

A microlithic industry from Woodbridge Road, Guildford

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Archaeological excavations at Woodbridge Road in Guildford produced a substantial assemblage of Mesolithic flintwork associated with a number of pits or tree-throw hollows. The lithic assemblage was dominated by Later Mesolithic microlithic forms and a complementary date for the deposition of artefact-bearing sands was obtained by Optically Stimulated Luminescence (OSL) dating. In addition to microliths, the lithic assemblage contained significant numbers of micro-burins, indicating the on-site manufacture of microliths, and substantial quantities of burnt flint were also recovered. The almost total dominance of microliths to the exclusion of other retouched types strongly suggests that the activities conducted here were remarkably specialised.

Also recovered were small assemblages of later prehistoric, Romano-British, medieval and post-medieval pottery, which attests to continued but low-level interest in this riverside location. This report describes the stratigraphic and artefactual evidence associated with the Mesolithic occupation at the site and discusses these within the broader framework of such activity in the region.

Introduction

Archaeological investigations were conducted at the former Seeboard depot at Woodbridge Road in Guildford (centred SU 9933 5052; fig 1). The development area was *c* 220m east–west x *c* 130m north–south. The work was conducted according to national, county and local planning policies, which required an archaeological appraisal prior to the redevelopment of the site. Accordingly, the clients, Fairview New Homes Ltd, on advice from CgMs Consulting, commissioned an archaeological desk-based assessment which recommended that an Archaeological Field Evaluation be undertaken to assess any surviving archaeological remains threatened by the proposed development (Hawkins 2002; 2003).

The field evaluation comprised the excavation of thirteen trenches (fig 2), which demonstrated that across most of the site any potential archaeological deposits had been destroyed by recent landscaping and other works. In the north-western sector of the site, however, remnants of flood plain deposits containing significant quantities of struck flint and burnt stone had survived, bounded by areas of severe truncation. Consequently, an open area archaeological excavation was conducted in this part of the site to examine the nature of these remains. This involved enlarging evaluation trench 3 and incorporating evaluation trench 2 into the excavation strategy. In total, the excavation strategy involved the spatially controlled excavation and total sieving of *c* 150m² of the artefact-bearing deposits. A concurrent programme of geoarchaeological and geochronological sampling was also undertaken.

A NOTE ON DATING

Dating of artefact-bearing deposits as presented in this report was obtained from Optically Stimulated Luminescence (OSL), which produces ‘true’ or calendar year dates before present (BP). In order to allow comparison, uncalibrated radiocarbon dates as quoted in other publications have been adjusted to reflect approximate calendar years.

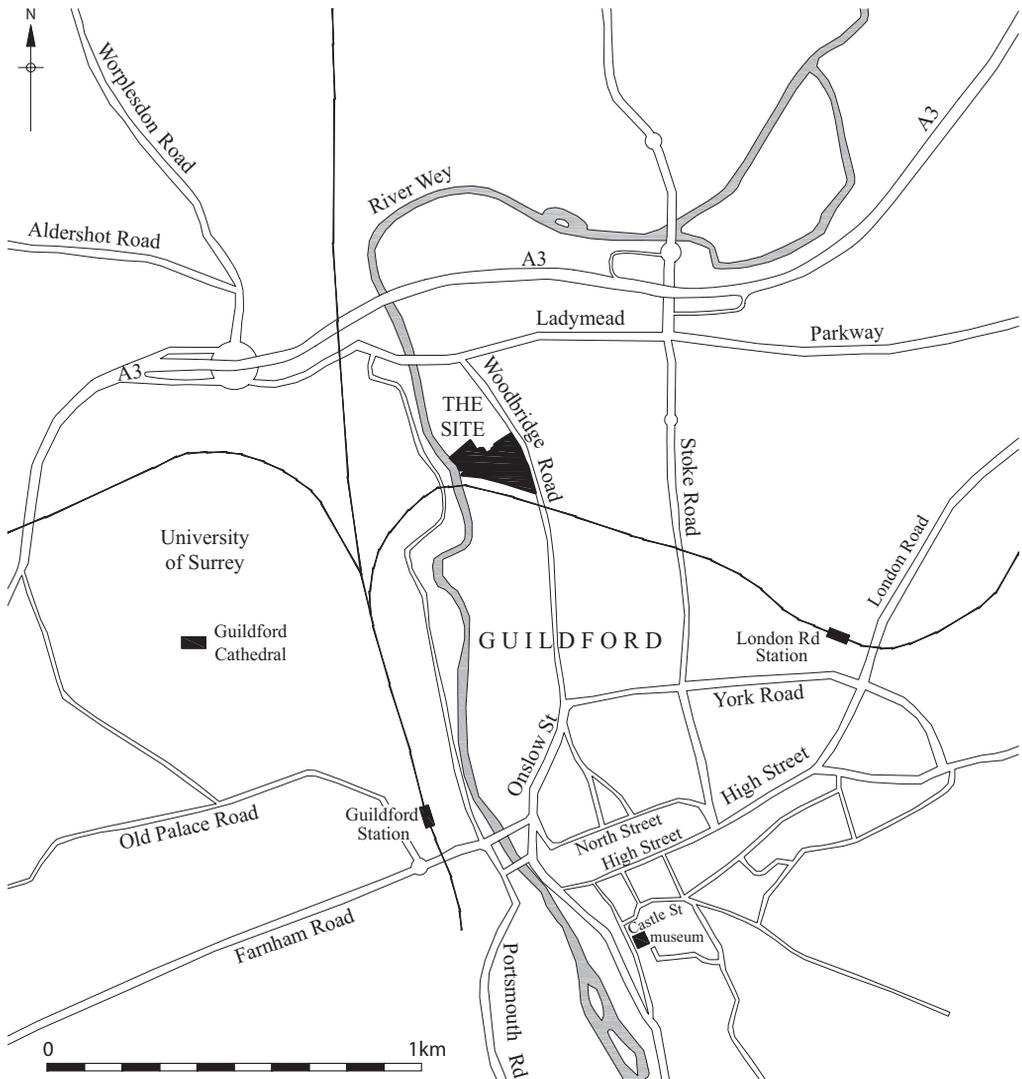


Fig 1 Woodbridge Road, Guildford. Site location. (© Crown copyright Ordnance Survey. All rights reserved)

SITE LOCATION

The site lies on the broadly level alluvial flood plain of the river Wey, abutting its eastern bank. It is located to the north of the centre of the historic town of Guildford, which is situated within a narrow gap in the North Downs created through erosion by the northwards-flowing Wey. The Cretaceous chalk uplands of the North Downs rise to the east and west where they open up and become more extensive. To the north of Guildford lies the Thames Basin, characterised principally by Palaeogene London Clay and the Barton, Bracklesham and Bagshot Beds. To the south lies the Weald, characterised by deposits varying from clays to sandstones laid down during the Lower Cretaceous period. Both these areas contain extensive tracts of alluvium, principally located around the river margins.

Guildford is favourably situated to allow movement between these differing geological and physiographic zones. Easy access is afforded via the Wey into the Thames Basin to the north

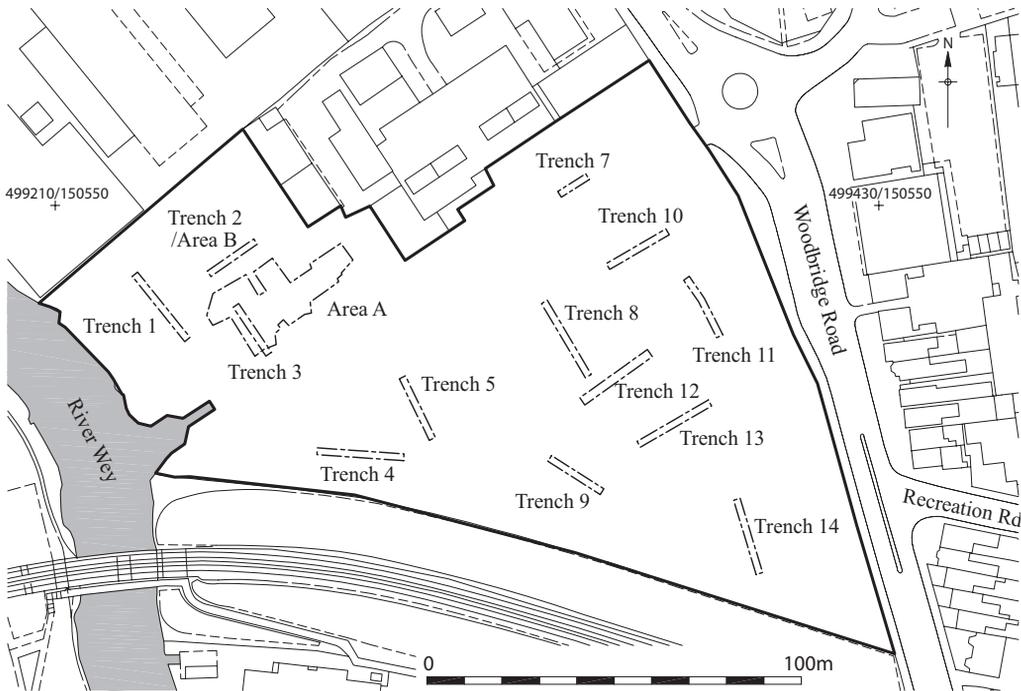


Fig 2 Woodbridge Road, Guildford. Trench and Area location.

and the Weald to the south, as well as to the higher ground of the expanses of chalk uplands to the east and west.

SITE STRATIGRAPHY

Borehole data, provided by a geotechnical survey of the site (Hawkins 2002), demonstrated that the geological sequence at the site consisted of London Clay overlain by Terrace Gravels, in sharp contact with modern made-ground. The archaeological investigations revealed Pleistocene alluvial Terrace Gravel deposits, consisting of light brownish-yellow coarse sand and gravel, present across the site. The surface of these gradually sloped down, generally towards the river Wey, from a high point of 32.08m OD at the south-east of the site to 31.28m OD in the north and 30.52m OD towards the west.

In the north-western corner of the site, Terrace Gravels were overlain by an homogeneous reddish-brown medium to coarse sand containing frequent scattered flint and sandstone clasts (up to at least 90mm) and an abundance of struck flint and burnt stone. The sand appeared to be waterlain but, in the absence of any primary depositional structures, the exact depositional environment was difficult to determine, although sedimentation as a series of sand sheets during successive flood events seems most likely. OSL dating established that it was laid down during the period between *c* 5700BC and 3100BC, a date broadly commensurate with that of the struck flint (see below). Later biological reworking was evident in the form of root channels and worm burrows, which formed a dense pattern of disturbance through all but its lowest levels. In places, these had introduced small fragments of pottery, coal, charcoal and glass.

The artefact-bearing sands were encountered in evaluation trenches 2 and 3, and these formed the focus of the ensuing excavation strategy (fig 3). Evaluation trench 3 was significantly enlarged and is referred to here as Area A. The extent of the sand as exposed was 34.9m east–west by 15.8m north–south, continuing beyond the trench limits to the north

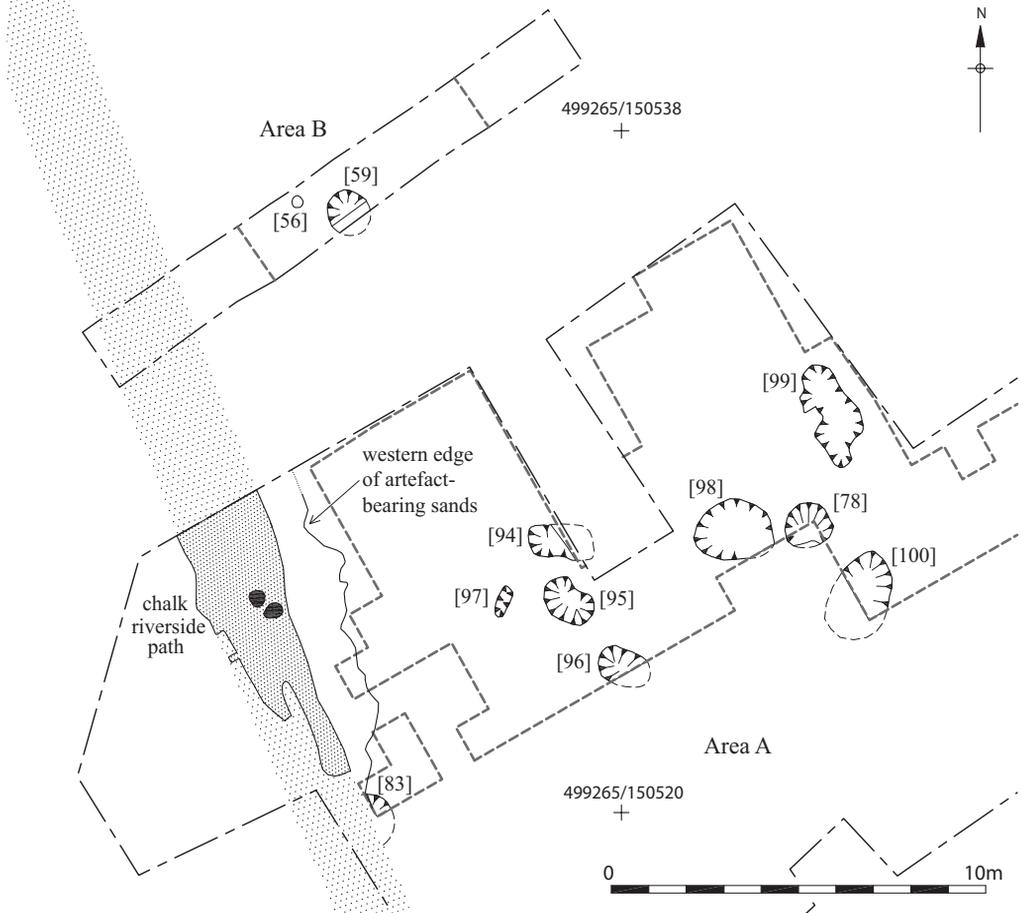


Fig 3 Woodbridge Road, Guildford. Areas A and B, showing pits and other features, and outline of excavated grid squares.

and east. Modern landscaping and services had truncated this deposit to the south, while its western edge had been eroded and infilled with an artefact-sterile, light to mid-brownish blue-green sandy clay-silt. This deposit was sedimentologically indistinguishable from the artefact-bearing sand, with the exception of its lack of artefactual material and its colour, and it would therefore appear to represent a fluvial redeposition.

The artefact-bearing sand in Area A varied in thickness from a minimum of 20mm at the western end of the trench to a maximum of 0.42m to the east. Its highest point was 31.10m OD at the eastern end, gently sloping down towards the river in the west to 30.59m OD. The artefact-bearing sands in the smaller excavated area (Area B) were present to an extent of 7m east-west x 1.8m north-south. Here the sand was of a fairly uniform thickness, measuring a maximum of 0.24m in depth, and the surface varied between 30.77 and 30.56m OD. It was truncated to the east and west but continued beyond the excavated area to the north and south.

Following the complete excavation of the artefact-bearing sand, a number of features were observed, cutting into the underlying Terrace Gravel deposits (see below). The features were filled with sediments similar to the overlying sand and many contained quantities of struck and burnt flint. It is uncertain exactly how and when the features were created; it is thought that they had probably cut through the sand, but that traces of their edges had been lost through subsequent reworking of that deposit. As they were filled with material

indistinguishable from the sand, their edges were not detected until after its removal.

Sealing both Areas was up to 0.60m of plough-soil, recently redeposited 'made-ground', and concrete and tarmac surfaces associated with the former Seaboard depot. There were few indications as to whether or to what extent the artefact-bearing sands had been horizontally truncated by the recent constructional work, although the absence of an obvious topsoil contiguous with the sands would suggest that some truncation had occurred.

METHODOLOGY

The excavation strategy involved the division of the untruncated parts of Areas A and B into 1m grid squares and excavation of these in 0.1m spits, employing a 100% retrieval strategy, with each square and spit being numbered separately. The entire sediment was wet sieved on site through a 2mm mesh to remove the sandy matrix and all residues were retained. Owing to the varying thickness of this deposit, the number of spits present within each grid square before the Terrace Gravel deposits were encountered varied from one, at the western end of Area A, to four, at its eastern end. In Area B, two spits were excavated along the eastern end and one in the western squares. Features subsequently encountered beneath the sand were completely excavated and processed according to the same sampling strategy. A photographic record was made of the excavated deposits and features, as well as all stages of the sampling process. Concurrent with the archaeological investigation, a programme of geoarchaeological and geochronological investigations was undertaken by ArchaeoScape of Royal Holloway, University of London.

Following an archaeological assessment of the excavations (Deeves & Bishop 2004), the entire sieved residues, amounting to approximately 6500 litres of material, were sorted and all artefactual material retrieved, examined and classified, the results being entered on a Microsoft Access database. This report represents a summary of the findings of the subsequent analyses and attempts to put those findings into a wider appreciation of the Mesolithic occupation of the site.

The completed archive, comprising written, drawn and photographic records, databases compiled during the analyses as well as the artefactual material recovered during the excavations, will be deposited with Guildford Museum under the site code SWBR 03.

The lithic assemblage

A total of 52,606 pieces of struck flint were recovered from the artefact-bearing sands, of which 45,801, or nearly 90%, consisted of pieces measuring less than 15mm maximum dimension (table 1). These have been termed micro-débitage, with those pieces measuring over 15mm referred to as macro-débitage.

The bulk of the assemblage appeared to be the product of a single technological tradition, characterised by the manufacture of competently produced, standardised, narrow flakes and

Table 1 Composition of the struck flint assemblage

	Decortication and dressing flakes	Rejuvenation flakes	Flakes	Blade-like flakes	Blades	Microoliths	Micro-burins	Retouched	Cores	Conchoidal chunks	Total macro-débitage	Micro-débitage (no)	Micro-débitage (wt g)
No	795	69	3116	579	1231	368	271	94	84	198	6805	45801	2791.1
%	11.7	1.0	45.8	8.5	18.1	5.4	4.0	1.4	1.2	2.9	100		

blades. The retouched component was overwhelmingly dominated by microliths with Later Mesolithic affinities, a date consistent with the general technological characteristics of the assemblage as a whole. Only a single piece, a possible transverse arrowhead with Later Neolithic affinities, may not have been of Mesolithic derivation. Although it is likely that this piece was not alone and, given the presence of later prehistoric pottery at the site, some admixing of worked flint from later periods is entirely possible, it would appear that any such 'contamination' by later material was limited and that the bulk of the worked flint was broadly contemporary.

RAW MATERIALS

The raw materials principally consisted of translucent black, brown or grey flint, sometimes with frequent opaque cherty inclusions, typical of flint originating from the North Downs. Also present, but in smaller quantities, were coarser grained flints and cherts of a variety of colours. The presence of original cortex suggested that relatively unweathered but thermally affected cobbles were most commonly selected, with smooth-worn, rounded pebbles only occasionally used. The raw materials used could easily be matched with the unworked pebbles and cobbles found within the underlying Terrace Gravel deposits, from which they presumably originated, possibly even as exposed by pit digging (see fig 3 and below). These were often of good knapping quality but were generally small and their knapping potential was limited by frequent thermal faulting. There was no evidence to suggest that any attempts were made to obtain better quality raw material directly from chalk sources, which would have been available within easy reach of the site.

CONDITION

The condition of the assemblage as a whole was variable although the bulk of it had only experienced minor chipping or rubbing. Most of the observed damage would be consistent with 'trampling', general weathering and reworking of the burial matrix. Although some pieces did show a higher degree of abrasion, there was little evidence that the assemblage as a whole had experienced any extensive post-depositional displacement, such as through alluvial transportation.

The extent of recortication was also very variable, ranging from heavy to completely absent. Occasionally variable degrees of recortication have been used to differentiate chronologically components within single assemblages (eg Reynier 2000). Here, however, pieces with close typological affinity, such as those within the same microlith classes, showed the same wide variations in the degrees of their recortication, and this factor is unlikely to be useful in refining the chronological resolution of occupation at the site (cf Schmalz 1960).

MICRO-DÉBITAGE

The lithic assemblage was dominated by micro-débitage, consisting of small flakes, flake fragments and conchoidal shatter of less than 15mm and frequently only 2–3mm in maximum dimension, which accounted for 87% of the total assemblage. This high figure was a consequence of the sampling programme undertaken, where virtually the entire surviving artefact-rich layer was passed through a 2mm sieve and all pieces displaying evidence of conchoidal fracture retained. It may be comparable to the assemblage from Rock Common in Sussex, for example, where 50% of the struck assemblage, which had been passed through a 4mm sieve, consisted of struck pieces less than 10mm in length (Harding 2000, 33).

The arbitrary figure of 15mm was chosen as a dividing point for the micro- and macro-débitage as it was thought that the larger and more technologically distinctive pieces were most likely to reflect the way that lithic materials were perceived and used at the site (cf Brown 1991). The micro-débitage would have originated from two agencies: during knapping and

from post-depositional processes. Knapping generates large quantities of small waste products, often termed 'shatter', generated through core trimming, flake retouching and core disintegration. Post-depositional factors include cultural influences, such as trampling of the discarded waste, natural processes such as the reworking of the burial environment, and post-excavation processing, including the initial excavation of the material and sieving.

The entire quantity of micro-débitage was searched systematically for microlith and micro-burin fragments, many of which were very small, to ensure that practically all those present at the site were identified. The following discussion concentrates on the analysis of the macro-débitage as well as the smaller microlith and micro-burin fragments. Nevertheless, as the micro-débitage was collected systematically, its further study could hold great potential for elucidation of aspects of lithic technology and site-formation processes and remains with the archive for future examination.

MACRO-DÉBITAGE

Knapping waste

All stages in the reduction sequence were present, from raw material 'testing' to the manufacture and discard of finished implements. The presence of obvious knapping waste, such as primary flakes, shattered or exhausted cores and the large quantity of knapping shatter, clearly indicate on-site reduction and tool manufacture. Since it appears that raw materials were not imported, it is likely that the site operated both as an extraction site and as a place where the raw materials were converted into tools.

Flakes and blades

The assemblage principally consisted of flakes and blades, which together contributed two-thirds of the macro-débitage assemblage. They were generally small, reflecting the size of the raw materials used. A very few flakes and blades did attain a length of nearly 100mm but the vast majority were less than 40mm in length.

Blades, defined here as being flakes at least twice as long as they are wide and having parallel margins and dorsal scars, formed 18% of the macro-débitage assemblage. This proportion is relatively low if compared with many Mesolithic assemblages, and perhaps reflects the decline in blade production towards the end of the Mesolithic as noted by Pitts & Jacobi (1979, 171–3). However, their ratio to flakes, at 1:2.5, can be compared with similarly dated sites such as Rock Common in Sussex, where the ratio was in the order of 1:2.4 (Harding 2000). Most of the blades were less than 10mm in width, which may reflect a concern with producing blanks suitable for conversion into microliths.

Flakes, while varying in shape considerably, also tended to be narrow and many had similar attributes to the blades, such as parallel margins and dorsal scars (blade-like flakes). Their platform edges were frequently finely trimmed or abraded although very few had the actual platform surface modified.

Cores (fig 4, nos 1–5; fig 5, nos 6–11)

Eighty-five cores were recovered, representing a rather low 1.2% of the total macro-débitage assemblage, although many of the chunks (of which 198 fragments were recovered) probably represented cores that had shattered during reduction. It is also possible that many cores might have been partially worked and subsequently removed from the site for further reduction elsewhere. The recovered cores were all small; the largest weighed 110g but more than half fell within the range of 30–70g, reflecting both the size of the raw materials and the extent of their reduction. The cores were classified according to an adaptation of the scheme devised by Clark *et al* (1960) (table 2). This revealed that the commonest types were

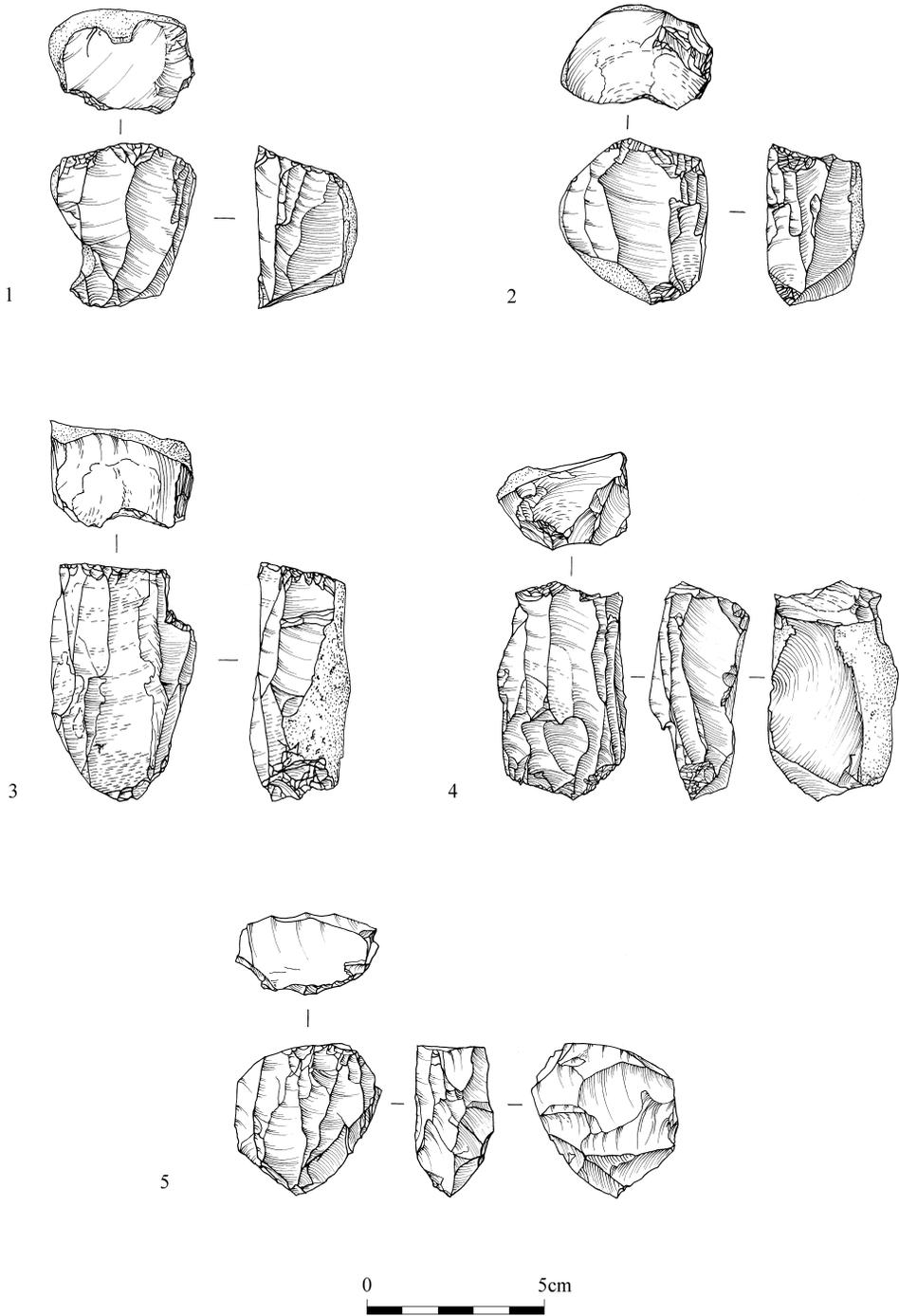


Fig 4 Woodbridge Road, Guildford. Cores

Table 2 Classification of the cores

Type	No	%	Fig no
Single platform	30	36	Fig 4, nos 1 and 3
Two opposed platforms	15	18	Fig 4, nos 2 and 4
Two platforms at angles	8	9	Fig 4, no 5; fig 5, nos 7 and 10
Three or more platforms	14	17	Fig 5, nos 8–9
Keeled/bifacial cores	2	2	Fig 5, no 6
Minimally/irregularly worked	15	18	Fig 5, no 11

those with a single platform although opposed platformed cores, those with three or more platforms, and minimally reduced cores were all reasonably well represented.

Truly prismatic or elaborately prepared cores were rare; instead they tended to have been reduced rather expediently with only minimal pre-shaping of the raw material and with little evidence for attempts to fashion an 'ideal' core shape that would permit a greater degree of subsequent manipulation. Cresting, used to facilitate the removal of blades, was also rarely undertaken. In nearly all instances, either a simple platform was created by removing a single flake or a suitable thermal facet was employed. This surface was then used to remove a series of flakes and blades from around the edges of the core but often the 'back' of the core was left unmodified (eg fig 4, nos 1–3). When the initial platform failed, in most cases new ones were created, often contiguous to the first and using the old core face as the new platform (eg fig 4, no 5; fig 5, nos 7 and 10). Sometimes flakes were removed from the base of the core using the same face, resulting in the production of further usable pieces and sometimes rectifying the inadequacies of the original platform (eg fig 4, nos 2 and 4). Occasionally a third or more platforms were added, causing the core to become quite 'blocky' in shape (eg fig 5, no 8). Several cores exhibited basal crushing suggesting that they were supported on an 'anvil' during reduction, a possibility strengthened by the fact that many were of such a small size that holding them only by hand during reduction may have proved difficult and potentially hazardous (eg fig 4, nos 2–4).

Platform edges were regularly trimmed and sometimes rejuvenated, either by removal of the platform, as evidenced by true 'core tablets', or removal of parts of the core face to remove hinge and step fractures or remnants of cortex. This was not practised routinely, however, and obvious rejuvenation flakes accounted for only 1% of the total macro-débitage.

Most cores clearly produced both flakes and blades but at least 80% showed evidence of having been used to produce at least some blades during their life. As reflected by the blade population, nearly all of the scars were 10mm or less in width. Many of the flake cores shared similar attributes to the blade cores and appeared to be from the same industrial tradition, but may have been reduced specifically to produce blanks suitable for non-microlithic use.

Of the minimally worked cores, many probably represented 'testing' pieces or cores that failed early in their life because of flaws in the flint or from an inability to secure suitable platforms. Perhaps around half of these appeared to be deliberately minimally worked since they could have produced further flakes and at least some might have been intended as heavy-duty tools, including coarsely denticulated examples (fig 5, no 11) and cores with steeply trimmed edges that may have been used in the same way as scrapers (fig 5, no 9). Some of the more irregularly worked cores shared some characteristics with Bronze Age examples and may actually be later in date than the others.

There was a noticeable variability in the extent to which the cores had been reduced and often there was good evidence of reasons for abandonment. Thermal shattering was perhaps the most common reason, and this probably also accounted for a large proportion of the conchoidal chunks recovered. Severe and persistent hinge fractures were also present on a number of cores (eg fig 4, nos 3–4; fig 5, no 10), and others were probably abandoned because of constraining factors such as unfavourable platform angles. Since raw materials seem plentiful at the site, rather than expend effort in trying to rectify wayward cores, it might have been easier to start again.

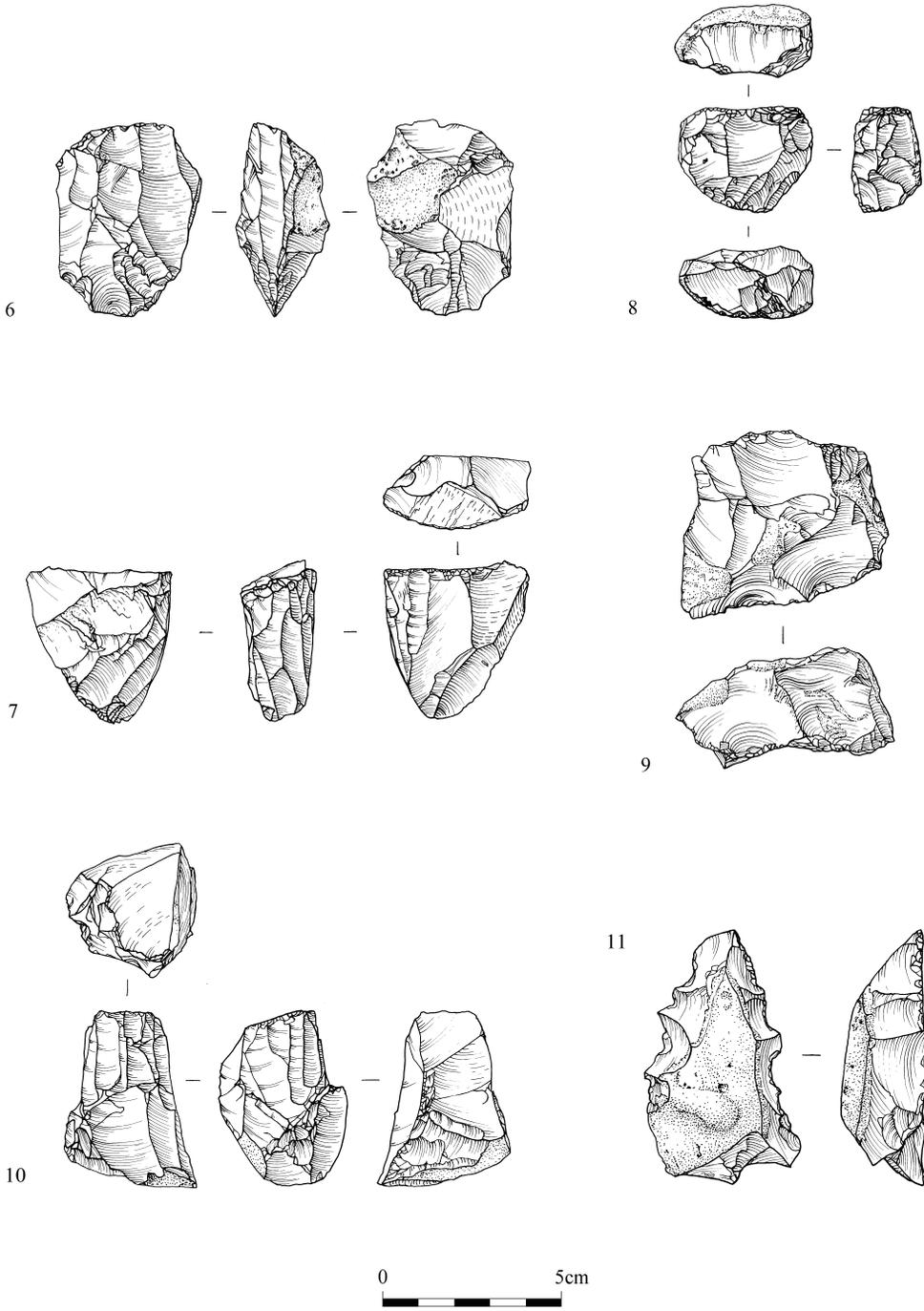


Fig 5 Woodbridge Road, Guildford. Cores

Retouched implements

Retouched implements accounted for 6.8% of the total macro-débitage assemblage, of which 80% consisted of microliths (table 3). Other implement types were very poorly represented, the only types present in any quantity consisting of backed or truncated blades and edge-damaged pieces.

Microliths

The microliths were classed here *sensu stricto* as being blunted blades that have had their bulbar ends removed (Clark 1934, 55). The backed blades and truncated blades exhibited very similar types of retouch, often in comparable locations, but retained their bulbar ends. Although it is likely that there are real differences between these and the microliths, their morphology and the style of retouch used to produce them tend to merge. There was, for example, often little difference in shape between truncated blades and simple obliquely truncated microliths, or between backed blades and rods.

A total of 368 microliths was recovered, of which 177, or just under half of all identified microliths, were sufficiently complete to be confidently assigned to Jacobi's (1976a, fig 6) typological scheme (table 4). The remaining pieces were too fragmentary to classify and, although it is possible that some of these could be fragments from other retouched implements, their size would suggest that virtually all represented broken microliths. Most of the fragments were very narrow, blunted along one or both margins and most likely originally to have been either rods or scalene triangles. The overwhelming majority of microliths were of the heavily retouched narrow blade variety, which superseded the more simply truncated broad blade varieties during the 8th millennium BC (Jacobi 1976b) and which can be taken as indicators of Later Mesolithic industries.

Table 4 shows that the commonest microlith forms comprised scalene triangles followed by rods, which combined, formed nearly 85% of all classifiable microliths. This dominance is further indicated by the unclassified examples, the majority of which were likely to have been fragmented rods or scalene triangles. The remaining classifiable examples represented a variety of types, including simple obliquely truncated points, crescents, convex-backed and inversely retouched types, all of which were present in small numbers.

A number of problems were encountered when attempting to classify the microliths, which were accentuated by their often fragmentary nature. Generally, the classes were clear-cut and could be convincingly seen as deliberately conceived, separate varieties. However, some overlap between the classes was evident; the narrowest scalene triangles did merge into slightly

Table 3 Retouched and utilised implements

Type	No	%
Arrowhead	1	0.2
Backed blade	20	4.4
Burin	3	0.7
Chamfered piece	1	0.2
Denticulate	1	0.2
Edge retouched	7	1.5
Microlith	368	79.8
Notch	2	0.4
Piercer	2	0.4
Scraper	2	0.4
Serrate	2	0.4
Transverse axe	1	0.2
Truncated blades	23	5.0
Edge damaged: cutting/scraping	26	5.6
Edge damaged: piercing	2	0.4
Total	461	100.0

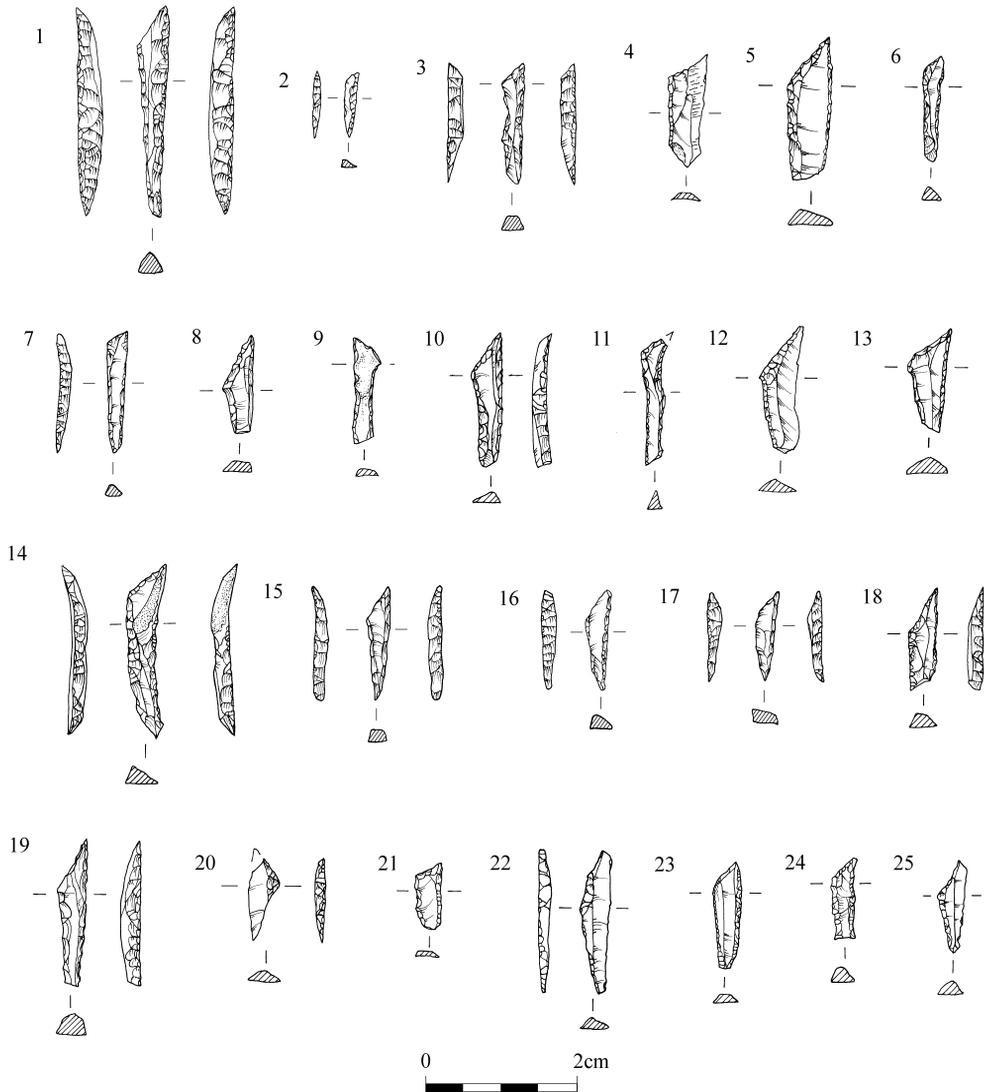


Fig 6 Woodbridge Road, Guildford. Scalene triangles

Table 4 Quantification of microlith types

Type	Jacobi (1976a) type	No	% of total microliths	% of classifiable microliths
Unclassified fragments	—	191	51.9	
Obliquely truncated	1a	6	1.6	3.4
Obliquely truncated	1ac	2	0.5	1.1
Obliquely truncated	1b	6	1.6	3.4
Convex-backed	3d	5	1.4	2.8
Rod	6	57	15.5	32.2
Scalene triangle	7a1	28	7.6	15.8
Scalene triangle	7a2	65	17.6	36.7
Crescent	9	5	1.4	2.8
Inversely retouched	12/13	3	0.8	1.7
Total	—	368		

angular rods and some of the rods had 'pointed' ends, resembling the thin ends of scalene triangles as well as obliquely truncated pieces. The squatter scalene triangles, particularly those with a less emphasised angular side, merged into convex-backed forms. In addition, many of the obliquely truncated points were scalene in shape, but relied on the natural shape of the blank to form the triangle, rather than modifying the blank through retouch.

Most of the scalene triangles and rods were bilaterally blunted although often they had one heavily blunted edge and the other noticeably more lightly retouched, this retouch only being present around the tips of the implement. A few microliths had been blunted with bi-directional retouch, possibly resulting from use of the 'anvil technique'.

Scalene triangles (fig 6, nos 1–25)

Generally, the scalene triangles were remarkably uniform in shape although their size could vary quite markedly. They averaged 16mm in length with the largest complete example attaining 28mm (fig 6, no 1) and the smallest only 9mm (fig 6, no 2). In width, they varied between 2 and 9mm.

Scalene triangles are characterised by having one long acutely pointed end and a broader, more obtusely angled end. The angle of the narrower end varied from between 10 and 35°, with the wider end varying between 30 and 70°. With a few, their narrower ends did not fully converge to form a point but consisted of the unmodified distal end of the blank (eg fig 6, nos 3–5). Others were less well defined, and some ambiguity remains in distinguishing them from rods (eg compare fig 6, nos 6 or 7 with fig 7, no 17). Conversely, many scalene triangles were almost shouldered, either having slightly convex sides or the broader end emphasised by slight undercutting or notching (eg fig 6, nos 3, 6 and 8–13). Others were quite curved in profile (eg fig 6, nos 7, 10, 14, 15).

Rods (fig 7, nos 1–19)

Rods consist of blades with retouch along all or most of one or both margins, parallel to the longitudinal axis of the blade. Of the 56 identified, thirteen were blunted along only one side, the remainder being blunted along both margins. The latter pieces frequently had heavier retouch on one side than the other, resulting in them being wedge-shaped in cross-section. The majority had been retouched to the extent that very little of the dorsal surface of the blade had survived and, in the case of those blunted down both margins, the retouch scars sometimes actually converged along the dorsal surface.

Very few rods were unequivocally complete. This was at least partially due to the lack of deliberately 'finished-off' ends, rendering it impossible to distinguish complete examples with deliberately snapped ends from broken ones. There was also a high incidence of breakage owing to the fragile nature of these very thin but long implements. The more complete rod fragments mostly measured around 15–20mm in length; the longest example identified, which had a fluted fracture and was not complete, measured 30mm and attained 5mm in breadth (fig 7, no 1), but most were between 2 and 3mm wide. As with the scalene triangles, some rods were quite curved in profile (eg fig 7, nos 2–3).

Crescents (fig 8, nos 1–3)

Crescents were very regular in shape, size and in the extent of their retouch, measuring between 7 and 9mm in length and 3 and 5mm in breadth.

Convex-backed (fig 9, nos 1–4)

Convex-backed microliths were symmetrical and leaf-shaped in plan, with retouch altering most of their margins. They were remarkably regular in shape and the nature of their retouch,

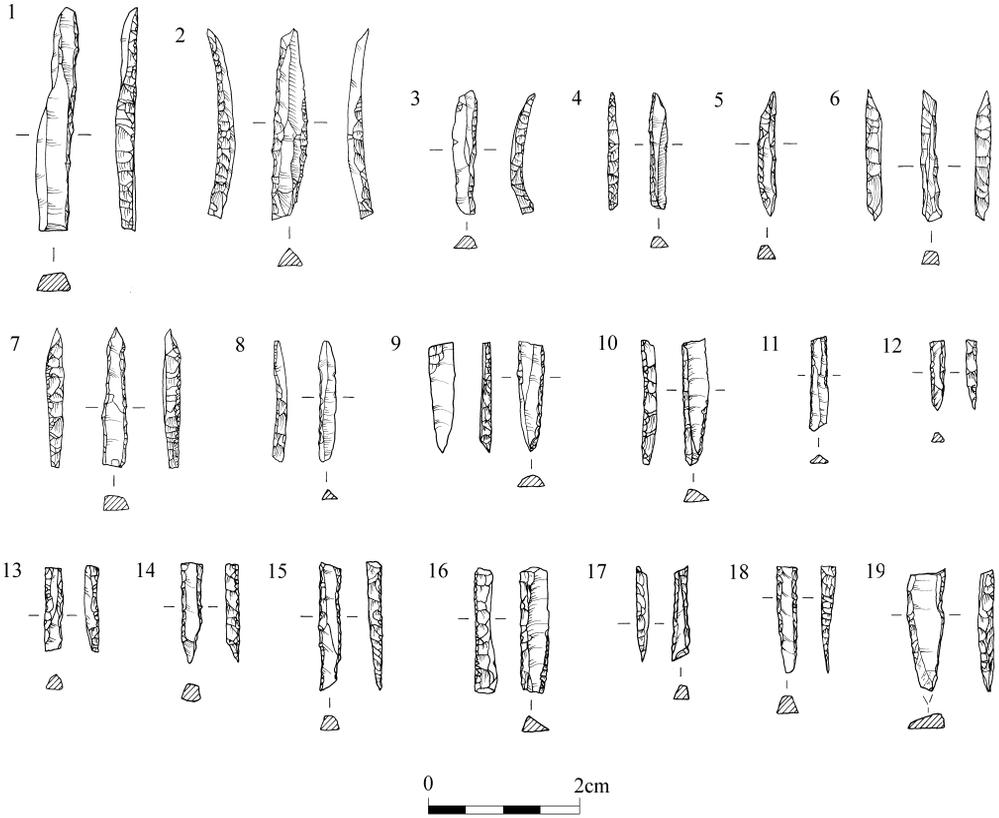


Fig 7 Woodbridge Road, Guildford. Rods

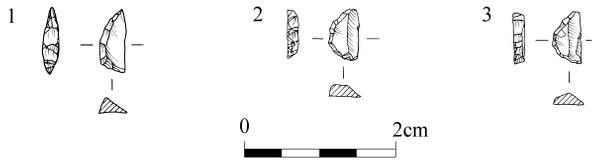


Fig 8 Woodbridge Road, Guildford. Crescents

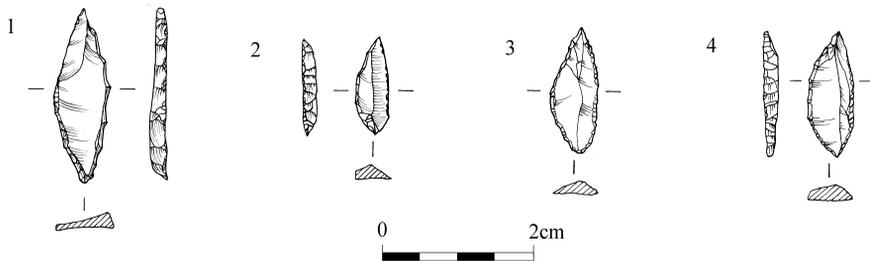


Fig 9 Woodbridge Road, Guildford. Convex-backed pieces

but there was some variation in size, with the largest being 22mm in length (fig 9, no 1) and the smallest 13mm (fig 9, no 2).

Obliquely truncated points (fig 10, nos 1–7)

Twelve microliths had been formed by a simple, oblique truncation to their bulbar ends. All the examples here fall within the size and shape ranges consistent with Later Mesolithic assemblages as established by Pitts & Jacobi (1979, 169–70: fig 5). A few were lanceolate in shape (fig 10, nos 1–2) and these included a single example that had been obliquely truncated at both ends (fig 10, no 7). The others were essentially triangular, being largely formed by the natural shape of the blank (eg fig 10, nos 3–6). It is possible that in some cases these represented unfinished variants of more complex types, such as scalene triangles.

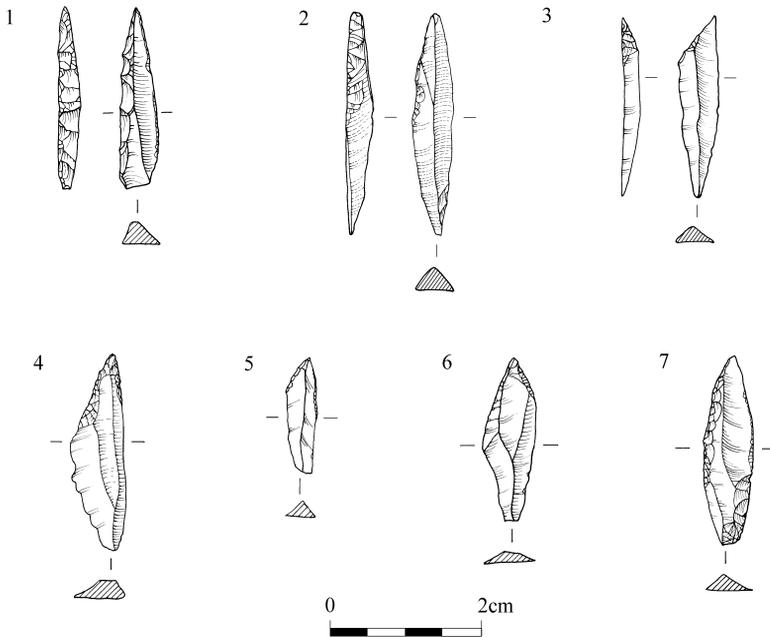


Fig 10 Woodbridge Road, Guildford. Obliquely truncated points

Inversely retouched types

Only three microliths had inverse retouch. Two had their tips accentuated with inverse retouch (Jacobi 1976a, type 12) while the remainder consisted of a small rod or scalene triangle fragment with one margin retouched from the ventral surface and the other from the dorsal.

Discussion of the microliths

Only 48 of the 368 microliths were complete. This was probably due partially to breakage occurring during manufacture, as experimental work has confirmed a high accidental breakage rate when working on such delicate implements (Finlay 2000a, 26). However, none of the microliths could be refitted with micro-burins from the same squares, suggesting that many of the newly manufactured microliths had been removed from the site for use elsewhere. Although the distribution patterns were not entirely clear-cut and both microliths and micro-

burins adhered to the overall distribution pattern displayed by the assemblage as a whole, there was a possible correlation between the clustering of the mostly broken microliths and the (non-related) micro-burins, with most squares containing similar quantities of each type. This may indicate that microliths were being discarded and replaced with newly manufactured ones; in other words, toolkits were being repaired and their microliths replaced. Most of the breaks on the microliths consisted of simple snap fractures, although a few pieces had long flute-like fracture scars, a feature often equated with impact fractures (eg fig 6, no 22; fig 7, no 1).

Micro-burins

Micro-burins are not normally considered as true implements in their own right (although see Donahue 2002) but are usually regarded as a waste product, characterised by a retouched notch and an oblique fracture facet (Finlay 2000a, 26) and inextricably linked with the manufacture of microliths.

As can be seen from table 5, the micro-burins were dominated by examples notched on their right sides near the bulbar end. This dominance seems a long-noted and very widespread phenomenon (eg Clark 1934; Hooper 1933; Lacaille 1942). It shows an enduring standardisation in manufacturing techniques, which appears to be of only limited technological or functional utility. It may reflect handedness; if the blade was held at the bulbar end it would be easier for a right-handed person to produce a notch on its right side. The bulbar end is usually the thickest part of a blade and it might have been considered desirable to remove this prior to making the microlith, although it could always have been removed by simply snapping the blade. The micro-burin technique does allow an oblique truncation to be easily made on the ensuing remnant of the blade. However, as many microliths, including scalene triangles, had oblique truncations on both ends this would still not account for the dominance of bulbar types with their right edges notched. It is possible that micro-burination was seen as an appropriate way to manufacture microliths, not necessarily prescribed, but following a long-established and well-understood tradition of working flint. This 'tradition' may have had its origins in the earlier simple truncated points, where the bulbar end was removed to form a sharp point. By the time that more complex shaped microliths were being produced such techniques may no longer have been quite so useful; nonetheless, microliths continued to be made following the same, time-honoured, conventions.

Many examples of 'failed' micro-burins were observed, where the blades snapped away from the notch or the resultant break failed to produce the distinctive oblique fracture. Even taking this into account, nearly 100 more microliths than micro-burins were recovered, despite the micro-débitage being systematically searched for even the smallest examples. Although this could indicate that many more microliths were being discarded than manufactured at the site, the micro-burin technique might not have been used to produce every microlith. In experimental work, Finlay (2000a, 26) noted that discernible micro-burins were only produced in about half the cases where this method was attempted. If this were

Table 5 Micro-burin forms

Lateralisation (assuming bulbar end held nearest to the observer and with dorsal surface upwards)	No	% of total micro-burins
Left bulbar	4	1.5
Right bulbar	232	85.6
Left distal	24	8.9
Right distal	5	1.8
Unclassified	6	2.2
Total	271	100.0

the case, it could suggest that, to the contrary, more microliths might have been manufactured than were discarded.

The micro-burins varied in size and shape. They ranged from 3 to 14mm in width and the angle that the oblique fracture travelled along the blade varied from being virtually perpendicular to almost parallel to the lateral axis of the blade. A few examples were identified where the micro-burin technique appeared to have been executed on extant microliths (eg fig 11). This might have resulted from an attempt to re-sharpen the microlith, through accidental damage to the microlith during use, or, perhaps more plausibly, an accidental by-product of microlith manufacture (cf Krukowski micro-burins: Barton 1992).

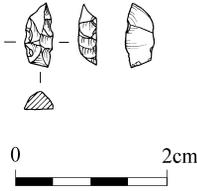


Fig 11 Woodbridge Road, Guildford. Micro-burin

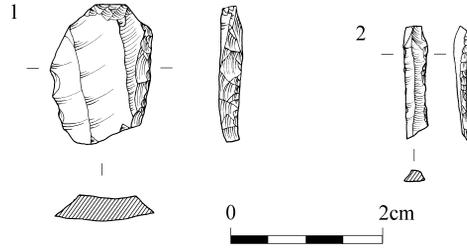


Fig 12 Woodbridge Road, Guildford. Backed blades

Backed blades (fig 12, nos 1–2)

Twenty backed blades were recovered. These had a similar type of retouch to the microliths, executed along all, or part of one, or, more occasionally, both lateral margins, but all had their bulbous ends intact. Nearly all had been broken but most were made on quite small blades, varying from 3 to 13mm in breadth, and were unlikely to have greatly exceeded 30mm in length. Some were significantly larger than the microliths and these might have represented backed cutting tools (eg fig 12, no 1) while the narrowest examples were very reminiscent of rod-shaped microliths (eg fig 12, no 2).

Truncated blades (fig 13, nos 1–7)

Twenty-two truncated blades were recovered. These all had their distal ends removed by similar retouch to that used in manufacturing the microliths. They varied considerably in size, between 11 and 42mm in length and 5 and 27mm in breadth. The angle of the truncation also varied. Some were truncated transversely and, in many respects, were similar to end scrapers (eg fig 13, nos 1–2). Others had slightly concave truncations (eg fig 13, no 3), sometimes with one side accentuated to a point (eg fig 13, no 4). Most were obliquely truncated and were of similar form to simple obliquely truncated microliths, although generally significantly larger (eg fig 13, nos 5–7). These frequently have further blunting around their acute point, strengthening the tip and supporting the notion that they could have been used for piercing or graving. One had a shallow notch cut into its side, which would have enabled it to have been gripped quite firmly in the hand (fig 13, no 6).

Truncated pieces are commonly present in Mesolithic tool inventories; they formed the most common retouched type (after microliths) at Charlwood for example (Ellaby 2004). There it was suggested that ‘a number of these may be argued to fall into the category of boring and piercing tools’ (*ibid.*, 20). Complementing the probable use of many of the microliths as projectile points, it has been suggested that backed and truncated blades may have been used in the manufacture of arrowshafts (R Jacobi, pers comm).

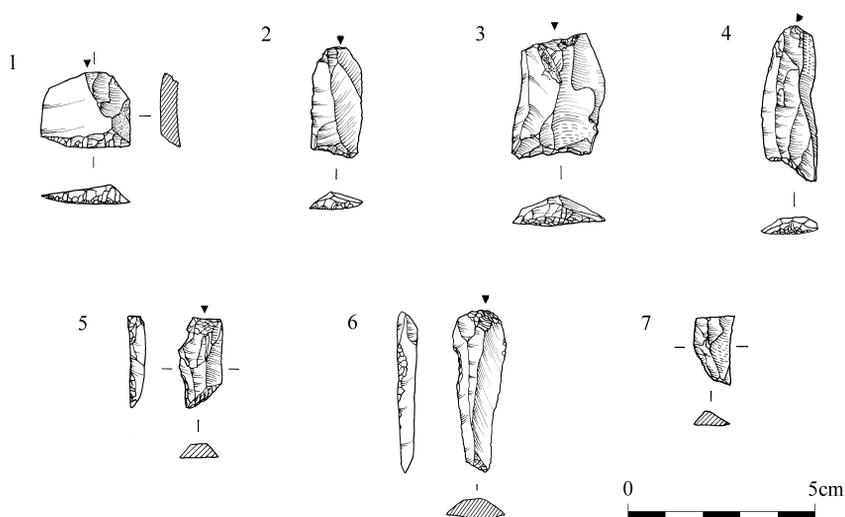


Fig 13 Woodbridge Road, Guildford. Truncated blades

Other retouched implements

Only 21 other retouched implements and one transverse axe were recovered (table 3). Although these represented a wide variety of types, the actual quantities present were remarkably small, considering both the overall size of the lithic assemblage and the numbers of microliths recovered. With the exception of a possible transverse arrowhead, all of the types would be typical of Mesolithic industries. The possible transverse arrowhead, which if correctly identified would have Later Neolithic affinities, appeared to be an intermediate type between Green's (1980) chisel and oblique types, perhaps most closely matching Clark's (1935) type E (fig 14, no 1).

Simple edge-retouched pieces represented the most common type; these consisted of flakes or blades of a variety of shapes and sizes, all with short stretches of edge-blunting along parts of their margins. Three burins and a non-refittable spall from a further burin were recovered. The burins all consisted of relatively thick flakes, two with spalls removed longitudinally from the distal end (fig 14, nos 2–3), the other being dihedral and worked on its bulbar end (fig 14, no 4). The other retouched pieces comprised two each of scrapers, serrated blades, piercers and notches, and single examples of a chamfered blade, a denticulated flake and a transverse axe. The transverse axe measured 88 x 44 x 22mm and weighed 145g. It had a pointed butt and a classic transversely sharpened cutting edge. It was plano-convex in section with a slightly curved profile, suggesting it may actually have been used as an adze (fig 14, no 5).

Twenty-eight flakes and blades displayed convincing evidence of having been utilised, although these figures are somewhat arbitrary given that utilised pieces would not necessarily display distinctive evidence of their use, and 'incidental' and spontaneous edge damage can be difficult to distinguish from edge damage accruing from use (Newcomer 1976). Nearly all had wear consistent with cutting or perhaps light scraping, while two blades with pointed distal ends had wear suggestive of piercing.

TECHNOLOGICAL STRATEGIES

Although it cannot be calculated precisely over how long the site was used, or the number of separate knapping events that led to the accumulation of the lithic assemblage, it was evident that one of the main activities represented by the lithics involved the manufacture of microliths from small blades. Given these objectives, a number of choices were available to the flintworkers. The first decision to be made involved the choice of raw materials; better

quality pieces would have been available from deposits closer to the chalk and available within a few kilometres, but it was decided to use those which were of lesser quality but far more readily available from the natural gravels at the site. The quality of the raw materials was possibly a major determining factor governing the ensuing reduction methods.

At first consideration, basic core reduction appeared to have been relatively opportunistic. The raw materials selected were beset by thermal flaws that frequently caused them to fail, the cores either completely shattering or developing severe step fractures. Very little effort was expended in converting the raw materials into suitably shaped cores that could have facilitated repeated blade production. Instead, a striking platform was usually made by removing a single flake from an undressed cobble; sometimes just a naturally occurring flat surface was used. It was thus the knappers' skill, and their ability to appreciate the natural shapes and qualities of the raw materials in terms of their knapping potential, that allowed the production of relatively standardised flakes or blades from simple platforms.

Once flake and blade production had commenced, the only efforts invested in ensuring continued removals consisted of platform-edge trimming and, occasionally, the complete removal of faulty platforms or defective parts of the core face. These attempts were limited; few rejuvenation flakes were recovered and most cores were readily discarded if they became too problematic, presumably in favour of starting anew. However, the fact that so many suitable blades were produced indicates that this pragmatism was not a result of a lack of skill. Indeed, the ability to be casual about so many aspects of reduction can only be possible where there is a detailed comprehension of the shape of the raw materials combined with an in-depth, almost transcendental, appreciation of the material they were working.

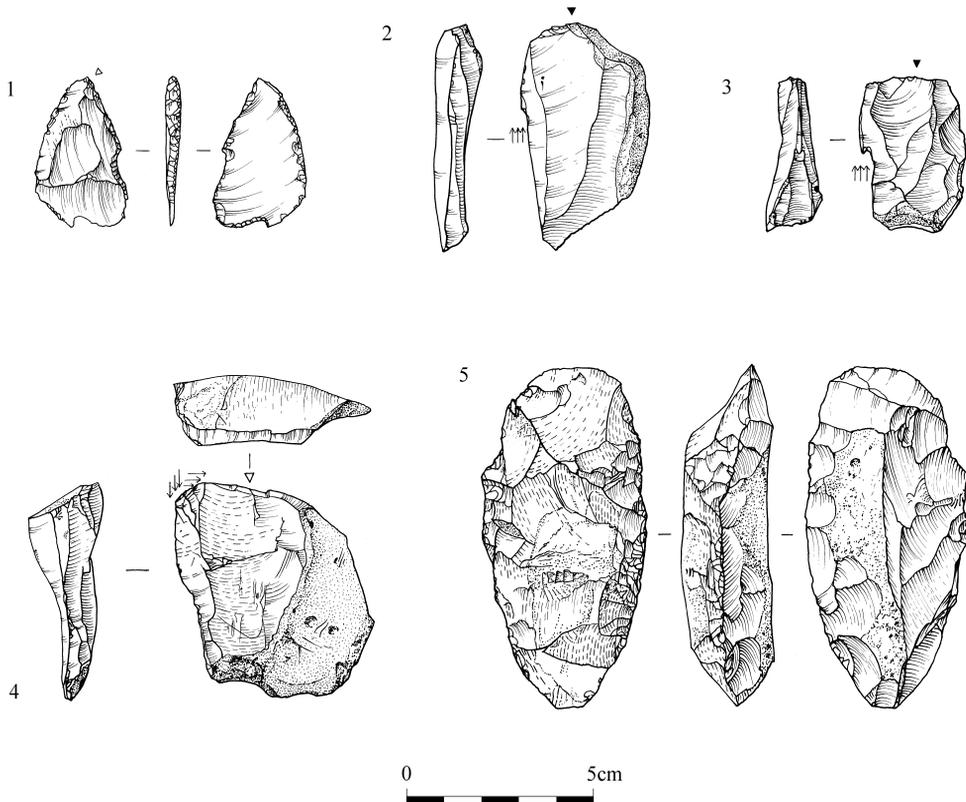


Fig 14 Woodbridge Road, Guildford. Other retouched implements.

The main objective, once suitable blades had been produced, appears to have been the manufacture of microliths. The adaptable approach to producing the blanks may be contrasted with the rather circumscribed approach taken to microlith production, which seems to have followed a series of predetermined conventions. Micro-burins were almost always notched in a particular way; not only was it nearly always the bulbar ends that were removed, but they were removed predominantly from along the same edge. Likewise, the shapes of the microliths were remarkably consistent and nearly all of the more complete examples could be placed within a few closely defined shape categories, even though their sizes varied somewhat. The extent to which these categories might have been recognised by the manufacturers is not fully resolvable, but it does appear that they repeatedly manufactured microliths according to closely defined stylistic parameters – not just at Woodbridge Road, but also across Britain and beyond.

Generally, the microliths displayed carefully executed retouch which, given their frequent diminutive size, must have required great dexterity to execute (eg fig 6, nos 2, 17; fig 7, no 12; fig 8, nos 1–3). The reasons why such difficult and awkward work was deemed necessary are not easy to comprehend, particularly as almost identically shaped sherds of flint were often recovered from the same contexts, so that complex microlith manufacture would not always have been necessary to provide appropriately shaped pieces. A more functional approach views the adoption of an increasingly diverse range of smaller and more heavily retouched microliths during the 8th millennium BC as reflecting changes in hunting methods and technology, involving the replacement of arrows with two or three lithic armatures with those holding significantly higher numbers (Myers 1989, 133). However, some of the more diminutive pieces appear too small to have functioned efficiently, merely hafting them would have proved problematic, and it is tempting to suppose that, on occasion, there was an emphasis placed on trying to produce the smallest retouched piece possible, regardless of any functional utility. It is possible that very small microliths were perceived as providing some benefit beyond what might have been functionally required, such as through conferring good providence on hunting expeditions, or the ability to make and use small microliths being perceived as somehow socially prestigious or beneficial. Alternatively, the manufacture of such diminutive pieces might have resulted from light-hearted competition between comrades or seen as emblems of knapping prowess. It might even be that they were made by younger members of the community whose dexterity and eyesight would have been more favourably suited to such tasks.

The reduction of the cores shows great ingenuity and adaptability, while the manufacture of microliths shows concessions to conformism and tradition. Recent work has reminded us that the acquisition of flint, the act of its reduction and the production, display and eventual discard of the implements produced were all shaped and governed by broader routines, concerns and principles operating within the community. Flintworking would have conveyed ideas and values about the flintworkers: who they were and how they and their activities related to the broader social entity (eg Edmonds 1995; Finlay 2000a; 2000b). Conversely, such principles would have greatly influenced the way the whole process of flintworking was approached – who was allowed to engage in it and the methods with which it should be undertaken. In the case of the Woodbridge Road material, any deeper significances, traditions or metaphorical aspects of flint reduction appeared to be less invested in the act of reduction but were perhaps more apparent in the production of the microliths. It was with these that an importance over and above functional utility was embedded, more so than in the creation of the blanks with which they were made. Whatever the reasons for making these tiny items in such specific ways, it is perhaps unlikely that the microliths themselves would have functioned as emblematic signifiers of the community, as they would be virtually invisible from any distance, especially if hafted. The almost ritualised use of the micro-burin technique might indicate that it was the act of turning a blade into a microlith that was invested with some deeper significance, not the processes that made the blades, and perhaps not even the possession or display of the finished microlith.

BURNED FLINT

Just over 71.5kg of otherwise unmodified burnt flint fragments, comprising nearly 10,000 fragments over 10mm in size, were recovered from the excavations. These were distributed throughout the excavated areas, although several distinct concentrations were identified (fig 15). In some cases these concentrations are likely to represent the dispersed contents of the pits (see below); other concentrations away from these pits possibly represent the locations of disturbed hearths.

Although small quantities of burnt flint would be likely to accrue from the incidental burning of material beneath and around the hearths, it is less likely that large quantities of flint would be deliberately used for hearth construction within a living/working context, such as around a campfire, as flint tends to explode when heated and prove hazardous for anyone in the vicinity. Instead, the quantities present suggest deliberate production. Such accumulations have been recorded at many later prehistoric sites, particularly those referred to as burnt mounds (eg Buckley 1990; Hodder & Barfield 1991). Many explanations for these accumulations have been proposed although probably the most prevalent view interprets them as representing the waste generated from the use of flint in cooking with the heated flint used either to boil water or to provide direct heat for roasting. Food, particularly meat, could be boiled by being placed in skin bags and held over heated flint or, alternatively, the food could have been buried in pits alongside heated flint, which would have slowly baked it. Two of the pits here did contain high quantities of burnt flint although neither had clay linings and it seems unlikely that they would have held water. Nor was there evidence of *in-situ* burning within the pits and the presence in both pits of substantial quantities of unburnt worked flint would suggest that their contents represented deposited occupational debris.

Although the deliberate burning of stone is most commonly viewed as a later prehistoric phenomenon, substantial quantities of burnt flint were recovered alongside the Later Mesolithic industries at Farnham (Clark & Rankine 1939; Rankine 1936) and high quantities of burnt flint have been found at Tolpits Lane, Rickmansworth, associated with a similar range of microlithic rods and scalene triangles as that found here (R. Jacobi, pers comm). At Rock Common in Sussex, over 26kg of burnt flint was recovered from an area of *c* 130m², which, although only one-third of that recovered here, may still suggest that something more than simple hearth construction could have been occurring (Harding 2000, table 1).

Distribution of the lithic material

Burnt flint and struck flint was present in every square excavated and throughout the profile of the artefact-bearing sand layer. There were several concentrations or clusters apparent in the horizontal distribution of both the burnt flint and the struck flint, the broad coincidence suggesting that they were deposited broadly contemporaneously (figs 15 and 16). The clustering was quite marked; while pieces of macro-débitage rarely fell below ten pieces per square, over 500 pieces were recovered from the two squares in the vicinity of pit 100 and over 400 were recovered around pit 98. The distribution of the major categories of struck flint was analysed, but no major differences could be detected. This indicates that all stages in the reduction sequence were equally distributed and no zoning, such as areas dedicated to initial core reduction, microlith manufacture or implement use, was apparent.

Burnt flint formed a similar pattern; although it rarely fell below a level of 50g per square, it may be possible to discern a number of clusters. Using the criterion of squares containing greater than 1kg, at least six concentrations are apparent, two of which coincide with pit locations, while the others may signal the locations of hearths.

The quantities of lithic material per square decreased along the western edge of the site, towards the Wey, although it is possible that later erosional activity by the river might have scoured the upper parts of the sand horizon. There was also a decline in concentrations towards the east of the excavated areas. The most notable concentrations of both burnt flint



Fig 15 Woodbridge Road, Guildford. Distribution of burnt flint by grid square superimposed on plan of pits (see fig 3 for grid location and pit numbering).

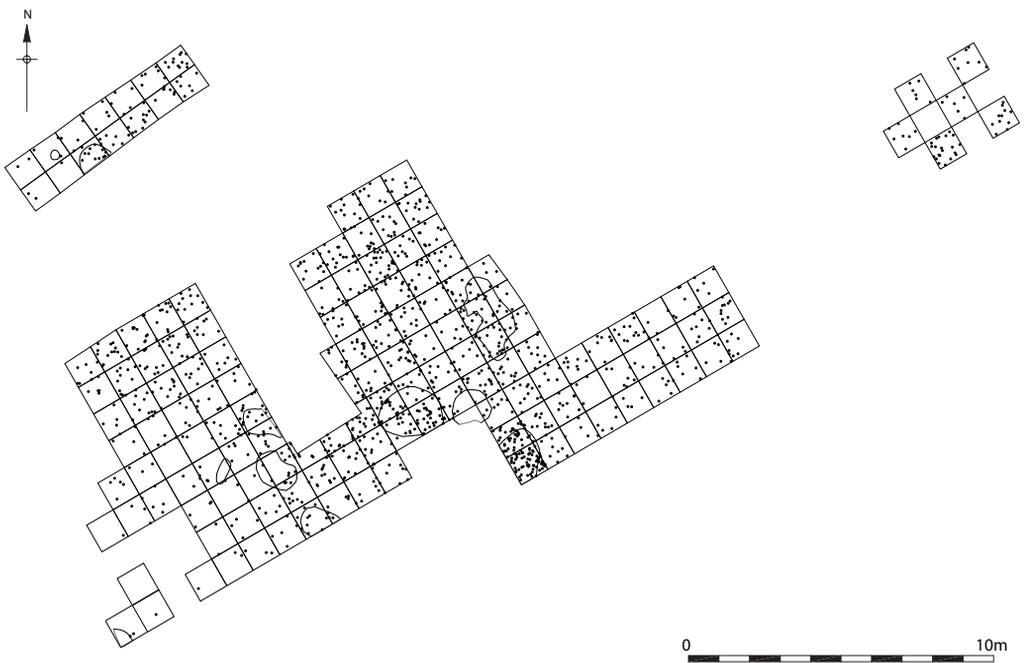


Fig 16 Woodbridge Road, Guildford. Distribution of struck flint by grid square superimposed on plan of pits (see fig 3 for grid location and pit numbering).

and struck flint were along the southern central edge of Area A. These mostly coincide with the presence of underlying pits, and this material may originally have been contained within them but diffused through later reworking of the artefact-bearing sands. There was also a broad area of relatively high concentrations of both burnt flint and struck flint in the northern part of Area A, although this density did not continue as far as Area B. This generally does not coincide with pitting, although shallower pits now lost could have been present. Instead, it is possible that these concentrations represent the presence of separate activity areas focusing around hearths.

Overall, the quantities of burnt flint and struck flint declined rapidly and consistently with depth through the sand layer profile (fig 17). This decline was consistent among the major artefact classes, including heavier and lighter pieces such as cores and microliths. Vertical movement of artefacts within a relatively loose matrix, such as sand, is a common phenomenon and arises from a number of factors, including trampling, bioturbation and artefact settling (cf Barton 1987).

Although this gradual decrease in quantities with depth generally holds, examination of specific squares demonstrates that vertical distribution is not in every case uniform or straightforward. In the area of pits 96 and 100, for example, the distribution was much more even throughout the profile. In the case of the area around pit 99, the distribution was reversed, with most pieces recovered from towards the base of the profile. Further complications arise from the possibility that the lithic material could have been originally deposited on an accumulating horizon, with activity occurring on a surface that might have been periodically flooded, disturbed and possibly subjected to erosional episodes. Nevertheless, the overall impression given by the vertical distribution is that the material was either deposited towards the surface of the sand layer and subsequently slowly settled through it, or had been dumped into pits cutting through the sand layer, where it was relatively evenly distributed.

The condition of the material, the presence and lack of sorting of both large and very small pieces, and the occasional refits noted from within individual squares, argue against any mass movement of sediment, such as through colluviation or wholesale alluvial redeposition. However, smaller-scale movement, such as by root, worm and burrowing activity, surface erosion and redeposition from periodic flooding, as well as through cultural activity, such as trampling, pit digging, hearth construction and the dumping of waste within pits, means that the material cannot be regarded as *in situ*, and specific activity areas or differential zoning in the use of the site cannot be reconstructed. Despite the post-depositional modification to the artefact distribution, a degree of integrity in the horizontal distribution of the material is apparent. It suggests a number of activity areas may be represented, with flintworking occurring around separate hearths and with material being occasionally dumped into some of the pits.

Pits

Nine pits in Area A and a further two in Area B were recorded cutting into the gravels (see fig 3). They were all identified after the removal of the overlying sand horizon, but it is likely that they originally were cut through it or from within it as it accumulated, their original edges being obscured by the later reworking. The fills of these features were excavated as part of the 100% retrieval and sieving strategy described in the methodology.

The pits varied considerably in shape and size (table 6) but had edges that were mostly concave or steeply sloping with flat or slightly concave bases. The two pits in Area B filled with water during excavation and could not be fully excavated.

It cannot be demonstrated conclusively whether the pits represent tree-throw hollows, extraction pits dug to obtain flint raw materials, other purposefully dug features or perhaps a combination of these. Pit 99 represented perhaps the most convincing tree-throw hollow because of its irregular shape, although none of the pits had the characteristic crescentic shape

Vertical distribution of lithic material

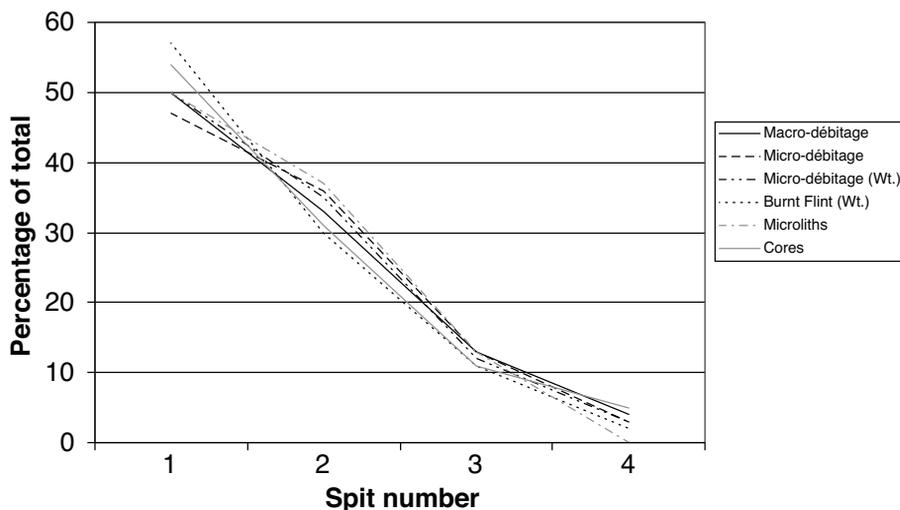


Fig 17 Woodbridge Road, Guildford. Vertical distribution of the major artefact classes.

produced by upturned trees (Moore & Jennings 1992, fig 6). Some of the pits were much more regular in shape and had steep and well-defined edges, suggesting that they were dug for a purpose.

In several cases, the densities of lithic material in the overlying sand layer were much higher in the vicinity of the pits than elsewhere and, unlike in the general scatter, the vertical distribution of artefactual material in the sands above the pits often showed greater concentrations either towards the middle or the base of the profile. This suggests that much of this material was originally contained within the pits but, because of the later reworking of the artefact-bearing sands, the edges of these could no longer be recognised. The two highest concentrations of struck flint within the sand horizon closely coincided with pits 98 and 100, while high quantities of burnt flint coincided with pits 98–100. It would therefore appear that these pits had been filled with substantial quantities of lithic material, more than might be expected from later residual deposition, and suggests that at least some pits were specifically used for the purpose of depositing this material.

The positioning of the pits does not appear to demonstrate any clear structuring, although they do cluster in the south of Area A, with two examples being located to the north within Area B. Pits associated with Mesolithic occupation have recently been identified in Surrey at Chipstead, Charlwood and Bletchingley (Ellaby 2004; English Heritage 2005; Howe *et al* 2000, 191), as well as a few other, as yet unpublished, sites (Cotton 2004). These all contained worked flints with Mesolithic characteristics and range from isolated pits to small clusters. At Charlwood the pits might have been located around, and defined, living or working areas, while at Bletchingley the pits were closely associated with a series of knapping scatters and hearths. The pits at Woodbridge Road were clustered but did not appear to demonstrate any clear structuring in their positioning, nor did they obviously define or enclose any specific area. Nevertheless, and building upon the patterns identified at Charlwood and Bletchingley, it may be tentatively suggested that if the artefact clusters in the central part of Area A do represent hearth use and flintworking areas, the pits identified along the southern part of Area A, as well as those to the north in Area B, could have been dug around the periphery of this activity. However, such a possibility cannot be demonstrated conclusively, given the limits of the areas excavated, and it presupposes that such activity was undertaken within a discrete timeframe and of sufficient intensity and duration to allow the site to be structured in such a way.

Table 6 Size and contents of the pits

Area	Cut	Length (m)	Breadth (m)	Depth (m)	Struck flint >15mm	Struck flint <15mm (wt g)	Microoliths	Micro-burins	Cores	Burnt flint (wt g)
A	78	1.24	1.08	0.24	26	168	3	1	0	63
A	83	>0.7	>0.4	0.2	4	0	0	0	0	11
A	94	1.55	>0.90	0.15	28	166	4	2	0	143
A	95	1.40	1.18	0.24	5	31	0	1	0	40
A	96	1.22	>0.84	0.15	9	66	0	0	0	136
A	97	0.84	0.36	0.12	3	32	0	1	0	40
A	98	2.05	1.65	0.25	54	213	0	2	3	615
A	99	2.74	1.35	0.29	143	592	10	9	1	1662
A	100	>1.60	>1.13	0.25	148	687	11	7	0	480
B	56	0.32	0.30	>0.27	9	37	2	0	0	33
B	59	>1.2	0.7	>0.17	16	104	4	0	1	25

The microlith assemblage from the pits mirrors that recovered from the excavations as a whole: scalene triangles were marginally better represented at the expense of rods, although not to a degree that may be considered significant (table 7) and no chronological patterning can be discerned in terms of the types of microliths present (see *Discussion*, below). It would appear that it was the general lithic debris, as distributed across the site, which was incorporated within the pits, rather than the waste from any specific activities. It was notable that there was a much lower proportion of broken, unclassifiable microliths within the pits, these representing only 20%, as compared to the 52% that were unclassifiable from the rest of the site. This may indicate that the microliths had been deposited within the pits relatively quickly and had consequently received much less attrition from processes such as trampling.

Table 7 Composition of microliths from the pits

Type	% Unclassified fragments	Obliquely truncated	Convex-backed	Rod	Scalene
Pits: no		2	1	8	16
Pits: %	(20.5)	7.4	3.7	29.6	59.3
All microliths %	(51.9)	7.9	2.8	32.5	52.5

Later activity at the site

Other than the pits discussed above, no further features of prehistoric date were recorded during the excavations. However, in addition to the possible Neolithic flints discussed above, small quantities of later prehistoric, Saxon, Roman, medieval and post-medieval pottery were also recovered from the sand horizon, where they were assumed to have been introduced through such mechanisms as biological reworking. The pottery recovered indicates that the river margins continued to attract visitors over a period of several millennia. The quantities involved, however, suggest that such visits were sporadic and low-key with no apparent evidence for any prolonged occupation or settlement.

The first evidence for constructional activity following the digging of the pits as described above consisted of a chalk-filled linear feature located in the western end of Area A. This was 0.60m wide and followed the alignment of the river (fig 3). It appeared that its chalk fill was laid as intentional packing and spread beyond the cut, suggesting that this feature might represent consolidation for a riverside pathway, or perhaps the base foundation for a riverside

wall. It was in turn cut by two circular postholes with which it might have been associated. No dating evidence was produced from any of these features although they immediately underlay a soil horizon containing pottery and other artefacts of post-medieval date. It is unlikely that the features were constructed any earlier than the medieval period and probably even later, perhaps being associated with the management of the bank of the river Wey or its canalisation during the mid-17th century.

The results of the geoarchaeological and geochronological investigations,

by Chris Green and Phillip Toms

OSL dating of the artefact-bearing sands was undertaken at the University of Gloucester Geochronology Laboratories (UGGL) to show whether the date of sediment deposition was broadly contemporary with the likely period of Mesolithic occupation, or alternatively that the sediment body is more recent and the artefacts have been reworked into it from their primary context elsewhere. Full details of the methodology and results are contained within the archive.

Two samples were submitted to UGGL for dating, from the top (GL03060) and bottom (GL03061) of the artefact-bearing sands. Sample preparation, field measurement of environmental dose rates, luminescence measurements and age determinations followed standard UGGL procedures. The OSL results indicate dates of 7.7 ± 0.4 ka BP at the base of the reddish-brown sand and 5.1 ± 0.4 ka BP towards the top of the context.

The results of the geoarchaeological investigations indicate that the archaeologically significant sedimentary unit was deposited by floodwater, and is broadly contemporary with the Mesolithic cultural period suggested by artefact typology. Sediment deposition commenced *c* 7700 years ago and continued to at least *c* 5100 years ago. It seems evident therefore that, during a period (or periods) of Mesolithic occupation on the valley floor of the river Wey, artefacts were deposited on temporary land surfaces, subject to intermittent flooding. The shallow depth at which the Mesolithic archaeological material is preserved probably reflects the infrequent occurrence of flooding across the Woodbridge Road site, close to the edge of the flood plain.

Discussion

The excavation at Woodbridge Road has produced a large and exceptionally well-recovered lithic assemblage of Later Mesolithic date from the strategically important gap in the North Downs that links the Weald with the Thames Valley. The results have added importance due to the somewhat surprising dearth of evidence for Mesolithic activity in the Guildford area, despite the plethora of sites known to the south in the Weald and the obvious importance of the area in facilitating movement between major physiographic zones. In addition, it has provided evidence for possible pit digging and discard practices – activities that are otherwise very poorly represented in the archaeological record for this period.

Although Guildford is renowned for its medieval and post-medieval remains, very little is known of the prehistoric occupation of the area. The evidence available comprises a small collection of isolated finds dating from between the Mesolithic and Iron Age periods, although significant archaeological remains datable to the later prehistoric period have recently come to light at the University of Surrey site to the south-west of the town (Howe *et al* 2003, 349; 2004, 317). The nearest published evidence for Mesolithic activity comes from St Catherine's Hill, a riverside site located *c* 2.5km to the south of Woodbridge Road. This site, however, has furnished a microlith assemblage dominated by large obliquely truncated points and other early types, and it almost certainly pre-dates the occupation at Woodbridge Road (Gabel 1976). Mesolithic flintwork has been recovered *c* 500m to the east near Stoke Road (HER ref 3252), and from the Dominican Friary *c* 2.5km to the south-west (Poulton & Woods 1984), although the specific details of these remain unpublished. For the Mesolithic period,

this relative paucity of evidence contrasts with that from the Weald, particularly the concentrations of sites recorded on greensand and along the Wey Valley in the Farnham area, where some of the most prolific clusters of Mesolithic sites in the country have been identified (Clark & Rankine 1939; Hooper 1933; Oakley *et al* 1939; Rankine 1936). To the north, in the Thames Basin, Mesolithic sites are scarcer and mainly consist of small scatters of artefacts, often located along river margins. Important riverine sites are known upstream of the Thames, such as at Thatcham (Healey *et al* 1992; Wymer 1962), but downstream larger Mesolithic sites are rare and tend to be located on higher ground, such as at West Heath in Hampstead (Collins & Lorimer 1989) and in the Carshalton area (eg Cotton & Hayes 1980; Leary *et al* 2005; Turner 1966). Other than these, evidence for Mesolithic activity in the lower Thames valley is prolific but limited to small accumulations of flintwork, although the number of tranchet axe/adzes and other implements recovered from the Thames itself suggests intensive activity along its banks (Field 1989; Lacaille 1961; 1966).

Both the OSL dating and microlith typology suggest a Later Mesolithic date for the main period of activity at Woodbridge Road, the OSL dates indicating that the sand horizon within which the lithic material was recovered started to accumulate around 5700BC and continued to be deposited, or at least reworked, into the Neolithic period. The microliths were dominated by characteristically Later Mesolithic rods, scalene triangles and other types, broadly datable to *c* 7500–4500BC.

Unfortunately, owing to the paucity of securely dated assemblages, details of the typological succession of microlith types in Britain remains poorly defined. Nevertheless, attempts have been made to produce a refined chronology for the Later Mesolithic based on changes in the proportion of different microlith types present within individual assemblages (Ellaby 1987; 2004; Jacobi 1976b; 1987; Switsur & Jacobi 1979). Taken together, these studies suggest that assemblages containing significant numbers of rods may represent a 'pioneering' phase of the Later Mesolithic, with scalene triangles becoming dominant a little later at the expense of the rods. By the end of the 7th millennium BC, scalene triangles still dominate but the rods appear to have been largely replaced by convex-backed and lanceolate types. A final Mesolithic phase may be discernible, being represented by assemblages that continue to contain high proportions of scalene triangles but where the convex-backed and lanceolate types decline in number, to be replaced by inversely retouched shouldered points (Ellaby 1987, 63–6; 2004, 22; Jacobi 1987, 164).

The assemblage from Woodbridge Road is not easily placed within this framework. The large number of rods recovered would suggest that it belongs to an early phase within the Later Mesolithic while the presence of some later types, such as convex-backed pieces, crescents and possibly the scalene triangles that showed some indications of shouldering, would indicate later occupation of the site and be more consistent with the OSL dating of the deposition of the sand in which the microliths were contained.

The main basis for ascribing an earlier date within the Later Mesolithic for assemblages with significant numbers of rods rests primarily with considerations of general developments within the Continental Mesolithic that are not necessarily applicable to Britain (R Jacobi, pers comm). Nevertheless, the few dated assemblages that fall within the period of deposition of the sands contain a notably paucity of rods. These include Wawcott XXIII, dated to *c* 5300–4700BC, and Charlwood, dated to the middle of the 5th millennium BC, both of which contain negligible numbers of rods but significant proportions of later types (Ellaby 2004). Perhaps more relevant is the Hermitage Rocks shelter at High Hurstwood in East Sussex, which has provided early 6th millennium BC dates that are broadly contemporary with the onset of sand deposition at Woodbridge Road (Jacobi & Tebbutt 1981). The Woodbridge Road assemblage has higher proportions of scalene triangles than that at Hermitage Rocks, although these form the dominant types at both sites. More pertinently, there are fewer rods at Hermitage Rocks, these forming only 9% of the microliths as compared with the 32% at Woodbridge Road. A number of these, particularly the wider examples (eg fig 7, nos 1–2, 7, 9–10 or 19) are comparable to some of the elongated lanceolate

or convex-backed pieces shown illustrated from Hermitage Rocks (Jacobi & Tebbutt 1981, figs 5 and 6) and demonstrate some of the difficulties inherent in the classification of microliths, particularly if they are incomplete and when shape ranges overlap. Nevertheless, some differences between the assemblages remain; there were undoubtedly more convex-backed pieces at Hermitage Rocks than at Woodbridge Road (11.1% compared with 2.8%) and the Hermitage Rocks assemblage contained a greater range of other late microlith forms, including four-sided pieces and micro-tranchet forms, although crescents were present at both sites (*ibid*). The differences between the microlithic components at these sites are not extensive but they do appear to suggest that the Woodbridge Road assemblage, at least in part, is the earlier of the two. It is possible that the Woodbridge Road material represents the beginnings of an intermediate stage between rod-dominated and later assemblages, a situation suggested for the assemblage from Abinger Common (Ellaby 1987, 65). Perhaps the simplest explanation, however, is that the dating of the onset of sand deposition is an underestimation and that it commenced earlier than the OSL determinations indicate. This is certainly possible as the OSL dates reflect the last reworking of the sand, not its initial deposition, and would allow for the likelihood that the site was repeatedly visited over a period of time, with occupation occurring both prior to the last reworking of the sand and during its continued deposition.

The composition of the struck assemblage demonstrated that on-site reduction was occurring, with raw materials being procured at the site and being converted predominantly into microliths. These dominated the tool inventory, accounting for nearly 80% of the retouched implements. The other retouched pieces consisted mainly of simply backed or truncated blades and, remarkably, there is an almost total absence of other types, including the usually ubiquitous scrapers, piercers and notches. This strongly suggests that very specific activities were conducted at the site, involving the manufacture and repair of microlithic toolkits. The replacement of microliths is suggested by the lack of success at refitting microliths with micro-burins, as well as the high incidence of broken microliths, with 87% being damaged to some extent, suggesting they were discarded as waste. A similar situation was noted at the earlier site of Kettlebury 103, where 77% of the microliths were broken and which was interpreted as being primarily a re-tooling station (Reynier 2002, 229).

Although there has been much discussion of the role of microliths, there is still very little consensus as to what functions they actually performed (Clarke 1976; David 1998; Finley 2000a; 2000b). There is little direct evidence for their use from Britain although on the Continent there are indications that they were used in composite hunting equipment (eg Fischer 1989). Microwear analyses suggest many other potential uses in addition to projectile points, including cutting, sawing and piercing (Findlayson 1990; Finlay 2000a; Grace 1992), although microwear traces on microliths can be ambiguous and they may show a variety of damage caused by their small size and the degree of handling during manufacture and subsequent use (eg Moss 1998, 200). The function of the microliths has major implications for how the site is interpreted. As the bulk of the microliths recovered here consisted of sharp and slender scalene triangles and rods there seems little reason not to suppose that they were used at least primarily for the tipping and barbing of projectile points, even if other potential uses are accepted. If this were the case, then the site would appear to have been used as a hunting and re-tooling camp. Its location, adjacent to the river Wey, is undoubtedly of significance in that this would have afforded a wealth of resources, including fish, wildfowl and other animals that might have made use of the river, in addition to vegetable foods and raw materials. The riverine location of the site also invites the suggestion that some of the microliths recovered might have served as points and barbs fixed on wooden shafts or leisters (pronged spears) used for spearing fish. The shape and size of many of the microliths from the site suggest they could easily have accommodated such a role, and would be compatible with many ethnographically attested fishing implements (eg Curwen 1941). Fishing, alongside game hunting and plant gathering, is generally regarded as an essential subsistence activity during the Mesolithic, and such views are generally supported by a variety of forms of

evidence available from across north-west Europe (eg Smart 2000). Unfortunately, because of the similarity that any postulated fishing spears would have to microlith-tipped arrows, and the unlikelihood that spearing fish would result in impact fractures or microwear traces distinct from those produced by other hunting methods, their potential use in fishing will not easily be resolved. Although isotopic analysis from coastal Mesolithic communities has confirmed extensive exploitation of maritime resources at this time (Schulting *et al* 2004, 144–52), other isotopic work indicates that, for inland communities, fish might not have formed such an important part of the diet as has often been assumed (Schulting & Richards 2000), even though riverbanks would doubtless have provided a wealth of other resources.

The pits add Woodbridge Road to the small but steadily growing repertoire of sites containing Mesolithic subsoil features. They appear to be associated with the general lithic scatter and many were filled with prodigious quantities of burnt flint and knapping waste indistinguishable from that of the general scatter. During the earlier 20th century, pits were considered an integral part of Mesolithic settlements, thought perhaps to represent ‘winter dwellings’ (eg Clark 1937; Clark & Rankine 1939). As the century progressed, the dating and interpretation of these pits as dwellings was increasingly questioned (eg Ellaby 1987). It remains undoubtedly true that the vast majority of Mesolithic sites consist of lithic scatters with an absence of subsoil features and, in many cases, features close to Mesolithic scatters can be shown or are suspected to post-date them significantly. More recently, however, the question of Mesolithic pitting has been renewed with new sites being identified where subsoil features can be more convincingly associated with Mesolithic artefacts (eg Cotton 2004, 23–4; Ellaby 2004). At Charlwood and Bletchingley, both in Surrey, pits appear to have been excavated within and around working or living areas; it has even been suggested that these might represent the beginnings of an earthmoving tradition that develops into the causewayed enclosures of the Neolithic (Cotton 2004; Ellaby 2004). The pits at Woodbridge Road were of a comparable size to those at Charlwood and, although they did not unequivocally enclose or define anything, it is at least possible that they were clustered around the periphery of the main activity areas.

A further possibility is that they might have formed ‘extraction’ pits, either naturally formed by tree-falls or purposefully dug, allowing the procurement of raw materials from the underlying Gravel Terrace deposits. In the heavily forested landscapes of the Later Mesolithic, actual exposures of suitable raw materials would have been limited and tree-throw hollows might have permitted welcome access to underlying flint-rich deposits. The exploitation of gravel flint as exposed by tree-throws during the Mesolithic has been documented at Beddington, further eastwards along the North Downs (Bagwell *et al* 2001). At Farnham, several large pits containing extensive worked and burnt flint assemblages were recorded. These were interpreted as ‘pit dwellings’ but probably also provided the raw materials for the lithic industry recorded there (Clarke & Rankine 1939). A tree-throw hollow at Ashford Prison near Staines produced a large assemblage of knapping waste, apparently representing the reduction of a number of pieces of raw materials from the gravels that the tree-throw had exposed (Carew *et al* 2006). Evans *et al* (1999) have suggested that fallen trees might have served as settlement foci and landscape markers in the thickly wooded environments of the Early Neolithic, which, with their possible additional role as sources of lithic raw materials, could equally apply to the Mesolithic. The pits at Woodbridge Road could have served similar purposes. They all penetrated the overlying sand and into the flint-cobble-rich Terrace Gravel deposits that was the source for much of the resultant worked flint industry. Although some appeared deliberately dug, others may be more easily interpreted as tree-throw hollows. It is possible that some pits were dug once the raw material source in the underlying gravels had been revealed by fallen trees.

This apparent deposition within pits of occupational debris from adjacent activity areas might also prefigure Neolithic practices. Artefact-filled pits often form the only evidence for Early Neolithic settlement locations and these often appear to have been filled with selected detritus generated during occupation (eg Garrow *et al* 2005). Many reasons why such pits

were dug and filled have been put forward but it is now increasingly accepted that some were purposefully dug to receive cultural material and that these practices held meaning over and above the seemingly unlikely need to dispose of unwanted occupational debris in this manner. Their interpretation usually focuses on the metaphorical referencing that their construction and contained deposits might have held for the communities occupying the site (eg Chapman 2000; Thomas 1999). These practices appear to have been designed to convey some form of information and it may be that they marked, defined or commemorated aspects of the occupation during which they were created. The identification of 'rubbish' filled pits at this site and elsewhere could be an indication that this particular form of referencing or communication might have had its antecedents in the Mesolithic.

It is not clear whether the site witnessed a single period of occupation or was repeatedly visited. The possible structuring of the site, with activity areas being surrounded by pitting, would imply an intense but relatively short span to the occupation, but the reality of this scenario is far from certain. The spatial distribution and possible clustering of the artefacts does suggest that flintworking focused around a number of hearths, which might indicate that the site was repeatedly visited by smaller groups, engaged in rather specialised activities as represented by the worked flint. Although the lithic technology and typology is remarkably consistent, its variable condition, with some pieces suffering greater degrees of post-depositional abrasion than others, would also support the notion that the site was repeatedly visited, perhaps over a relatively long period. Additionally, it has been suggested that changes in the nature of retouched inventories and the increased variability in the nature of sites dating to the Later Mesolithic (Myers 1989) reflects smaller task groups, engaged in actively searching out prey within a variety of geographical settings (Eerkens 1998; Myers 1987; 1989). Although the full spatial extent of the occupation at Woodbridge Road cannot be quantified, the overall assemblage is substantial and much larger than would be expected from a single, short-lived and task-specific, occupation, set within a network of encounter hunting spread across the landscape. However, it could have easily accumulated from a series of such visits. Certain locations appear to have been seen as suitable places to routinely return to, even though equivalent locations with similar sets of resources might have been available close by. Such places include the renowned Early Mesolithic site of Star Carr (cf Pollard 2000, 128) as well as many Later Mesolithic coastal sites, where shell middens testify to repeated visits to precisely the same location for perhaps hundreds of years (*ibid*, 129). In this context, the overwhelming emphasis on microlith production and replacement at Woodbridge Road might indicate that it was seen as a notable place, perhaps of some significance in itself or for restricted sections of the community, where a specific set of activities could be appropriately undertaken within the broader network of locations that would have formed a mobile community's perception of the landscape (Barton *et al* 1995; Conneller 2000; Pollard 2000).

There is only limited securely dated environmental evidence covering the Mesolithic period for Surrey (Branch & Green 2004), and even less that relates to the environmental and ecological conditions around the river Wey near Guildford. In general, the evidence from Surrey does suggest that during the later parts of the Mesolithic the landscape was dominated by relatively dense, mixed deciduous woodland, including oak, elm, lime and hazel, with willow and alder along the river margins. There is also some evidence for human impact on the environment by the end of the Mesolithic, including possible attempts at forest clearance and wetland management, which may have even affected the river regime (Branch & Green 2004, 12–13). The burning of reeds and scrub along the river margins has been indicated within the Colne and Lea valleys during the Mesolithic (Bedwin 1991; Lewis *et al* 1992; Rackham & Sidell 2000, 21) and it is possible that similar river-edge management was practised at Woodbridge Road. However, the only evidence for fire-related activities here consisted of the considerable quantities of burnt flint recovered, the extent to which they were burnt suggesting that these were unlikely to have accumulated as a secondary result of burning of the vegetation cover. Nevertheless, if some form of management of parts of the river

margins did take place, then this could have formed part of the reason for the repeated visiting of this location.

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BIBLIOGRAPHY

- Bagwell, M, Bishop, B, & Gibson, A, 2001 Mesolithic and Late Bronze Age activity at London Road, Beddington, *SyAC*, **88**, 289–307
- Barton, R N E, 1987 Vertical distribution of artefacts and some post-depositional factors affecting site formation, in P Rowley-Conwy, M Zvelebil & H P Blackholm (eds), *Mesolithic northwest Europe: recent trends*, 55–62, Sheffield: University of Sheffield
- , 1992 *Hengistbury Head Dorset Volume 2: the Late Upper Palaeolithic and Early Mesolithic sites*, Oxford Univ Comm Archaeol Monogr, **34**
- , Berridge, P J, Walker, M J C, & Bevins, R E, 1995 Persistent places in the Mesolithic landscape: an example from the Black Mountain uplands of South Wales, *Proc Prehist Soc*, **61**, 81–116
- Bedwin, O, 1991 An Early Flandrian peat in the Lea Valley; excavations at the former Royal Ordnance Factory, Enfield Lock 1990, *Essex Archaeol Hist*, **22**, 162–3
- Branch, N P, & Green, C P, 2004 Environmental history of Surrey, in J Cotton, G Crocker & A Graham (eds), *Aspects of archaeology and history in Surrey: towards a research framework for the county*, Guildford: SyAS, 1–18
- Brown, A, 1991 Structured deposition and technological change among the flaked stone artefacts from Cranborne Chase, in J Barrett, R Bradley & M Hall (eds), *Papers on the prehistoric archaeology of Cranborne Chase*, Oxbow Monogr, **11**, 101–33
- Buckley, V, 1990 *Burnt offerings: international contributions to burnt mound archaeology*, Dublin: Wordwell
- Carew, T, Bishop, B J, Meddens, F, & Ridgeway, V, 2006 *Unlocking the landscape: archaeological excavations at Ashford Prison, Middlesex*, Pre-Construct Archaeology Monogr, **5**
- Chapman, J, 2000 Pit digging and structured deposition in the Neolithic and Copper Age of Central and Eastern Europe, *Proc Prehist Soc*, **66**, 61–87
- Clark, J G D, 1934 The classification of a microlithic culture: the Tardenoisian of Horsham, *Archaeol J*, **90**, 52–77
- , 1935 Derivative forms of the *petit tranchet* in Britain, *Archaeol J*, **91**, 32–58
- , 1937 Mesolithic pit dwellings, *Antiquity*, **11(44)**, 476–8
- , Higgs, E S, & Longworth, I H, 1960 Excavations at the Neolithic site at Hurst Fen, Mildenhall, Suffolk (1954, 1957 and 1958), *Proc Prehist Soc*, **26**, 202–45
- , & Rankine, W F, 1939 Excavations at Farnham, Surrey (1937–38): the Horsham culture and the question of Mesolithic dwellings, *Proc Prehist Soc*, **5**, 61–118
- Clarke, D L, 1976 Mesolithic Europe: the economic basis, in G Sieveking, I H Longworth & K E Wilson (eds), *Problems in economic and social archaeology*, 449–82
- Collins, D, & Lorimer, D H, 1989 *Excavations at the Mesolithic site on West Heath, Hampstead 1976–1981*, BAR Brit Ser, **217**
- Conneller, C, 2000 Fragmented space? Hunter-gatherer landscapes of the Vale of Pickering, *Archaeol Rev Cambridge*, **17(1)**, 139–50
- Cotton, J, 2004 Surrey's early past: a survey of recent work, in J Cotton, G Crocker & A Graham (eds), *Aspects of archaeology and history in Surrey: towards a research framework for the county*, Guildford: SyAS, 19–38
- , & Hayes, K, 1980 Finds from Westcroft Road, Carshalton, 1971 and 1978, in C Orton (ed), *The past – our future: studies in local archaeology and history presented to Keith Pryor on the occasion of the Diamond Jubilee of the Beddington*,

- Carshalton and Wallington Archaeological Society*, Beddington, Carshalton Wallington Archaeol Soc Occas Pap, **4**, 13–17
- Curwen, E C, 1941 Some food-gathering implements: a study in Mesolithic tradition, *Antiquity*, **15(60)**, 320–36
- David, A, 1998 Two assemblages of Later Mesolithic microliths from Seamer Carr, North Yorkshire: fact or fancy, in N Ashton, F Healy & P Pettitt (eds), *Stone Age archaeology: essays in honour of John Wymor*, Lith Stud Soc Occas Pap, **6**, 196–204
- Deeves, S, & Bishop, B, 2003 Assessment of an archaeological investigation at the former Seeboard Depot, Woodbridge Road, Guildford, Surrey, Pre-Construct Archaeology unpubl report
- Donahue, R, 2002 Microwear analysis, in J Sidell, J Cotton, L Rayner & L Wheeler (eds), *The prehistory of Southwark and Lambeth*, MoLAS Monogr, **14**, 81–88
- Edmonds, M, 1995 *Stone tools and society: working stone in Neolithic and Bronze Age Britain*, Batsford: London
- Eerkens, J W, 1998 Reliable and maintainable technologies: artifact standardization and the Early to Later Mesolithic transition in Northern England, *Lith Technol*, **23(1)**, 42–53
- Ellaby, R, 1987 Upper Palaeolithic and Mesolithic, in J Bird & D G Bird (eds), *The archaeology of Surrey to 1540*, SyAS: Guildford, 53–69
- , 2004 Food for thought: a Late Mesolithic site at Charlwood, Surrey, in J Cotton & D Field (eds), *Towards a New Stone Age: aspects of the Neolithic in south-east England*, CBA Res Rep, **137**, 12–23
- English Heritage 2005 ALSF summaries 2005/2006: North Park Farm, Bletchingley, (<http://www.english-heritage.org.uk/server/show/ConWebDoc.5618>) (Accessed 17 May 2008)
- Evans, C, Pollard, J, & Knight, M, 1999 Life in woods: tree throws, ‘settlement’ and forest cognition, *Oxford J Archaeol*, **18(3)**, 241–54
- Field, D, 1989 Tranchet axes and Thames picks: Mesolithic core tools from the west London Thames, *Trans London Middlesex Archaeol Soc*, **40**, 1–26
- Findlayson, B, 1990 The function of microliths: evidence from Smittons and Carr, SW Scotland, *Mesolithic Miscellany*, **11(1)**, 2–6
- Finlay, N, 2000a Microliths in the making, in Young 2000, 23–31
- , 2000b Deer prudence, *Archaeol Rev Cambridge*, **17(1)**, 67–79
- Fischer, A, 1989 Hunting with flint-tipped arrows: results and experiences from practical experiments, in C Bonsall (ed), *The Mesolithic of Europe: papers presented at the third International Symposium, Edinburgh 1985*, Edinburgh: John Donald Press, 29–39
- Gabel, G, 1976 *St Catherine’s Hill: a Mesolithic site near Guildford*, SyAS Res Vol, **3**, 77–101
- Garrow, D, Beadsmore, E, & Knight, M, 2005 Pit clusters and the temporality of occupation: an earlier Neolithic site at Kilverstone, Thetford, Norfolk, *Proc Prehist Soc*, **71**, 139–57
- Grace, R, 1992 Use wear analysis, in Healy *et al* 1992, 53–63
- Green, H S, 1980 *The flint arrowheads of the British Isles*, BAR Brit Ser, **75**
- Harding, P, 2000 A Mesolithic site at Rock Common, Washington, West Sussex, *Sussex Archaeol Collect*, **138**, 29–48
- Hawkins, D, 2002 Archaeological desk based assessment: land at Woodbridge Road, Guildford, Surrey, CgMs unpublished paper
- , 2003 Specification for an archaeological evaluation: land at Woodbridge Road, Guildford, Surrey, CgMs unpubl paper
- Healy, F, Heaton, M, & Lobb, S, 1992 Excavations of a Mesolithic site at Thatcham, Berkshire, *Proc Prehist Soc*, **58**, 41–76
- Hodder, M A, & Barfield, L H (eds), 1991 *Burnt mounds and hot stone technology. Papers from the second International Burnt Mound Conference, Sandwell, 12th–14th October 1990*, Sandwell: Sandwell Metropolitan Borough Council
- Hooper, W, 1933 The pygmy flint industries of Surrey, *SyAC*, **41**, 50–78
- Howe, T, Jackson, G, & Maloney, C, 2003 Archaeology in Surrey 2002, *SyAC*, **90**, 347–71
- , 2004 Archaeology in Surrey 2003, *SyAC*, **91**, 315–35
- , Jackson, G, Maloney, C, & Saich, D, 2000 Archaeology in Surrey 1997–9, *SyAC*, **87**, 183–218
- Jacobi, R, 1976a The Mesolithic of Sussex, in P L Drewett (ed), *Archaeology in Sussex to AD 1500*, CBA Res Rep, **29**, 15–22
- , 1976b Britain inside and outside Mesolithic Europe, *Proc Prehist Soc*, **42**, 67–84
- , 1987 Misanthropoc miscellany: musings on British Early Flandrian archaeology and other flights of fancy, in P Rowley-Conwy, M Zvebil & H P Blackholm (eds), *Mesolithic Northwest Europe: recent trends*, Sheffield: Department of Archaeology and Prehistory, University of Sheffield, 163–8
- Jacobi, R M, & Tebbutt, C F, 1981 A Late Mesolithic rock-shelter at High Hurstwood, Sussex, *Sussex Archaeol Collect*, **119**, 1–36
- Lacaille, A D, 1942 Scottish micro-burins, *Proc Soc Antiq Scot*, **76**, 103–19
- , 1961 Mesolithic facies in Middlesex and London, *Trans London Middlesex Archaeol Soc*, **20(3)**, 101–49
- , 1966 Mesolithic facies in the Transpontine fringes, *SyAC*, **63**, 1–43
- Leary, J, Branch, N, & Bishop, B J, 2005 10,000 years in the life of the river Wandl: excavations at the former Vinamul site, Butter Hill, Wallington, *SyAC*, **92**, 1–28
- Lewis, J S C, Wiltshire, P E J, & Macphail, R, 1992 A Late Devensian/Early Flandrian site at Three Ways Wharf, Uxbridge: environmental implications, in S Neesham & M G Macklin (eds), *Alluvial archaeology in Britain*, Oxbow Monogr, **27**, 235–47

- Moore, J, & Jennings, D, 1992 *Reading Business Park: a Bronze Age landscape*, Thames Valley Landscapes: The Kennet Valley, **1**
- Moss, E, 1998 Microscopic analysis, in A David, Two assemblages of Later Mesolithic microliths from Seamer Carr, North Yorkshire: fact and fancy, in N Ashton, F Healy & P Pettitt (eds), *Stone Age archaeology: essays in honour of John Wymer*, Lith Stud Soc Occas Pap, **6**, 200
- Myers, A M, 1987 All shot to pieces? Inter-assemblage variability, lithic analysis and Mesolithic assemblage 'types'; some preliminary observations, in A G Brown & M R Edmonds (eds), *Lithic analysis and later British prehistory: some problems and approaches*, BAR Brit Ser, **162**, 137–53
- , 1989 Lithics, risk and change in the Mesolithic, in I Brooks & P Phillips, *Breaking the stony silence: papers from the Sheffield Lithics Conference 1988*, BAR Brit Ser, **213**, 131–60
- Newcomer, M H, 1976 Spontaneous retouch, in F H G Engelen (ed), *Tweede Internationale Symposium over Vuursteen, Starvingia*, **3**, Nederlandse Geologische Vereniging, 62–4, Netherlands
- Oakley, K P, Rankine, W F, & Lowther, A W G, 1939 *A survey of the prehistory of the Farnham district (Surrey)*, Guildford: SyAS
- Pitts, M W, & Jacobi, R M, 1979 Some aspects of change in flake stone industries of the Mesolithic and Neolithic in southern Britain, *J Archaeol Sci*, **6**, 163–77
- Pollard, J, 2000 Ancestral places in the Mesolithic landscape, *Archaeol Rev Cambridge*, **17(1)**, 123–38
- Poulton, R, & Woods, H, 1984 *Excavations on the site of the Dominican Friary at Guildford, 1974 & 1976*, SyAS Res Vol, **9**
- Rackham, J, & Sidell, J, 2000 London's changing landscapes: the changing environment, in *The archaeology of Greater London*, MoLAS Monogr Ser, 11–27
- Rankine, W F, 1936 A Mesolithic site at Farnham, Surrey, *SyAC*, **44**, 25–46
- Reynier, M J, 2000 Thatcham revisited: spatial and stratigraphic analyses of two sub-assemblages from site III and its implications for Early Mesolithic typo-chronology in Britain, in Young 2000, 33–46
- , 2002 Kettlebury 103: a Mesolithic 'Horsham' type stone assemblage from Hankley Common, Elstead, *SyAC*, **89**, 211–31
- Schmalz, R F, 1960 Flint and the patination of flint artefacts, *Proc Prehist Soc*, **26**, 44–9
- Schulting, R J, & Richards, M P, 2000 The use of stable isotopes in studies of subsistence and seasonality in the British Mesolithic, in Young 2000, 55–65
- , Tresset, A, & Dupont, C, 2004 From harvesting the sea to stock rearing along the Atlantic façade of North-West Europe, *J Human Palaeoecology*, **9(2)**, 143–54
- Smart, D, 2000 Design and function in fishing gear: shell mounds, bait and fishing practices, in Young 2000, 15–22
- Switsur, V R, & Jacobi, R M, 1979 A radiocarbon chronology for the early postglacial stone industries of England and Wales, in R Berger & H E Suess (eds), *Radiocarbon dating*, Berkeley & London: University of California Press, 42–68
- Thomas, J, 1999 *Understanding the Neolithic: a revised second edition of Rethinking the Neolithic*, London: Routledge
- Turner, D, 1966 Excavations at Orchard Hill, Carshalton, *SyAC*, **49**, 56–74
- Wymer, J J, 1962 Excavations at the Maglemosian sites at Thatcham, Berkshire, England, *Proc Prehist Soc*, **28**, 329–61
- Young, R (ed), 2000 *Mesolithic lifeways: current research from Britain and Ireland*, Leicester Archaeology Monogr, **7**

