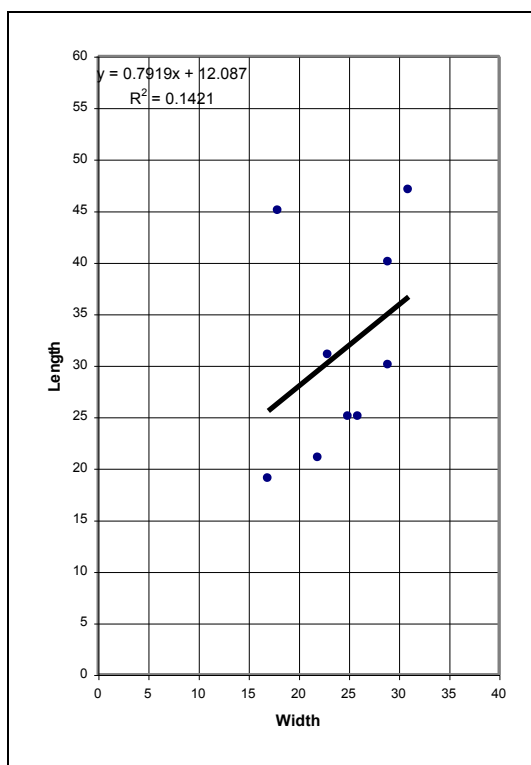


Figure 12: The length (mm): width (mm) of short end-scrapers

Most of the blanks for the short end-scrapers are robust flakes, but one piece was made on a crested flake [CAT 538], two on platform rejuvenation flakes [CAT 525, 537], one on an indeterminate piece [CAT 547], and two on thin flake fragments [CAT 565, 623]. CAT 538, 565, and 623 have some blunting of one or more lateral sides, and CAT 537, 538, 554, 583, and 623 have marked overhangs at the scraper-edges, demonstrating extensive or heavy-duty use. The scraper-edges are typically steep and convex, and where working-edges are less convex or more uneven, this is usually due to wear or damage.

CAT 569 (Figure 11) is a small, short blade-scraper (20mm x 10mm x 3mm) with a regularly convex, steep scraper-edge at the distal end. Slight use-wear along the left lateral side suggests that the piece was used for cutting as well as scraping. CAT 527 is a side-scraper (42mm x 32mm x 23mm) on a core-side flake from a regular single-platform core. A steep, convex scraper-edge has been formed along its entire left lateral side. CAT 639 is a steep convex scraper-edge fragment from an indeterminate piece; it is not certain whether the original scraper was a large end- or side-scraper.

Burins

The assemblage includes four expedient angle-burins, or possible angle-burins [CAT 552 (Figure 11), 576 (Figure 11), 633, 650]. CAT 552 (36mm x 32mm x 23mm) is an indeterminate piece which appears to have had a burin spall detached from one corner. However, the most revealing attribute of the tool is the way this corner has been used for graving, creating a noticeable overhang. The opposite corner has been used as well. CAT 576 (32mm x 24mm x 13mm) is a medial flake fragment which has had two transverse burin spalls removed from the right corner of the proximal break. One spall was detached from the ventral face, and one from the dorsal face, thus creating two strong burin-edges. CAT 633 (21mm x 22mm x 11mm) is a fully corticated flake, the two lateral sides of which have broken off. Both ventral corners display either modification or use-wear from the application

as a burin. CAT 650 (35mm x 33mm x 21mm) is a slightly dubious burin on an indeterminate piece which has had three burin spalls detached from one corner, one secondary spall perpendicular to two initial spalls. An edge adjacent to the potential burin-edge has been blunted.

Piercer-burins

One combined piercer-burin was found at Glentagart [CAT 516; Figure 10]. This implement is relatively large (54mm x 37mm x 25mm). At one corner it has had a strong piercer tip formed by merging two stretches of coarse retouch at an almost right angle. At the opposite end, a strong burin-edge was created by detaching five spalls. It is possible that this burin-edge simply represents the platform-edge of a core, and, depending on one's interpretation, modification next to the potential burin-edge may be defined as either blunting or trimming.

Truncated pieces

Six truncated pieces were recovered from the site. Two pieces with convex truncations are on small crested flakes (average diameter: 31mm x 18mm x 11mm), and they both have expedient convex modifications at their distal ends. It is possible that the distal retouches are 'flimsy' scraper-edges, but CAT 574 has additional use-wear along one lateral edge, suggesting that it may also have been used for cutting. Two pieces with curved truncations differ somewhat. CAT 601 (14mm x 10mm x 3mm) is the medial fragment of a blade which has had the distal corner blunted by expedient retouch. CAT 568 (Figure 9), on the other hand, is an elongated flake (26mm x 16mm x 5mm) with a more well-defined curved blunting of its distal end. Both have use-wear along one lateral edge, indicating use as a knife. CAT 567 (17mm x 12mm x 4mm) is a small flake with an oblique truncation at the distal end; very fine use-wear along its right lateral side suggests that this piece is a diminutive knife. CAT 605 (14mm x 10mm x 3mm) is a fragment of a blade with a straight truncation at the distal end. The retouch of this piece is sporadic, and, though no lateral use-wear is visible, this piece may also be a fragment of a knife.

Pieces with retouched notch(es)

The finds include two notched pieces [CAT 626, 638 (Figure 11)]. CAT 626 is a proximal flake fragment (13mm x 22mm x 7mm) with two small notches (chords *c.* 4mm) in the right lateral side; it broke in the notch furthest towards the distal end. CAT 638 is the medial fragment of a regular blade (22mm x 14mm x 3mm) with a regular notch (chord *c.* 6mm) in the right lateral side, distal end. This piece is most probably a rough-out for a microlith, but the distal end was never detached as intended. Faint use-wear at the distal end, and along the left lateral side, suggest that the discarded piece found other uses.

Pieces with edge-retouch

This tool group comprises 41 pieces. They differ considerably in size (average diameter: 30mm x 22mm x 9mm; GD 7mm–60mm) and shape, with 27 of the 41 pieces being on flakes, nine on blades and microblades, one on a chip and one on a core. Twenty-four pieces with edge-retouch are intact and 17 are fragmented. It is not possible to define any of the pieces more precisely, and, though lateral or terminal use-wear suggests that some retouched pieces were used as either scrapers or knives, it is uncertain which function(s) most of these artefacts served.

Ochre

Two small pieces of ochre (< 10mm) were recovered from the site. In prehistoric times, this material (red or brown iron oxide, or hematite) may have been used as a colouring agent (e.g.

Andersen 1981: 146).

TECHNOLOGY

The following presentation of the probably Early and Later Mesolithic industries of Glentagart and their operational schema(s) (*'chaîne opératoire'*; Leroi-Gourhan 1965; Lemonnier 1976) is founded, largely, on assumptions made in the sections above and below. The discussion of the operational schema(s) is based, mainly, on the approach outlined in the presentation and discussion of the Later Bronze Age assemblage from the Bayanne site on Yell, Shetland (Ballin forthcoming c). Though it is likely that the assemblage is an accumulation of Early and Later Mesolithic material (see Dating section), many approaches and technological choices were probably the same throughout the Mesolithic period, dictated, as they were, by the constraints of a flawed but abundant raw material — chert. For a characterisation of Southern Uplands chert, and a discussion of its procurement, see the Raw Material section (above).

Core preparation and rejuvenation

At Glentagart, cores were prepared and rejuvenated quite vigorously, as demonstrated by 15 crested pieces and five platform rejuvenation flakes. To an extent, the careful core preparation and rejuvenation reflects the poor flaking properties, or flaws, of the raw material, and it is likely that this continuous adjustment of the cores limited the (already too high) discard rate somewhat. These processes may be sub-divided into five different forms of core preparation or adjustment, namely 1) 'quartering', 2) partial decortication, 3) crestring, 4) platform formation/rejuvenation, and 5) trimming, with decortication and crestring forming complementary parts of one course of action.

The fact that most of the single-platform cores have flat 'back-sides' (with 'back-side' being defined as the face opposite the flaking front) suggests that, as a first step, large blocks of chert were 'quartered' to produce handy core-sizes. Cresting may take two forms, that is, the production of either unilateral or bilateral crests or guide ridges, where small corticated flakes are removed to either one or both sides of the crest. At Glentagart, only unilateral crests were produced, and the initial core preparation (the production of a core rough-out) typically included the production of two diagonally positioned guide ridges, and the formation of one, mostly plain, platform.

Two such core rough-outs were recovered during the excavation, one in chert [CAT 649] and one in chalcedony [CAT 509]. Generally, the platform-edges would be trimmed before commencing flake or blade production, as in the case of core rough-out CAT 649. Between the various flake or blade series, the platform would be rejuvenated by detaching a complete or partial core tablet, and the platform-edge would be trimmed anew to remove irregularities and salient points ('smoothing-out'). In a small number of cases, fine faceting of the platform took place, most likely to either level out the platform immediately next to the platform-edge or 'roughen-up' the platform to prevent a punch or pressure-flaker from slipping. The various elements of core preparation and rejuvenation are described in Figure 14.

Apart from the two small core rough-outs for conical microblade cores, the majority of the site's flake and blade cores began their existence as large cores, most probably to allow for multiple repairs and adjustments. As a consequence of the raw material's inherent weaknesses, proximal step fractures were common and apices were frequently detached as a result of snapping (due to fissures and planes of weaknesses) or exaggerated plunging.

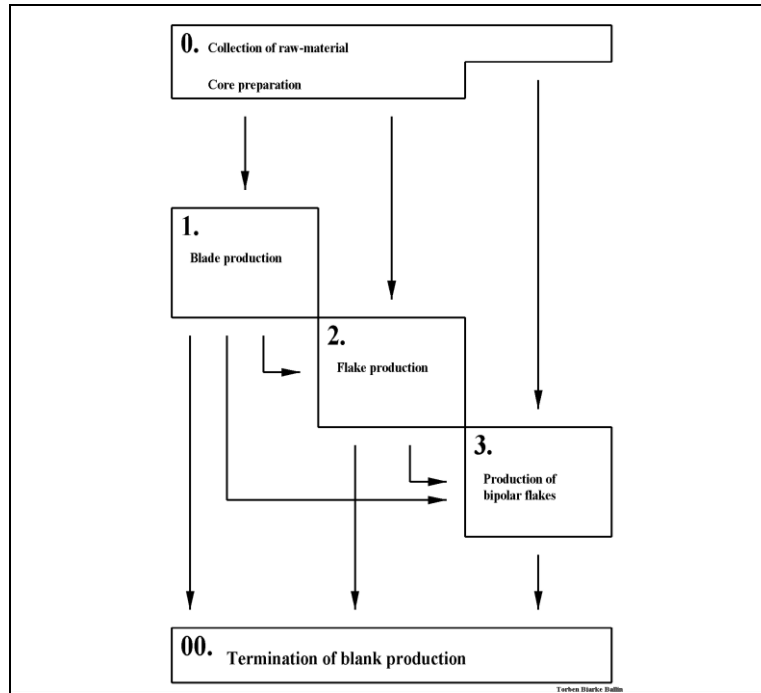


Figure 13: The modules and sequences of most operational schemas. For detailed explanation and discussion, see Ballin (forthcoming c).

Blank (primary) production

As described in Figures 13–14, the blank production of a blade industry would usually be a staged process, starting with the manufacture of blades or microblades. Then, as the cores are continuously growing smaller and more irregular it may become necessary to redefine the cores by converting them to lower-rank blank production. Usually, this conversion process follows a set sequence, with blade cores being transformed into platform flake cores, and, at the end of the sequence, platform flake cores are transformed into bipolar cores.

At Glentagart, blank production only included two modules, namely blade production and the production of platform flakes. No bipolar flakes were manufactured. As discussed in the Débitage section, this is most likely a result of the raw material's soft, brittle and flawed character, as the application of the violent 'hammer-and-anvil' approach might cause the parent core to disintegrate. This material weakness is also demonstrated by the frequent examples of collapsed platform remnants.

Though blades and microblades only make up 16% of the débitage, the assemblage is most certainly the product of one or more specialized blade industries: the 82 blades and microblades are generally long, narrow and thin, with parallel lateral edges and dorsal ridges. To allow the manufacture of these elegant, delicate blanks it was necessary to adhere to a strict operational schema, and the relatively low proportion of blades is most likely the result of the raw material's high fragmentation rate, producing much waste per intact blade blank.

As argued in the dating section, the Glentagart lithics may be the products of two Mesolithic industries, one aiming at the manufacture of microblades with an average width of *c.* 7mm, and one aiming at the manufacture of blades with an average width of *c.* 10mm. Following the traditional dating of narrow/broad blade industries, this suggests that the Glentagart chert artefacts were deposited during the Early and Late Mesolithic periods, respectively. This is

supported by Figure 5, which shows that microblades were most probably produced from slender conical cores (at the rough-out stage much smaller than the exhausted single-platform cores), whereas blades were produced from much larger and more squat single-platform cores.

	REDUCTION STAGES (processual elements A-E)	CORE TYPES	BLANK TYPES	REFUSE TYPES
0.	A. Collection of raw-material	Nodule		Unsatisfactory nodules
	B. Core preparation	Core rough-out		Unsatisfactory core rough-outs Decortication flakes Chips, flakes, chunks
1.	C. 1. blade series	Blade core (e.g. conical core, handle-core or cylindrical core)	One primary crested blade Several secondary crested blades Blades and/or microblades	Unsatisfactory blades Blade fragments Chips
	D. 1. core rejuvenation			Platform- and core-edge flakes Core-side flakes, chunks Chips
	C. 2., 3., etc. blade series	Blade core	Blades and/or microblades	Unsatisfactory blades Blade fragments Chips
	E. Termination of blade production			Exhausted blade core
2.	C. 1. flake series	Flake core (e.g. platform core, irregular core, or discoid core)	Flakes	Unsatisfactory flakes Flake fragments Chips
	D. 1. core rejuvenation			Platform- and core-edge flakes Core-side flakes, chunks Chips
	C. 2., 3., etc. flake series	Flake core	Flakes	Unsatisfactory flakes Flake fragments Chips
	E. Termination of flake production			Exhausted flake core
3.	C. Production of bipolar flakes	Bipolar core	Bipolar flakes	Unsatisfactory bipolar flakes Fragments of bipolar flakes Chips
	E. Termination of bipolar production			Exhausted bipolar core

Figure 14: Complete operational schema ('master schema'). For detailed explanation and discussion, see Ballin (forthcoming c). The numbers in the left column refer to the modules of Figure 13.

Examination of the blades' and microblades' platform remnants, particularly the bulbar area, suggests that the attributes of the traditional percussion techniques (bulbs and lips) are less well-developed when chert is used as a raw material. This may be due to the relative softness of this material, absorbing much of the applied force. Though the determination of percussion techniques is less straightforward in the case of chert assemblages, there is no doubt that the Glentagart microblades, and most of the blades, were detached using soft percussion. A small number of, mostly robust and possibly unintentional, blades were detached by the application of hard percussion.

If a series of unfortunate terminations (e.g. hinge, step or plunging terminations) disallowed continued blade production, the single-platform core would be reduced further by detaching ordinary short flakes. For this, direct hard percussion was employed, as demonstrated by the flakes' pronounced bulbs of percussion, and the deep negative bulbs below some cores' platform-edges. When it was not possible to adjust the single-platform core to allow further uni-directional flake production, it would be converted into a core of lower rank, which in the present case means a core with two platforms at an angle. The reason for preferring this type of dual-platform core to, for example, opposed-platform cores may be that this choice allowed

old platform-edges to be re-used as ready-made guide-ridges when the core was re-orientated. Several detached crests are actually old platform-edges [e.g. CAT 651, 653], and in one case a core has had its platform-edge detached in an (unsuccessful) attempt to define a new platform and flaking direction [CAT 531]. Finally, the core with two platforms at an angle would be re-orientated to produce an irregular core. As mentioned above, bipolar technique was not applied at Glentagart to totally exhaust the abandoned platform cores.

Tool (secondary) production

All tools from Glentagart are edge-retouched tools and, though ‘the absence of evidence is not evidence of absence’, the complete lack of tools modified by invasive retouch supports the notion of this assemblage as belonging to a Mesolithic stone-working tradition.

VERTICAL AND HORIZONTAL DISTRIBUTION

Vertical distribution (stratigraphy)

During the excavation, the finds were referred to a number of layers which may be summarised as:

- Topsoil and re-deposited turf (turf/topsoil, upper fill, turf mound, turf bank, and mixed mound fill)
- Undisturbed subsoil
- Unstratified finds (all of Areas 3, 4 and B, spoil heap finds, and finds from damaged or unreadable bags)

A number of areas were gridded and sampled/sieved, including the lower levels of Areas 1 and 2, and all levels of Area 8.

Though each level or area only includes a relatively small number of intact or fragmented blades/microblades (*c.* 10–40), thus limiting the statistical validity of the inference, the vertical distribution of the blades and microblades does lend some support to the dating suggested in the following section. Macroblades make up 60% of the total blade assemblage and microblades 40%. Finds from higher levels and gridded areas, as well as unstratified finds, do not differ significantly from these proportions, with macroblades making up between 54% and 59%. From subsoil levels, however, only macroblades were recovered. On this background, the proposal of the assemblage being a mixture of Early Mesolithic finds (lower levels/macroblades) and Later Mesolithic finds (higher, now re-deposited levels/narrower blades) seems reasonable.

Horizontal distribution

The size and shape of the excavation area (Figure 15) was originally defined by the size and shape of the horseshoe-shaped structure which covered most of Areas 1–7. The centre of the horseshoe-shaped structure, as well as its central pit, is located exactly where the main north/south-going baulk crosses the main east/west-going baulk. Neither the structure nor the pit have been inserted in Figure 15 as neither is of any relevance to the interpretation of the chert assemblage (see the Context of Discovery section).

The central trench was later extended, as the find distribution indicated that the settled area might continue towards the west (Area B) and north-west (Area 8). As the areas were not gridded consistently, it was not possible to produce a contour map of the lithic finds, clearly

indicating centre and periphery of the settled area. Instead, Tables 3–4 were produced in an attempt to get a more generalized impression of the finds distribution and the settled area.

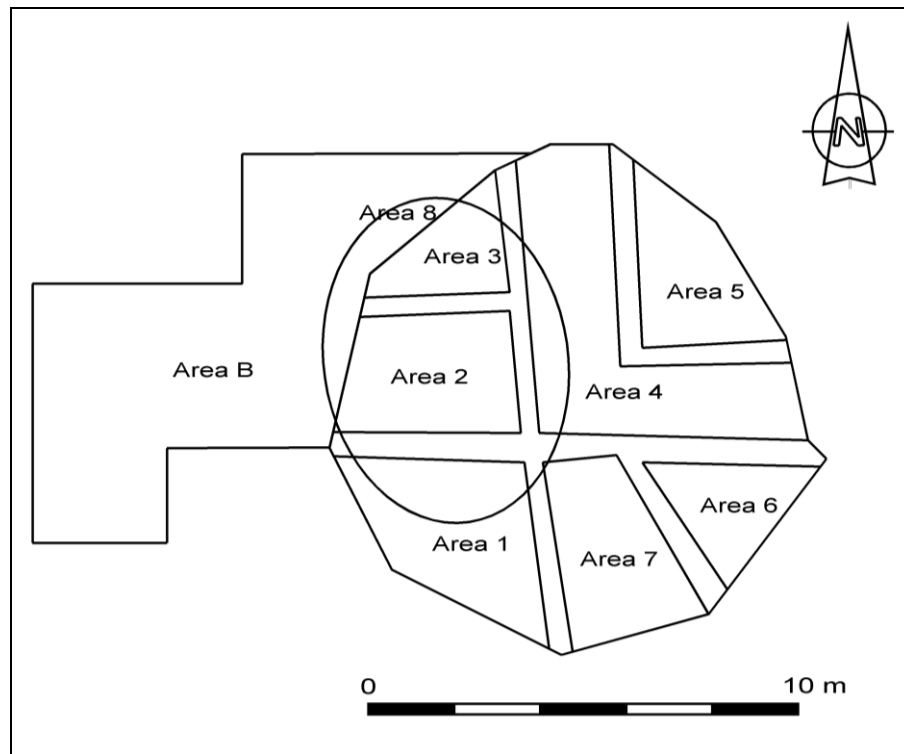


Figure 15: Glentagart Site 66. The oval indicates the assumed settlement area. The size and shape of this area is subjective and based on the find frequencies of the individual areas (cf. Table 4).

Area	1	2	3	4	5	6	7	8	B
Square metres	13.6	11.2	5.6	21.5	9.1	6.2	10.8	9.0	35.9

Table 3: The individual sizes of the nine areas (Areas 1–8, and B). The sizes were calculated in FastCAD v7.12.

Table 3 shows the different sizes of the nine areas, or sub-trenches. The extents of these areas were then used to calculate the general artefact frequency of each area, as well as the local frequencies of the débitage, core and tool categories (Table 4, right-hand section). The size and shape of the oval figure in Figure 15 (the settled area) is based on the information presented in Table 4.

The table's left-hand section shows that there are very few lithic finds in Areas 5, 6, 7 and B (c. 10–30 per area), many in Areas 2, 3 and 8 (c. 100–200 per area), and an intermediate number of lithic finds in Areas 1 and 4 (c. 70 per area). Though the trends of the two parts of Table 4 differ somewhat (absolute and relative numbers), the general distribution trends are the same in the table's left- and right-hand sections: the table's right-hand section confirms that Areas 2, 3 and 8 represent the core of the settled area, as these three sub-trenches have frequencies of c. 10–20 artefacts per m², whereas all other areas have frequencies below 5 artefacts per m².

In the discussion of site organisation and site activities, Table 4 (artefact frequencies) should be used in conjunction with Table 5 (artefact category ratios). As some of the sample sizes are

relatively small, some trends may be due to random statistical fluctuations.

	<i>Artefacts per area</i>										<i>Artefacts per m²</i>									
Area	1	2	3	4	5	6	7	8	B	1	2	3	4	5	6	7	8	B		
Débitage (excluding micro-chips)	57	63	90	62	10	6	15	183	15	4.2	5.6	16.1	2.9	1.1	1.0	1.4	20.3	0.4		
Cores	4	11	5	2	2	2	3	4	5	0.3	1.0	0.9	0.1	0.2	0.3	0.3	0.1	0.1		
Tools	6	24	13	3	3	0	4	8	7	0.5	2.1	2.3	0.1	0.3	0.0	0.4	0.9	0.2		
Total	67	98	108	67	15	8	22	195	27	4.9	8.8	19.3	3.1	1.7	1.3	2.0	21.7	0.8		

Table 4: Artefacts per area (left) and per square metre (right)

	<i>Numbers</i>										<i>Percent</i>									
Area	1	2	3	4	5	6	7	8	B	1	2	3	4	5	6	7	8	B		
Débitage (excluding micro-chips)	57	63	90	62	10	6	15	183	15	85	64	83	93	67	75	68	94	55		
Cores	4	11	5	2	2	2	3	4	5	6	11	5	3	13	25	14	2	19		
Tools	6	24	13	3	3	0	4	8	7	9	25	12	4	20	0	18	4	26		
Total	67	98	108	67	15	8	22	195	27	100	100	100	100	100	100	100	100	100		

Table 5: Artefacts per area (left) and débitage, core and tool ratios per area (right).

However, examination of Tables 4 and 5 does provide some general tendencies (the following suggestions are based on the approach presented in Ballin forthcoming b):

- With their higher find frequencies, Areas 2, 3 and 8 clearly represent the settled area (‘the settlement’) (Table 4). If the oval figure of Figure 15 is accepted as an adequate approximation of the prehistoric site, this settlement had an area of roughly 34m².
- Neighbouring areas 3 and 8 have markedly higher débitage frequencies (16.1 and 20.3 pieces per m²) than other areas (none higher than 5.6 pieces per m²), suggesting that most of the site’s primary production took place in these two north-westerly areas (Table 4). This is supported by the distribution of micro-chips, where Area 8 yielded 279 micro-chips against 20–28 micro-chips per area for the only other sampled areas, Areas 1 and 2 (Table 1).
- Areas 2, 5, 6, 7 and B have high core ratios (11–25% against the other areas’ 2–6%) (Table 5), indicating that these areas may represent a toss zone surrounding the central knapping floor(s) (Binford 1983; also Ballin forthcoming b).
- Areas 2, 3, 5 and 7 have higher than average tool ratios (12–25% against the other areas’ 0–9%), but only Areas 2 and 3 combine high tool ratios with high absolute numbers of tools (Table 5). One plausible interpretation of this fact may be that Area 2 (where, apparently, no primary knapping took place; see above) was the main tool using area, whereas Area 3 (characterised by intensive knapping), or part of it, may have been the centre for tool production. The fact that most microlithic pieces (*sensu stricto* and *sensu lato*) were found either in Area 2 or the adjacent parts of Area B indicate that some tool production took place outside Area 3. Several microlithic pieces have use-wear and may have been discarded in Area 2 as part of retooling (Keeley 1982).
- Unfortunately, no chert artefacts were defined as burnt (see the discussion in the Raw Material section), preventing certain location of the site’s main hearth(s). However, with most primary production taking place in Area 3/8 and retooling in Area 2 the likely position of a hearth would be approximately under the baulk between Areas 2 and 3, as

most primary production and retooling took place in the vicinity of fireplaces.

The fact that most tool categories are dominated by used implements (most scrapers, for example, have prominent overhangs at their working-ends from wear of the scraper-edges) shows that the site was the focus of not only primary and secondary production but also tool use.

As mentioned in the Dating section, the presence of narrow and broad blades suggests more than one visit to the site (the diagrams of Figure 17 have two peaks, one at width 6–7 mm and one at width 9–10 mm), both probably during the Mesolithic period (one Early and one Late Mesolithic). The fact that the relatively small Area 8 (the only area with enough blades and microblades to provide a statistically reliable picture) have roughly the same size distribution of blades as the entire site suggests that the two visits to the site probably had their production centres in approximately the same place (somewhere in the combined Area 3/8), with activity areas immediately to the south (mainly Area 2).

The site lay on a relatively level plateau which measured *c.* 75 by 75 metres (Mitchell 2001), and the almost complete overlap of remains from the two visits to the location may be a result of the plateau's micro-topography and surroundings, with this exact setting possibly providing the most favourable local combination of, among other things, shelter, defensibility, drinking water, and access to lithic raw materials, firewood and hunting grounds.

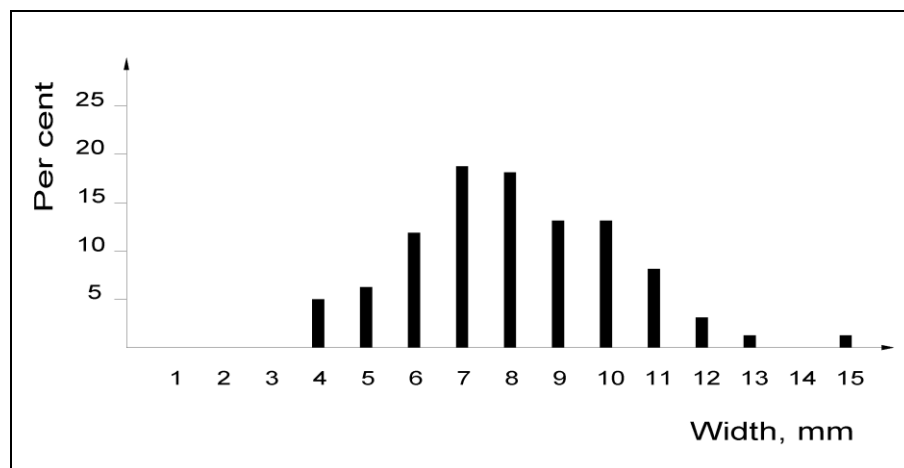


Figure 16: The widths of blades from the chronologically 'clean' site Lundevågen 17, SW Norway (Ballin & Lass Jensen 1995: 42)

DATING

The assemblage includes very few diagnostic elements but, during the examination of the lithic finds, a number of types and technological attributes were identified as being chronologically significant. The most diagnostic pieces are: one scalene triangle (probably produced by the application of microburin technique) [CAT 632], one microburin [CAT 631], and one probable microlith pre-form (notched piece) [CAT 638]. These artefacts are all datable to the Mesolithic period, and the fact that the geometric microlith and the microburin are narrow (in both cases, $W = 7\text{mm}$) indicate a relatively late date. CAT 638 has a width of 14mm, suggesting an Early Mesolithic date.

Generally, only microliths of the forms discussed by, for example, Clark (1933) or Jacobi

(1978) are certain to be Mesolithic, whereas the pieces referred to above as ‘microlith-related’ (that is, pieces assumed to have had the same function as microliths, but which are not included in the schemes of Clark and Jacobi) *may* be Mesolithic. The latter category includes the collection’s two truncated microblades [CAT 602, 604] and three edge-trimmed microblades [CAT 522, 546, 603]. Burins [CAT 552, 576, 633, 650] are usually also perceived as being Mesolithic (cf. discussion in Ballin forthcoming a).

As demonstrated in Ballin & Lass Jensen (1995), the widths of most chronologically unmixed blade assemblages form an approximately bell-shaped curve (Figure 16). When this is not the case (i.e. the curve has more than one peak), the cause is usually that the assemblage is the product of multiple occupations at the site, in most cases creating a trough in the central part of the curve. To test whether the chert assemblage from Glentagart is likely to be the product of one or multiple occupations at the site, the two diagrams of Figure 17 were produced.

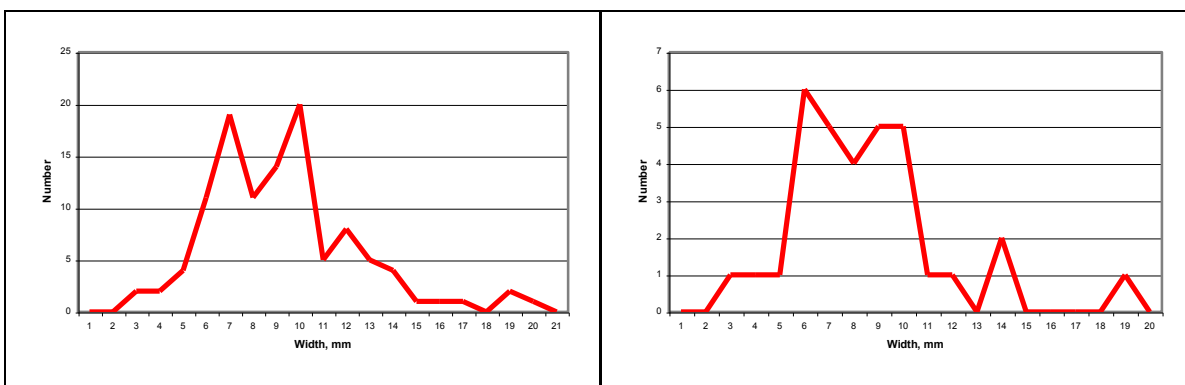


Figure 17: The widths of blades and microblades from (left) the entire site, and (right) Area 8

These illustrations suggest that the assemblage may be an accumulation of finds from two different periods, or from phases of the same period, and the fact that the width distribution of the entire site and Area 8 (the only area with enough blades and microblades to allow production of a diagram like this) are almost identical, indicate that the later of the two overlapping sites may have been placed almost exactly on top of the earlier settlement. If this was not the case (that is, if the narrow-blade assemblage had been centred on one area and the broad-blade assemblage on another), one would have expected that Area 8 would have been dominated by either narrow or broad blades, rather than completely reflect the width distribution of the entire site.

The vertical distribution of the blades supports this interpretation, as only macroblades were recovered from the lowest, undisturbed levels, whereas a mixture of broad and narrow blades were recovered from the higher, generally re-deposited levels. The fact that the broader blades appear to predate the narrower blades, lends probability to the suggestion of the broad blades being Early Mesolithic rather than Early Neolithic.

The two rough-outs for conical microblade cores [CAT 509, 649] most probably belong to the narrow-blade assemblage and, as suggested by the scalene triangle and the narrow microburin, they may be of a Late Mesolithic date. It is not possible, with any degree of certainty, to assign the remaining pieces of débitage, cores and tools to one or the other of the two sub-assemblages. Though ‘absence of evidence is not evidence of absence’, the complete lack of invasively retouched pieces, and other obviously Neolithic types (e.g. serrated pieces) does lend some credence to the proposed Mesolithic dates. The fact that the site’s two sub-

assemblages are both products of blade/microblade industries rules out the possibility of dates later than the earliest part of the Late Neolithic (cf. Pitts & Jacobi 1979).

FUTURE PERSPECTIVES

The discussion of the Glentagart chert assemblage presents a number of opportunities for further research, the most important of which are: 1) to compare the collection with other Scottish chert assemblages to test whether the above typo-technological composition, and operational schema, are representative of the region's chert industry(ies); 2) to compare the proposed characteristics of the Scottish chert industry(ies) with those of the Scottish flint and quartz industries; and 3) to compare the present chert assemblage from inland southern Scotland with flint and mixed flint/chert assemblages from coastal southern Scotland to allow discussion of the procurement strategies of this region in prehistoric times.

The examination and comparison of assemblages in different raw materials is a potentially fruitful manner of investigating prehistoric territorial structures, as the access to and exchange of raw material may allow a region to be defined as either a techno-complex or a social territory (cf. Ballin forthcoming d). In southern Scotland, comparison of assemblages based on flint (local, Antrim and Yorkshire flint), chert, and Arran pitchstone may illuminate these topics. A pitchstone project is presently ongoing (Ballin 2006), and it is hoped that funding may be secured for the examination, cataloguing, and analysis of Biggar Museum's (South Lanarkshire) holdings of flint, chert, and pitchstone assemblages.

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The full project archive will be deposited with the National Monuments Record of Scotland. Finds disposal will be allocated through Treasure Trove procedures.

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