

THE FLINT FROM PERRY OAKS

by Kate Cramp

Introduction

A total of 3181 struck flints were recovered from the Perry Oaks evaluation (POK96), Western Perimeter Road (WPR98), Northern Taxi Way (GAI99) and Grass Area 21 (GAA00). These sites produced a further 37,431 pieces (over 230 kg) of burnt unworked flint (Table 1). The majority of the struck flint and burnt unworked flint was recovered from WPR98, which produced a total of 2126 struck flints and 30836 pieces of burnt unworked flint weighing nearly 204 kg. A sizeable assemblage was also recovered from POK96, which yielded a total of 824 struck flints and 6072 (21.5 kg) of burnt unworked flint. Much small quantities were recovered from the Northern Taxi Way and Grass Area 21.

Table 1. Summary of the struck flint and burnt unworked flint assemblage from Perry Oaks, Heathrow.

Site code:	Site name:	Struck flint		Burnt unworked flint	
		Number:	Weight (g)	Number:	Weight (g)
POK 96	Perry Oaks evaluation	824	5814	6072	21472
WPR 98	Western Perimeter Road	2126	17023	30836	203972
GAI 99	Northern Taxi Way	204	2876	339	3687
GAA 00	Grass Area 21	27	249	184	1611
All sites total:		3181	25962	37431	230742

The flintwork represents a long-term human presence in the general Perry Oaks area, extending from the Lower Palaeolithic period to the late Bronze Age, although presumably punctuated by periods of little or no human occupation. The range of spot-dated diagnostic types (e.g. axes, microliths and arrowheads) reveals the longevity of human activity, although is not a reliable reflection of intensity (Table 2). Middle and later Bronze Age flintwork, for example, is characterised by a restricted range of formal tool types (Young and Humphrey 1999) and is consequently under-represented in this quantification.

Table 2: Number of diagnostic flint tools by phase and by area.

Phase:	GAA00	GAI99	POK96	WPR98	Total:
Lower Palaeolithic				1	1
Late Mesolithic				1	1
Mesolithic	1		1	7	9
Early Neolithic				1	1
Neolithic			2	7	9
Mid to late Neolithic	1			5	6
Late Neolithic to early Bronze Age			2	3	5
Early Bronze Age		1	1	3	5
Total:	2	1	6	28	37

The Lower Palaeolithic period is represented by a single redeposited handaxe (Fig. 1.1) from WPR98 and an end scraper (Fig. 1.2) from the primary fill of feature 214015, a Middle Bronze Age ditch on GAI99. Several flakes and other pieces may

also belong to a Palaeolithic industry but could not be confidently assigned to this period. Examples include a tertiary flake from a late Bronze Age pit, revealed in area 1A on GAI99 (216064) and a secondary flake from the topsoil on WPR98 (100000). The Mesolithic assemblage consists of a small number of diagnostic flint types, including one microlith and two microburins, which mostly occurred as residual artefacts in later features or layers; no *in situ* scatters of this date were identified.

The majority of the Perry Oaks flint assemblage derives from extensive activity in the Neolithic and Bronze Age period. The deposition of flintwork reached a peak at this time, with large collections of debitage, tools and cores being discarded in relatively discrete areas such as ditches, pits and tree-throw holes. Numerous features produced coherent, technologically diagnostic assemblages in fresh condition, in some cases with refitting elements (e.g. pit 129109 from WPR98 and pit 216063 from GAI99). Several potentially *in situ* groups were identified in the course of the analysis, which have presented the opportunity for further analysis.

A selection of the struck flints from the Perry Oaks excavations are illustrated in Figure 1; the accompanying catalogue is given in Appendix I.

Methodology

All the flints within the assemblage were individually examined and assigned to a broad category according to debitage, core or tool type with further distinction made using the sub-category field. A complete list of category types can be found in Appendix II.

Debitage categories include flakes, blades, bladelets, bladelike flakes, unclassifiable waste and chips. Unclassifiable waste is here defined as shattered pieces, frequently non-bulbar, which are produced during knapping. Particular unretouched flake types, such as those from polished or ground implements, core rejuvenation flakes and thinning flakes, were recorded as separate categories. The terminology for retouched forms uses standard morphological descriptions, for example Bamford (1985, 73-7), Healy (1988, 48-9) and Saville (1981, 7-11).

Cores/core fragments were classified by platform and removal type; complete specimens and partially-worked nodules were individually weighed. Chips were defined as pieces whose broadest surface was less than 10 mm², including small flakes or fragments of flakes (Newcomer and Karlin 1987, 33).

The condition and degree of cortication was noted for each artefact, along with evidence of burning, breakage and use. Dating was attempted throughout. The flints were individually numbered and recorded in order to facilitate revisiting the material and appending additional data at a later stage. Bulk records were used for burnt unworked flint, which were quantified by piece and by weight. The data was entered directly on to an MS Access database.

Condition

The condition of the flintwork varies, but a large proportion (nearly 60%) is in a fresh or minimally damaged condition implying negligible post-depositional disturbance. Severe instances of edge-damage and surface rolling are generally associated with residual pieces found in later features. Material from topsoil, ploughsoil and subsoil layers also tends to be in a poor condition. Around 8% of the assemblage (250 flints) showed this type of post-depositional damage, presumably following successive redeposition, while another 1% (32 flints) displayed the deep V-shaped notches and nicks typical of modern plough-damage (Mallouf 1982).

The vast majority of flints (over 85%) are uncorticated. A small number (*c.* 5%) display a light incipient cortication, which appears as a white or bluish-white surface discoloration. The rest of the assemblage, around 300 flints providing the remaining 10%, were characterised by a very heavy, opaque white cortication. Although not entirely reliable as a chronological indicator, a loose correlation between cortication and age is apparent. It was noted that a heavy degree of cortication tends to be associated with material of Mesolithic or earlier date, while the majority of the Neolithic and Bronze Age collection is uncorticated. This has, in a number of instances and as a complement to technological analysis, assisted in the isolation of residual pieces within a particular feature group.

Around 30% of the assemblage is iron-stained yellow or orange. In most cases, this staining appears to have been a feature of the raw material, rather than a post-depositional alteration. Other pieces appear to have become iron-stained *after* manufacture, as occasionally evident by areas of modern damage exposing the original colour of the flint; this may reflect deliberate attempts to alter the appearance of the flint.

Raw material

For the most part, the raw material used for knapping and burning was obtained from local gravel deposits, which are immediately available on and around the site. These nodules typically contain frequent thermal fractures and, although they would have provided a convenient and plentiful supply of flint for most routine purposes, are unlikely to have been of a particularly high flaking quality. The Bronze Age assemblage, in particular, contains numerous partially-worked nodules, angular flakes and pieces of irregular waste that have been struck down thermal faults, a factor that no doubt contributes to the general tendency towards thick and angular flake forms in this period.

At least 1% of the assemblage (38 pieces) has been manufactured from bullhead flint, which is distinguished by a buff- or orange-coloured band below a dark olive-green cortex. Additional non-cortical pieces may be present, but these cannot be confidently isolated in the absence of the distinctive cortex. Bullhead flint occurs at the base of the Reading Beds (Dewey and Bromehead, 1915; Shepherd 1972, 114). These nodules would therefore have been available relatively locally, at a distance of between 10km and 20km from the site.

A similar proportion of the assemblage (40 pieces) was provided by chalk flint sources. These pieces are distinguished by a thick, white cortex and a grey or black interior. Possible sources include the Upper Chalk, which lies around 10km to the south-west of the site. While it seems likely that the majority of nodules were gathered from superficial deposits of chalk flint, the flakes and fragments from polished implements almost certainly come from mined sources. While these implements were probably introduced to the site as finished artefacts, the presence of eight polished flakes suggests that they were also used as a source of raw material. Furthermore, the axe fragment with indirectly refitting flake from Neolithic pit 129109 on WPR 98 (Fig. 1.3) provides compelling evidence for the reduction of polished implements took place on site.

It may be significant that, as a group, the bullhead and chalk flint assemblage is marked by an unusually high number of retouched pieces. A total of 31 tools were identified within the collection of 78 pieces, accounting for nearly 40% compared to 15% in the gravel flint assemblage. This implies that raw material types were being treated differently. Perhaps non-local flint was usually brought to the site in the form as finished tools, rather than as unworked nodules ready for knapping. Bullhead flint and chalk flint were rarely used for burning, whereas gravel flint provided an almost limitless supply for such activities. There may also be a chronological dimension to this pattern of raw material consumption. At a very broad level, it seems that the use of non-local flint was at its peak during the Neolithic period, a trend that may reflect the particular social significance of flint at this time.

The assemblage

A total of 8131 struck flints (26 kg) and 37,431 pieces (23 kg) of burnt unworked flint were recovered during excavation at Perry Oaks, Heathrow (Table 1). The flint is quantified by type and by site in Table 3. The flintwork spans the Palaeolithic to Bronze Age period, although it is from the Neolithic period that large *in situ* assemblages of flintwork start appearing in pits and other negative features. The following offers a description of the flint assemblage from Perry Oaks, organised in broad chronological order, with detailed discussion of the more significant groups.

Palaeolithic

A total of five artefacts were considered to be of a possible Palaeolithic date, although only one of these (the handaxe from WPR98) can be confidently attributed to the period. The remainder were tentatively assigned a Palaeolithic date according to their general technological appearance and their condition. These artefacts possess a distinctive orange-brown iron-staining combined with a heavy cortication and have been heavily rolled, to the extent that original flake removals are abraded and indistinct.

None of these flints came from *in situ* deposits. Two were found as residual artefacts in later Bronze Age features and three were recovered from topsoil layers. WPR98 produced three unstratified artefacts, all of which came from the topsoil (layer

100000). These included an incomplete secondary flake, a piercer and a small hand-axe (Fig. 1.1). The handaxe has been bifacially worked and measures 53 mm long, 38 mm wide and 18mm thick. Like the handaxe, the piercer is heavily rolled and iron-stained. It has been manufactured on a thermal fragment, which has been minimally retouched to produce a robust boring point.

Table 3. Detailed quantification of the struck flint by site from Perry Oaks, Heathrow.

Category:	Sub-category:	Site:				Total:
		POK 96	WPR 98	GAI 99	GAA 00	
Flake/broken flake	Primary flake	94	184	24		302
	Secondary flake	274	553	78	13	918
	Tertiary flake	120	359	24	5	508
	Flake from a polished implement	2	6			8
	Unclassifiable waste	9	70	2		81
Blade/broken blade	Blade	7	36	2	1	46
	Bladelet	11	16			27
	Bladelike flake	15	52	5		72
Core preparation flake	Core face/edge rejuvenation flake	2	3			5
	Rejuvenation flake tablet	3	5			8
Axe/adze sharpening flake	Axe/adze thinning flake	1	3			4
Burin spall	Burin spall		1		1	2
Microburin	Microburin		2			2
Chip/sieved chip	Chip	141	449	15		605
Core/core fragment	Single platform flake core	6	19	2		27
	Multi-platform flake core	17	60	12		89
	Levallois/other discoidal flake core		1			1
	Keeled core		1			1
	Single platform blade core		1			1
	Opposed platform blade core		1			1
	Core on a flake	1	12	7		20
	Unclassifiable core		1			1
Nodule	Partially worked nodule	19	34	8		61
Retouched blade/flake	Retouched flake	47	107	10	2	166
	Retouched blade(let)	8	18		1	27
	Unclassifiable retouch	1	16			17
Scraper	End scraper	2	13	4		19
	Side scraper	6	5		1	12
	End-and-side scraper	6	15	3	2	26
	Disc scraper	1	1			2
	Thumbnail scraper	1	2	1		4
	Unclassifiable scraper	3	10	4		17
Knife	Backed knife	2	1			3
	Unclassifiable knife		1			1
Microolith/backed bladelet	Microolith		1			1
Serrate/denticulate	Serrated piece	4	13			17
	Denticulate	4	4			8
	Notched piece	7	16			23
Piercer	Awl/piercer	7	20	2		29
	Spurred piece	3	5	1		9
Arrowhead	Leaf-shaped		1			1
	Chisel		3		1	4
	Oblique		2			2
	Barbed-and-tanged		1			1
Axe/core tool	Flaked axe		1			1
	Polished axe		1			1

Total:	824	2126	204	27	3181
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Excavation of the GAI99 area yielded two possible Palaeolithic pieces. An end scraper (Fig. 1.2) in a rolled and iron-stained condition was recovered from the primary fill of feature 214015, a Middle Bronze Age ditch. The scraper has been retouched on one end of an elongated thermal fragment; a shallow notch on one of the longer sides may have been related to the method of hafting. A complete tertiary flake was recovered from the secondary fill of feature 216063, a Late Bronze Age pit on area 1A. This piece has been cautiously attributed to the Palaeolithic on account of its heavy-duty appearance and rolled condition.

Evidence for human activity in the Palaeolithic period at Perry Oaks is limited to what constitutes a small, residual assemblage, probably representing a considerable length of time. The artefacts occur as redeposited finds in later or unstratified contexts, and given their poor condition it is certain that they have been subjected to a considerable amount of post-depositional movement. Some or all of the artefacts may have been derived from the gravel deposits, and therefore may not necessarily be indicative of an immediate human presence in the landscape. It is thus difficult to speculate about human activity in this period within the defined Perry Oaks area, but it may be revealing to consider the artefacts within a broader geographical context, taking into account other Palaeolithic findspots in the Greater London area.

Mesolithic

Mesolithic occupation, as reflected by the distribution of diagnostic flint types, appears to have been both occasional and ephemeral. The flintwork forms a diffuse, residual spread across the site; no *in situ* scatters were identified. It seems likely that this pattern reflects short-term occupation, rather than a longer term encampment, and may indicate nothing more than intermittent visits to the site in the course of a wider territorial range.

Closely datable types include one microlith from one of the ditches (feature 107084) composing the Romano-British ‘ladder’ enclosure on WPR98. The microlith has lost its tip and tail, but may derive from a narrow-blade form comparable to Jacobi’s class 5 (Jacobi 1978, 16, fig. 6). These types are usually found in late Mesolithic assemblages, but an isolated find cannot be reliably dated. Two microburins, the by-product of microlith manufacture using the microburin technique (Inizan *et al.* 1992, 69, fig. 24), were also recovered from the WPR98 site. One of these is a proximal piece with a right-hand notch; this piece came from a late Neolithic pit (feature 127022). The other microburin, a medial example, and was recovered from feature 107042, an early Neolithic horseshoe enclosure.

Two burin spalls, detached from a flake or blade during burin manufacture, can also be attributed to the Mesolithic period (for a fuller description of the burin blow technique, see Tixier *et al.* 1992, 77-9). These came from a middle Bronze Age ditch on GAA00 (feature 401075) and from a late Bronze Age ditch on WPR98 (feature 160104). Four axe-thinning flakes, which may derive from Mesolithic *tranchet* axes, were also recovered from the excavations. Two of these came from a Neolithic pit (feature 129109) on WPR98; another was found within an early Neolithic tree-throw

hole (feature 156191) on the same site. The eastern cursus ditch on POK96 (feature 961501) produced the fourth axe-thinning flake.

Table 4. Distribution of possible Mesolithic flints, by feature.

Feature:	Interpretation:	Feature cut date:	No. of Mesolithic flints:
POK96			
961017	Gully	Early Neolithic	1
961501	Ditch	Neolithic	2
961508	Ditch	Late Bronze Age	1
961540	Natural Feature	Mesolithic	1
962363	Ditch	Middle Bronze Age	1
963163	Tree Throw	Unphased	1
963218	Ditch	Middle Bronze Age	1
Undefined	Undefined	Unphased	14
WPR98			
106013	Cremation	Late Bronze Age	1
107042	Ditch	Early Neolithic	2
107084	Ditch	Romano-British	1
108022	Ditch	Middle Iron Age	1
113131	Ditch	Romano-British	1
119240	Ditch	Middle/Late Iron Age	1
119259	Ditch	Middle/Late Iron Age	1
120072	Tree Throw	Mesolithic	1
121173	Ditch	Neolithic	1
122036	Ditch	Late Bronze Age	1
122084	Pit	Mesolithic	1
127022	Pit	Late Neolithic	1
128028	Ditch	Neolithic (western cursus ditch)	5
129013	Posthole	Neolithic	1
129109	Pit	Neolithic	2
132190	Posthole	Middle Bronze Age	1
132199	Undefined	Unphased	1
133198	Water-hole	Roman	1
134029	Ditch	Early Neolithic	2
135055	Pit	Late Bronze Age	1
136177	Pit	Neolithic	1
137114	Pit	Middle Iron Age	1
141228	Pit	Neolithic	1
147106	Ditch	Middle Bronze Age	1
148029	Ditch	Early Iron Age	1
148093	Ditch	Romano-British	1
148303	Pit	Middle Iron Age	1
149209	Posthole	Late Bronze Age	1
151031	Pit	Unphased	1
156191	Tree Throw	Early Neolithic	11
158143	Ring Gully	Middle Iron Age	1
160016	Ditch	Middle Bronze Age	1
160104	Ditch	Late Bronze Age	2
163135	Tree Throw	Mesolithic	1
166195	Ditch	Romano-British	1
167037	Ring Ditch	Middle Iron Age	1
172081	Tree Throw	Mesolithic	1
180080	Well	Early Iron Age	1
GAI99			
218038	Ditch	Middle Bronze Age	1

GAA00			
401075	Ditch	Middle Bronze Age	1
Total:			80

The presence of the microburins, burin spalls and axe-thinning suggests that some tool manufacture or maintenance was being performed at the site, although any associated settlement has left little trace.

While diagnostic tool types, such as microburins and microliths, provide a more reliable and quantifiable resource, it is possible that a significant quantity of undiagnostic Mesolithic flintwork is present but has been subsumed by the early Neolithic assemblage with which it shares many technological characteristics. This invisible element may, not entirely but to some extent, account for the apparent under-representation of the period in terms of flintwork from the site. Examples include some of the blades, bladelets and rejuvenation flakes, along with the two blade cores from WPR98. These pieces were isolated according general technological traits, such as the presence of platform edge abrasion and evidence for the use of soft-hammer percussion.

These potentially Mesolithic artefacts are quantified by feature and phase in Table 4, which provides an indication of the low numbers of flints involved. The majority occurred as occasional residual pieces within later features, as part of a general low-density scatter. Feature 156191, an early Neolithic tree-throw, contained a total of eleven flints including an axe-thinning flake that could belong to a Mesolithic industry; given the technological similarity between Mesolithic and early Neolithic flintwork, many of these probably form part of the early Neolithic assemblage.

Mesolithic fire pits

Features dated independently to the Mesolithic include a series of fire pits, each measuring less than 1 m in diameter, which were located in a roughly linear scatter between the two cursus ditches on WPR 98 (Areas B and C). While most were filled with large deposits of burnt unworked flint, six of these pits also produced very small quantities of struck material (Table 5). The struck component is undiagnostic and in poor condition, and may be unrelated to the construction and use of the fire pits. It seems likely that a certain amount of residual material was incorporated into the fill of the features from the time that they were cut and, as such, further interpretation is to a large extent prohibited.

Table 5. Quantification of struck flint and burnt unworked flint from the Mesolithic fire pits between the two cursus ditches on WPR98.

		Mesolithic pit:						Total:
Category:	Sub-category:	120028	160021	165003	165005	165007	165009	
Flake/broken flake	Primary flake	1	1	1	1		2	6
	Secondary flake		1		1	1	1	4
	Tertiary flake		1		2			3
	Unclassifiable waste		5		4	1		10
Chip/sieved chip	Chip	1	1		1			3
Retouched flake/blade	Retouched flake	1			1			2
Total:		2	9		10	2	3	26

Burnt unworked flint	No. of pieces	3154	388	852	1624	164	298	6480
	Weight (g)	12390	924	2674	7534	916	1534	25972

While there is little to link the struck assemblage to the construction and use of these features, several of the pits contained large assemblages of burnt unworked flint that have been dated by thermoluminescence to the 7th millennium cal. BC. Two deposits within pit 165005 contained 1624 pieces (7534 g) of burnt unworked flint, while pits 120028 and 165003 contained single deposits of 3154 pieces (12390 g) and 852 pieces (2674 g) respectively. Smaller assemblages were recovered pit 160021 (388 pieces, 924 g) and pit 165007 (164 pieces, 916 g), while pit 137021 only contained burnt unworked flint (107 pieces 530 g) and did not produce any struck material. These deposits seem to have resulted from the *in situ* burning of the natural gravels, perhaps the remains of a burnt mound, rather than being placed in the pit from elsewhere.

On the evidence of the flintwork alone, the pattern of deposition would seem to suggest fairly low-density activity in the area during the Mesolithic period. The thin distribution of typologically datable tools, for example, might be consistent with occasional, brief visits to the area during a wider-ranging hunting expedition. The presence of two microburins and two burin spalls indicates that limited tool manufacture probably took place, although any associated activity has left little trace and there is no clear evidence for even the most temporary of settlement within the excavated area. The burnt flint pits on WPR98 that anticipate the later cursus monument, however, suggest that the area was visited more regularly and may have been the focus of certain formalised deposits and practices.

Early Neolithic

The early Neolithic is represented by a single leaf-shaped arrowhead (Fig. 1.4) from WPR98, which occurred as an isolated find in a tree-throw hole exposed on area A6 (feature 180045). It is possible that a number of the flakes struck from polished implements, one of which can be refitted to an axe fragment (Fig. 1.3), are also of early Neolithic date. Beyond these diagnostic tools, identifying early Neolithic occupation from the flintwork alone is problematic as relatively few demonstrably early Neolithic assemblages were recovered from the Perry Oaks excavations. Some material was recovered from tree-throw holes and may reflect the secondary deposition of middened remains (e.g. Evans *et al.* 1999). Examples include the large assemblage of flintwork from tree-throw hole 156191 on WPR98; additional collections were recovered from the later excavations at Terminal Five (Brown *et al.* in prep).

WPR 98 Area A6: tree-throw hole 156191

Feature 156191, an early Neolithic tree-throw hole, was located some 45 m to the east of a pair of possibly Mesolithic features on WPR98 (Area A6). The tree-throw hole, which measured approximately 3 m by 1.7 m, contained a large assemblage of 230 struck flints including 86 chips (Table 6). This material, along with a further 137 pieces (514 g) of burnt unworked flint, was recovered almost exclusively from context 148109; a single flake came from context 156190. The flintwork is in fresh,

uncorticated condition and can be dated to the early Neolithic on technological and typological grounds.

Table 6. Struck flint by type from features discussed in text.

		WPR98	WPR98	WPR98	WPR98	WPR98	WPR98	WPR98	GAI99	POK96	Total:
		EN	N/LN	LN/EBA	LN/BA	EBA	LBA	LBA	LBA	BA	
		Tree-throw hole	Pit	Tree-throw hole	Pit	Pit	Waterhole	Ditch	Pit	Tree-throw hole	
Category:	Sub-category:	156191	129109	125108	136177	127022	157065	555348	216063	961543	
Flake/broken flake	Primary flake	10	1	6	7	4	1	10	12	3	54
	Secondary flake	54	12	19	15	13	2	18	21	13	167
	Tertiary flake	37	25	42	6	11	4	5	6	1	137
	Flake from a polished implement	1	3								4
	Unclassifiable waste	1						32	1		34
Blade/broken blade	Blade	11	1								12
	Bladelet	6	1	1						1	9
	Bladelike flake	8	5	1	1	1	3		1		20
Core preparation flake	Core face/edge rejuvenation flake	1									1
	Rejuvenation flake tablet	1	1								2
Axe/adze sharpening flake	Axe/adze thinning flake	1	2								3
Microburin	Microburin					1					1
Chip/sieved chip	Chip	86	1	61	1	13		1	10	14	187
Core/core fragment	Single platform flake core		1		1			1	2		5
	Multi-platform flake core					1		1	3	2	7
	Levallois/other discoidal flake core					1					1
	Opposed platform blade core				1						1
	Core on a flake	1	1						1		3
	Unclassifiable core							1			1
Nodule	Partially worked nodule			1				2	2		5

Table 6 (continued). Struck flint by type from features discussed in text.

		WPR98	WPR98	WPR98	WPR98	WPR98	WPR98	WPR98	GAI99	POK96	Total:
		EN	N/LN	LN/EBA	LN/BA	EBA	LBA	LBA	LBA	BA	
		Tree-throw hole	Pit	Tree-throw hole	Pit	Pit	Waterhole	Ditch	Pit	Tree-throw hole	
Category:	Sub-category:	156191	129109	125108	136177	127022	157065	555348	216063	961543	
Retouched blade/flake	Retouched flake	3				5	1	1	1		11
	Retouched blade(let)	1	1				1				3
	Unclassifiable retouch			1			1				2
Scraper	End scraper	2							2		4
	Side scraper	1									1
	End-and-side scraper			2					1		3
	Unclassifiable scraper	1					1		3		5
Serrate/denticulate	Serrated piece	2					1				3
	Notched piece		1								1
Piercer	Awl/piercer	1				2					3
	Spurred piece	1									1
Axe/core tool	Flaked axe										
	Polished axe		1								1
Total:		230	57	134	32	52	15	72	66	34	692
No. of burnt struck flints:		14	1	4		1		1			21
No. of broken struck flints:		64	25	27	5	18	7	30	12	10	198
No. of burnt unworked flints:		137	710	29		289	2493	1	27	7	3693
Weight (g) of burnt unworked flints:		514	4130	10		1203	8238	26	640	32	14793

While the majority of the struck flints represent the use of locally available river gravel, bullhead flint and chalk flint are also present in small quantities. One of the serrated flakes, for example, has been manufactured on a bladelike blank of bullhead flint (Fig. 1.5). Local nodules, on the other hand, seem to have been preferred for burning.

The assemblage is dominated by flakes (101 pieces) and chips (86 pieces), which together provide around 80 % of the struck assemblage. One of the flakes has been struck from a polished implement, probably an axe, and can be dated to the Neolithic period. Blades, bladelets and bladelike flakes are represented by a combined total of 25 pieces that provide around 20 % of the debitage component. While less common than flakes, blades are nonetheless sufficiently numerous to suggest a date in the earlier Neolithic (e.g. Ford 1987). The majority of flakes have been struck using a soft percussor, such as an antler hammer, and many display abraded platform edges and dorsal blade scars.

A total of 86 chips were recovered from the deposit, almost certainly reflecting *in situ* knapping activity. Along with several of the flakes, these chips seem to be the product of a single core and probably result from a discrete knapping event. Only one core (42 g), manufactured on a flake, was recovered from the feature; this suggests that the larger elements of knapping waste were removed and deposited elsewhere. Some of the flake material may refit, although brief attempts were unsuccessful.

The assemblage contains twelve retouched tools (8.3 %, excluding chips), ranging from retouched flakes and scrapers to piercing tools and serrated flakes. Numerous unretouched flints also display utilised edges. These retouched and utilised pieces are combined with the knapping waste described above, suggesting that the assemblage results from a series of activities performed on several occasions.

Middle and later Neolithic

Diagnostic tools datable to the middle and late Neolithic include four chisel arrowheads: one from ditch 149021 on WPR98 Area A3 (Fig. 1.6), another from the topsoil (402001) on GAA00, and two from the topsoil (100000) on WPR98. One Levallois core (Fig. 1.7), weighing 52 g, was recovered from pit 127021 during the excavation of WPR98 Area A8; one keeled core (97 g) came from pit 136174 in the same area. These core types have been associated with the production of blanks for transverse arrowheads (e.g. Green 1974, 84) and may therefore date to the mid or late Neolithic.

A total of eight flakes from polished implements, probably axes, were also recovered from the site. One of the flakes could be refitted to a polished axe fragment (Fig. 1.3); both pieces were found within a Neolithic pit (feature 129109) on WPR 98 Area C4. This pit, which is fully discussed below, produced two additional polished flakes that could not be refitted to the axe fragment. Of the remaining five pieces, one came from a late Bronze Age ditch (feature 230297) on POK96, one from the eastern cursus ditch (feature 230333) on the same site, another from an early Neolithic tree-throw hole (feature 148110) on WPR98 Area A6, and two from the WPR98 topsoil

(100000). These finds can be broadly dated to the Neolithic and, as such, several are likely to represent redeposited finds.

Several flint assemblages of reasonable size were dated to the middle or late Neolithic. These came from pits (e.g. Pit 129109 on Area C4 and pit 136177 on Area 8, both WPR 98) and, less frequently, tree-throw holes (e.g. early Neolithic tree-throw hole 125108 on Area A6, WPR 98). The assemblages from the C1 and C2 Cursus monuments on POK 96 and WPR 98, along with the flintwork from the HE1 ring ditch on WPR 98, seem to largely post-date the construction of these early Neolithic features and are therefore discussed in this section. Numerous additional features of middle or late Neolithic date produced smaller assemblages of flintwork which, although less suitable for statistical analysis, will nonetheless contribute to the wider picture of later Neolithic activity in the area.

WPR 98 Area C4: pit 129109

A total of 57 struck flints were recovered from two deposits in pit 129109, which was excavated in quadrants (Table 6). The flintwork can be dated to the Neolithic on the presence of one fragment and three flakes from three polished implements; the general technological appearance of the flintwork might support a date in the later half of the period.

The majority of flints are in a fresh, uncorticated condition. While local gravel flint is most heavily represented, a few flakes of bullhead flint along with several pieces of a distinctive derived flint are also present. Local nodules seem to have been preferred for burning.

Most of the material (53 pieces) came from the upper fill; only four pieces were recovered from the lower fill. A further 710 pieces (4130 g) of burnt unworked flint came from the pit, again mainly from the upper fill (707 pieces, 4113 g). There was little horizontal variation in the distribution of either struck flint or burnt unworked flint.

The assemblage is mostly composed of flakes (38 pieces). Blades, bladelets and bladelike pieces are less numerous (seven pieces), suggesting a flake-based later Neolithic technology. The majority of flakes are broad and thin with fine dorsal flake scars. Many have been carefully struck from an abraded platform edge using a soft-hammer percussor. The presence of a platform rejuvenation tablet reflects attempts to maintain the flaking angle during knapping. Two possible axe-thinning flakes were also recovered.

The paucity of preparatory flakes, pieces of unclassifiable waste, chips and cores suggests that the assemblage contains little knapping waste. No refits were found, despite the presence of several related groups of flint, which again suggests that the assemblage does not result directly from knapping activity. An important exception is the polished axe fragment from the northeastern quadrant and the indirectly refitting flake from the southeastern quadrant (Fig. 1.3). It is possible that other pieces that might have refitted have been lost to truncation, although it is not uncommon to find that only elements of a polished implement have been selected for deposition;

examples of both 'cores' and flakes are known from the nearby Neolithic causewayed enclosure at Staines, Surrey (Robertson-Mackay 1987, 104 and 107).

Two additional polished flakes, originating from two different axes, were recovered from the northwestern and northeastern quadrants. As seen at Ascott-under-Wychwood in Oxfordshire (Cramp forthcoming), it is not unusual for several axes to be represented by single flakes. It seems that, once knapped, the flakes from polished implements had a fairly wide and perhaps prolonged circulation, with the effect that material from the same implement was only rarely - and perhaps unintentionally - recombined for deposition.

Beyond the group of polished flakes, there were very few formal tools in the pit. A retouched bladelet was recovered from context 129104 (NW quadrant) and a notched flake was recovered from context 129095 (SW quadrant). Numerous unretouched edges show evidence of use.

WPR 98 Area A6: tree-throw hole 125108

This tree-throw hole contained a total of 134 struck flints within the main deposit, 125109 (Table 6). A further 29 pieces (10 g) of burnt unworked flint were also retrieved. The flintwork is in a fresh condition and probably dates to the late Neolithic or early Bronze Age. With the exception of a single flake of bullhead flint, most pieces are of local gravel flint manufacture.

The assemblage is dominated by flakes (67 pieces) and chips (61 pieces). Most of the flakes are broad and thin in appearance, often with finely flaked dorsal scars and rough platform edge abrasion. The hammermode seems to have been mixed. Blades are rare, suggesting a date from the later Neolithic (e.g. Ford 1987). Retouched tools are relatively few in number, and include one retouched flake and two end-and-side scrapers (e.g. Fig. 1.8).

The quantity of chips in the deposit, many of which appear to originate from the same core, suggest that the scatter contains *in situ* knapping remains. The assemblage contained a single partially worked nodule (30 g), which alone would not account for the quantity of knapping microdebitage and might suggest that the original cores have been removed from the scatter.

WPR 98 Area A8: pit 136177

A total of 32 struck flints were recovered from feature 136177, an unphased pit on WPR98 (Table 6). These were contained within two SG deposits, 136178 and 136179. The majority of the assemblage was recovered from deposit 136178 (21 pieces). No burnt unworked flint was recovered from the feature.

The material forms a technologically coherent group of a broad late Neolithic or Bronze Age date; no diagnostic pieces were recovered to allow the flintwork to be more closely dated. A small number of residual flints are probably present, including a minute opposed platform bladelet core (6 g) that could be Mesolithic or perhaps earlier Neolithic in date.

POK 96 and WPR 98: C1 Cursus

A total of 158 struck flints and 883 pieces (4352 g) of burnt unworked flint were recovered from various interventions along the length of the two ditches that compose the C1 Cursus on POK 96 and WPR 98 (Table 7). The material is in fresh condition and is mostly uncorticated. The flintwork probably dates mainly to the later Neolithic or Bronze Age, although a small residual component was also isolated. This element probably dates to the Mesolithic or early Neolithic period, and includes the axe-thinning flake and a number of the blades and bladelike flakes.

The assemblage is dominated by flakes (90 pieces). Blades (two pieces) and bladelike flakes (five pieces) are present in smaller quantities, suggesting a largely later prehistoric date for the material (e.g. Pitts and Jacobi 1979; Ford 1987). Platform edge abrasion occurs occasionally on individual pieces, as does evidence for the use of soft-hammer percussion. The relatively low quantity of chips (24 pieces) does not support an *in situ* knapping activity, while cores and tested nodules are relatively numerous (11 pieces), perhaps reflecting the selective deposition of the larger elements of knapping waste.

The retouched component is fairly generalised, consisting of retouched flakes and scrapers with smaller quantities of more specialised tools such as notched and denticulated flints. A high incidence of use-wear was noted on unretouched edges. A backed knife, which can be dated to the late Neolithic/early Bronze Age, came from the middle fill of the eastern ditch. Also of note is the flake from a polished implement, which was recovered from the basal fill of the western ditch and can be dated to the Neolithic. As might be expected, more typically Bronze Age pieces such as the thumbnail scraper, backed knife and denticulated scraper, were recovered from the upper fills. While this may provide some evidence of the chronological sequence, other technologically early pieces were scattered throughout the fills of the same ditch and argue for some redeposition.

The flints were recovered in approximately equal quantities from each ditch (Table 8). A total of 72 pieces came from the eastern ditch with the remaining 85 flints deriving from the western ditch. The composition of material from each ditch is mostly similar, although a greater number of cores were recovered from the western ditch (seven pieces compared to two pieces). In each case, the retouched component is similarly limited in number but broad in range. While both ditches contain approximately the same number of retouched tools, there is a greater range of types in the eastern ditch. In the western ditch, retouched flakes and blades predominate (seven pieces) to the almost total exclusion of scrapers (one piece). The retouched tools are mainly confined to the middle and upper fills of each ditch; very few pieces were recovered from the basal fill.

Table 7. Struck flint by type from the C1 Cursus ditches.

Category:	Sub-category:	128029	128030	134032	134033	159170	178067	230244	230245	230246	230334	230335	230336	230337	Total:
Flake/broken flake	Primary flake		4	2			1		3	2		1	1		14
	Secondary flake		11	1	2			2		13	1	5	8		43
	Tertiary flake	1	3	4	1	1		2	1	4		11	5		33
	Bladelike flake	1		1	1						1	1			5
	Unclassifiable waste		2										2		4
	Flake from a polished implement								1						1
Blade/broken blade	Blade		2												2
Thinning/sharpening flake	Axe/adze thinning flake											1			1
Spall/spall bag	Spall			2					6	9	2	4	1		24
Core/core fragment	Single platform flake core		1												1
	Multi-platform flake core	2	1	1						1			1		6
	Single platform blade core	1													1
	Core on a flake						1								1
Nodule	Partially worked nodule	1									1				2
Retouched flake/blade	Retouched flake		2				1		1	1		2	1	1	9
	Retouched blade(let)		1							1					2
Scraper	End scraper												1		1
	Thumbnail scraper									1					1
	Unclassifiable scraper												1		1
Serrate/denticulate	Serrated piece											1			1
	Denticulate												1		1
	Notched piece									1	1		1		3
Knife	Backed knife											1			1
Total:		6	27	11	4	1	3	4	12	33	6	27	23	1	158
No. of burnt unworked flints:		7	56	20		1	3	4	34	519	5	85	149		883
Weight (g) of burnt unworked flints:		65	560	256		16	15	10	197	1868	16	607	742		4352

Table 8. Distribution of struck flint between the ditches and fills of the C1 Cursus.

Category:	Sub-category:	East			East ditch total:	West			West ditch total:	Other	Total:
		Basal	Middle	Top		Basal	Middle	Top			
Flake/broken flake	Primary flake		3	1	4	4	4	2	10		14
	Secondary flake	1	6	10	17	2	11	13	26		43
	Tertiary flake	1	15	6	22	4	3	4	11		33
	Bladelike flake	1	2	1	4	1			1		5
	Unclassifiable waste			2	2		2		2		4
	Flake from a polished implement					1			1		1
Blade/broken blade	Blade						2		2		2
Thinning/sharpening flake	Axe/adze thinning flake		1		1						1
Spall	Spall	2	6	1	9	6		9	15		24
Core/core fragment	Single platform flake core						1		1		1
	Multi-platform flake core		1	1	2	2	1	1	4		6
	Single platform blade core					1			1		1
	Core on a flake					1			1		1
Nodule	Partially worked nodule	1			1	1			1		2
Retouched flake/blade	Retouched flake		2	1	3	2	2	1	5	1	9
	Retouched blade(let)						1	1	2		2
Scraper	End scraper			1	1						1
	Thumbnail scraper							1	1		1
	Unclassifiable scraper			1	1						1
Serrate/denticulate	Serrated piece		1		1						1
	Denticulate			1	1						1
	Notched piece	1		1	2			1	1		3
Knife	Backed knife		1		1						1
Total:		7	38	27	72	25	27	33	85	1	158

In terms of their vertical distribution, the majority of struck flints occurred in the upper ditch deposits. The basal fills contained just over 20% of the material, compared to 42% and 38% in the middle and upper fills respectively. The distribution is consistent with the assertion that the uppermost fills of the ditch were laid down in the later Neolithic and earlier Bronze Age. An analysis of the condition of the flintwork, however, showed no distributional patterning. Pieces in poor condition were scattered throughout the deposits and, as such, do not contribute to the discussion of the chronological development of the ditch fills.

POK 96 and WPR 98: C2 Cursus

The two ditches (east and west) of the C2 Cursus on POK 96 and WPR 98 produced a very small assemblage, consisting of 22 struck flints and 13 pieces (58 g) of burnt unworked flint (Table 7). The majority of flints (18 pieces) were recovered from the western ditch, where they were found to be thinly spread both horizontally and vertically throughout the fills (Table 8). The flintwork is generally in a very fresh condition and is uncorticated.

The assemblage is composed almost entirely of unretouched types, including flakes (14 pieces) and chips (six pieces). The majority have been struck using hard-hammer percussion and occasionally show rough abrasion of the platform edge. A single platform flake core (48 g) was recovered from SG 133038 (context 133032). This piece has been made on a half-cobble of local gravel flint and has been reduced by a series of hard-hammer flake removals taken along one edge of an unprepared thermal platform. A single retouched piece, consisting of a minimally-retouched piercer, was recovered from SG 230264 (context 962255).

The flints form a technologically coherent group, although are few in number and therefore largely undatable. A broad Neolithic or Bronze Age date seems likely but, in the absence of more closely datable types, remains unconfirmed. The assemblage is fairly unremarkable in its quality and composition, and it is therefore unlikely that any of the pieces were selected for formal deposition in the cursus ditches.

Table 9. Struck flint by type from the C2 Cursus ditches.

Category:	Sub-category:	SG:													Total:
		105024	124049	132010	132011	134014	133038	133045	134012	134013	134014	142009	153012	230264	
Flake/broken flake	Primary flake											2		1	3
	Secondary flake									2		2	1	1	6
	Tertiary flake			2	1					1	1				5
Chip/sieved chip	Chip							1	2			2		1	6
Core/core fragment	Single platform flake core						1								1
Unclassifiable tool	Awl/piercer													1	1
Total:				2	1		1	1	2	3	1	6	1	4	22
No. of burnt unworked flints:		1	1	2	1	2							3	3	13
Weight (g) of burnt unworked flints:		1	25	13	1	8							1	9	58

Table 10. Distribution of struck flint between the ditches and fills of the C2 Cursus.

		East	East ditch total:	West									West ditch total:	Total:
		Upper		Basal					Middle	Upper				
Category:	Sub-category:	230264		132011	133045	134012	142009	153012	134014	132010	133038	134013		
Flake/broken flake	Primary flake	1	1				2					2	3	
	Secondary flake	1	1				2	1				2	6	
	Tertiary flake			1				1	2		1	5	5	
Chip/sieved chip	Chip	1	1		1	2	2					5	6	
Core/core fragment	Single platform flake core									1		1	1	
Unclassifiable tool	Awl/piercer	1	1									0	1	
Total:		4	4	1	1	2	6	1	1	2	1	3	22	

WPR 98: HE1 ring ditch (features 107042 and 107058)

A total of 117 struck flints were recovered from the ring ditch feature located towards the eastern end of the C2 cursus (Table 1). The large number of flints is inflated by the presence of 51 spalls ($<10\text{mm}^2$), most of which were retrieved in the course of environmental sampling. The assemblage of 194 flints recovered from context 107037, now thought to be a late Bronze Age feature cut into the ditch, have been excluded from this discussion.

A further 1754 pieces (7053 g) of burnt unworked flint were also recovered (Table 2). These were largely confined to the upper fills (1670 pieces, 6805 g), although a small quantity came from the primary deposits (84 pieces, 248 g). The burnt unworked flint is also unevenly distributed between the northern and southern ditches. Most of the material came from a wide, dense spread in the central sections of the southern ditch. In the northern ditch, the burnt unworked flint produced a slight concentration in the eastern terminus but otherwise formed a thin scatter.

The flintwork from the ditch deposits is in very variable condition, but some significant differences were noted in the relative severity of the damage observed on the flints from the lower and upper fills (Table 3). The flints recovered from the primary fills (SGs 107051, 107053, 107064 and 107065) have suffered more extensively from post-depositional damage and rolling, suggesting that assemblage is composed mainly of residual material. By contrast, the material from the upper deposits is in much fresher condition and forms a more technologically coherent assemblage. It seems likely that the material contained within the primary deposits derives from a pre-existing scatter of lithic material, perhaps formed over several millennia, that was incorporated unintentionally into the later ditch cut. The flintwork from the upper fills is probably associated with the use of the monument and may have been deposited over a much shorter period of time.

As a group, the assemblage consists mainly of unretouched debitage. Excluding spalls (51 pieces), flakes are the most common removal type. These pieces tend to be small and squat in shape. The reduction strategy involved a mixed hammermode and the occasional use of platform edge abrasion. Although one bladelet and one bladelike flake were recovered, blades are conspicuously absent from the collection. The flake-based character of the assemblage might indicate a date in the later Neolithic or Bronze Age for the majority (Pitts and Jacobi 1979; Ford 1987), although much of the material is chronologically undiagnostic.

General knapping activity is indicated by the presence of 51 spalls and a small number of cores (two pieces) and tested nodules (three pieces). All of the cores have been aimed at the production of flakes and, technologically, probably belong to a later Neolithic or Bronze Age flintworking tradition. Without exception, the cores and tested nodules came from the upper fills of the ditch.

The retouched component is restricted to four pieces including two edge-retouched flakes. Also of note is the bifacially retouched fragment from context 157218 (SG 107065), which may have been a knife or arrowhead when complete. Context 161180 (SG 107063) contained a serrated tool made on a bladelike secondary flake.

It seems likely that the heavily rolled flintwork contained within the lower deposits pre-dates the construction of the enclosure, which contributes to a discussion of the enduring significance of the site already hinted at by the Mesolithic microburin from the late Bronze Age pit deposit (context 107037). Much of the flintwork from the upper deposits probably relates to the use of the monument and, morphologically and technologically, is most consistent with a later Neolithic or Bronze Age industry although the paucity of chronologically distinctive types does not allow much confidence in dating. In terms of function, this later assemblage is hard to characterise. The presence of small quantities of knapping waste in combination with burnt, broken, retouched and utilised pieces implies a range of tasks. Given the presence animal bone, it is possible that some of the flintwork results from feasting activity. and technologically, the remainder is most consistent with a later Neolithic or Bronze Age industry and it is not unlikely that this material is of mixed date.

Table 11. Flint by type from the HE1 ring ditch (features 107042 and 107058)

		Lower	Lower	Lower	Lower	Upper	Upper	Upper	Upper	Upper	Upper	Upper	
Object:	Object Subgroup:	107051	107053	107064	107065	107041	107042	107043	107056	107057	107061	107063	Total:
Flake/broken flake	Primary flake >75%	2	3					3		1		1	10
	Secondary flake 1- 74%	7	6	4	1		2	1			1	6	28
	Tertiary flake 0%	2	1	3	1			1			1	2	11
	Bladelike flake											1	1
	Unclassified debitage	2					3						5
Blade/broken blade	Bladelet	1			1								2
Spall/spall bag	Spall	3	6	14	4	7	2	6	2			7	51
Core/core fragment	Core on a flake										1		1
	Unclassifiable/fragmentary core											1	1
Nodule	Partially worked nodule					2		1					3
Retouched blade/flake	Retouched flake	1			1								2
	Miscellaneous retouch				1								1
Serrate/denticulate	Serrated piece											1	1
Total:		7	18	26	12	10	2	16	3	1	3	19	117
Number of pieces of burnt unworked flint:			199	6	43	14		6181	386	65	97	62	7053
Weight (g) of burnt unworked flint:			73	6	5	6		1605	24	2	10	23	1754

Table 12. Comparison of flint condition from the upper and lower fills of the ring ditch (HE1)

Condition category:	Lower fill		Upper fill	
	No. of flints:	% of total:	No. of flints:	% of total:
Fresh	7	11.11%	12	22.22%
Slight post-depositional edge damage	9	14.29%	15	27.78%
Moderate post-depositional edge damage	22	34.92%	19	35.19%
Heavy post-depositional edge damage	25	39.68%	8	14.81%
Total:	63	100.00%	54	100.00%

Bronze Age

Diagnostic tools of early Bronze Age date include a single barbed-and-tanged arrowhead from the topsoil on WPR98 (100000). Two oblique arrowheads, which are thought to be largely restricted to the second millennium b.c. (Green 1980, 114-5), were also recovered from the excavated areas. Both came from the topsoil (100000) on WPR98 (Figs 1.9 and 1.10). A total of four thumbnail scrapers can also be attributed to the early Bronze Age. Of these, single finds came from GAI99 Area 1A (feature 222079) and POK96 (context 962353), while two unstratified examples were recovered from the topsoil on WPR98 (100000).

Three backed knives are present in the assemblage and probably date to the later Neolithic or early Bronze Age. The POK96 evaluation produced two backed knives, one of which came from within a late Bronze Age ditch (230268) and other from the eastern cursus ditch (230323), while a single unstratified find came from the topsoil on WPR98 (100000). A total of eight denticulated tools with coarsely-toothed edges were also recovered and can be dated broadly to the Bronze Age. These were usually found within ditch deposits, perhaps reflecting the circumstances of their use. Examples came from a middle Bronze Age ditch (230224) and two late Bronze Age ditches (230268 and 230051) on POK96, and from a middle/late Iron Age ditch (feature 141084) on WPR98 (Area A6).

In addition to these isolated diagnostic types, several coherent assemblages of Bronze Age flintwork were identified. Some of these came from pits and tree-throw holes (e.g. pit 216063 on GAI99, pits 127022, 148042 and tree-throw hole 130206 on WPR98), but ditches and waterholes were also favoured spots for deposition (e.g. ditches 961020 and 961508 on POK 96 and waterhole 157065 on WPR 98).

WPR 98 Area A8: pit 127022

Pit 127022 contained total of 52 struck flints and 289 pieces (1203 g) of burnt unworked flint within SG deposit 127017 (Table 6). Technologically, the assemblage is in fresh condition and probably dates to the early Bronze Age, although several residual pieces are present, including one microburin and one, probably late Neolithic, Levallois core (Fig. 1.7). Retouched tools include five retouched flakes and two piercers.

WPR 98 Area R2: waterhole 157065

A total of 15 struck flints in reasonably fresh condition were recovered from three deposits (157066, 157067 and 157074) within the waterhole on WPR 98 (Table 6). A further 2493 pieces (8238 g) of burnt unworked flint were also retrieved from five deposits within the feature. The volume of burnt unworked flint suggests that the waterhole was used for a specialised, perhaps industrial, function.

The struck flint assemblage seems to combine late Bronze Age flintwork, such as the crudely-made scraper on a non-flake blank, with a number of residual pieces. These residual pieces have been isolated on technological grounds and can be dated broadly

to the Neolithic or earlier Bronze Age. Possible examples include the retouched flake and the serrated flake.

None of the struck flint assemblage has been burnt, which suggests that it was not originally associated with the burnt unworked flint component and may have been independently included in the deposit.

WPR 98 Area A7: tree-throw hole 130206

Tree-throw hole 130206 contained an assemblage of 23 struck flints within a single deposit, 130207 (Table 6). A further 23 pieces (257 g) of burnt unworked flint were also recovered. The flintwork can be tentatively dated to the early or perhaps middle Bronze Age on technological grounds, although a Neolithic date is not unlikely.

The assemblage is dominated by flakes (18 pieces), most of which are small, hard-hammer removals with occasional rough platform edge abrasion; blades are rare. Several flakes with a distinctive red banding below the cortex may have been struck from the same core, although no refits were found. Retouched tools include two retouched flakes and one scraper made on a heavy, irregular blank.

WPR 98 Area A8: pit 148042

A total of 19 struck flints and 671 pieces (2300 g) of burnt unworked flint were recovered from four deposits within this feature. The flintwork is in a reasonably fresh condition and probably dates to the later Bronze Age. The assemblage is dominated by chips (four pieces) and flakes (eleven pieces), including one of bullhead flint. Three retouched flakes were also recovered, along with one end scraper. The latter is in a poor condition and is probably residual; the quality of the retouch suggests an early Bronze Age date for the piece.

POK 96: ditches 961020 and 961508

A total of 42 struck flints and 195 pieces (552g) of burnt unworked flint were recovered from ditch 961020; ditch 961508, which is located some 90 m to the northeast, contained a further 55 struck flints and 17 pieces (74 g) of burnt unworked flint. Technologically, the material forms a coherent assemblage broadly Bronze Age date. The presence of a minimally-retouched backed knife, if contemporary, allows the date to be refined to the earlier half of the Bronze Age, while quantities of Deverel Rimbury pottery from both features suggest a middle Bronze Age date for the deposits. Other retouched tools include nine retouched flakes and blades, three scrapers, one serrated flake, one piercer and one denticulated scraper.

GAI 99: pit 216063

A total of 66 struck flints and 27 pieces (650 g) of burnt unworked flint were recovered from two deposits within pit 216063 (Table 6). The flintwork is in fresh condition and forms a coherent, late Bronze Age assemblage, containing high proportions of squat hard-hammer flakes. Several flake cores (six pieces) and a small quantity of chips (ten pieces) were also recovered. Two pairs of refitting flakes

indicate the likely presence of some *in situ* knapping waste, while the presence of five scrapers might suggest a specialised aspect to the retouched component.

POK96: tree-throw hole 961543

A total of 34 struck flints in fresh condition were recovered from tree-throw hole 961543 (Table 6). A further seven pieces (32 g) of burnt unworked flint were also recovered. The assemblage was contained within SG deposit 961917 and forms a coherent group, probably dating broadly to the Bronze Age.

The majority of the material consists of flakes and flake cores, all of which have been manufactured from the local gravel flint. Many appear to have been struck using a hard-hammer percussor, as do the two multi-platform flake cores from the deposit. A considerable number of the flakes and several of the chips are of a similar, orange-brown coloured flint; it is possible that a significant amount derive from the same original core. A refitting analysis would confirm this. No retouched flakes or tool types were identified, and only a small number of pieces exhibited macroscopically visible use-wear, suggesting that much of the assemblage was knapped and deposited unused.

Discussion

A prolonged period of human activity is represented by one microlith, one assemblage, with the earliest diagnostic flints dating to the Palaeolithic period. These include a small handaxe (Fig. 1.1) from the topsoil on WPR 98 (context 100000). An end scraper made on a thermal blank (Fig. 1.2) from GAI 99 (area 1B, ditch 214015) may also date to the Palaeolithic period. Given their heavily rolled and iron-stained condition, these pieces probably derive from the gravels. Their contribution to a discussion of Palaeolithic activity in the west London area, otherwise well-documented (e.g. Wymer 1968; Lewis 2000), is therefore somewhat limited.

In terms of diagnostic artefacts, the Mesolithic is represented by a single microlith from the Romano-British 'ladder' enclosure (ditch 107084) and two microburins (pit 127022 and enclosure 107042), all of which came from WPR98. Two possible burin spalls were recovered from a middle Bronze Age ditch on GAA00 (feature 401075) and a late Bronze Age ditch on WPR98 (feature 160104), although these may represent accidental removals of later date. Four axe-thinning flakes, which may derive from Mesolithic *tranchet* axes, were also recovered from the excavations. Two of these came from a Neolithic pit (feature 129109) on WPR98; another was found within an early Neolithic tree-throw hole (feature 156191) on the same site. The eastern cursus ditch on POK96 (feature 961501) produced the fourth axe-thinning flake.

In general, the Mesolithic flintwork forms a fairly thin and disparate scatter across the sites, although the reliance on diagnostic pieces may have produced a very partial picture of Mesolithic activity. In view of this, the cluster of burnt flint pits within the C1 Cursus on WPR 98 are of particularly importance for understanding the Mesolithic use of the landscape and its influence on subsequent developments in the

Neolithic period. It may be significant that many of the Mesolithic flints were recovered from features of Neolithic date, suggesting that the use of certain areas in the Mesolithic persisted into the Neolithic period.

Artefacts from the Palaeolithic and Mesolithic provide limited evidence for human activity, but it is only from the early Neolithic onwards that the lithic material has survived in the form of *in situ* assemblages that lend themselves to a more detailed interpretation of the activities undertaken. From Perry Oaks, such deposits include the large collection of flints from tree-throw hole 156191 on WPR98. Most early Neolithic flints, however, occurred as residual elements in later features, with examples including a leaf-shaped arrowhead (Fig. 1.4) from tree-throw hole 180045 on WPR98.

From the middle and later Neolithic, the deposition of middened flintwork in the natural shapes of tree-throw holes seemingly declines in favour of deposition in deliberately cut pits, a phenomenon also noted some 13 km away at Dorney, Berkshire (Allen *et al.* 2004) and elsewhere in southern Britain (Evans *et al.* 1999). Examples include the assemblage from pit 129109 on WPR98, although tree-throw holes (e.g. 125108) were still being used for flint deposition. The ditches of the C1 and C2 Cursus monuments and the HE1 enclosure produced assemblages that may belong to a later Neolithic or Bronze Age occupation phase. It is also likely that much of the residual flintwork in later features relates to activity in this period, including perhaps more generalised deposits of the flintwork discarded on the ground surface rather than into cut features.

Diagnostic middle and late Neolithic types include four chisel arrowheads, three from topsoil contexts and one from ditch 149021 on WPR98 Area A3 (Fig. 1.6). One Levallois core (Fig. 1.9) and one keeled core were recovered from Area A8 on WPR98; these may have been associated with the manufacture of chisel arrowheads (e.g. Green 1974, 84). A total of eight flakes from polished implements, probably axes, were also recovered from the site. Several of these came from topsoil layers and represent redeposited finds, although one of the flakes from Neolithic pit 129109 (WPR 98 Area C4) could be refitted to a polished axe fragment from the same feature (Fig. 1.3).

While the early Bronze Age period is reasonably well represented by residual diagnostic pieces, such as one barbed-and-tanged and two oblique arrowheads from the topsoil, the paucity of coherent *in situ* assemblages dating to this time is striking; the pottery assemblage from Perry Oaks seems to register a similar hiatus at this time. From the middle and later Bronze Age, *in situ* flint assemblages start appearing in greater number and in a wider range of discrete cut features, including pits, ditches, tree-throw holes and waterholes. These assemblages vary in character from knapping deposits and surface spreads, to general domestic accumulations. These assemblages vary in character from knapping scatters and surface spreads, to general domestic accumulations. Excavations on Terminal 5 later revealed more formalised deposits, such as near-complete knapping scatters from ditch contexts; waterholes also seem to have attracted 'special' deposits of flintwork, often accompanying other unusual finds such as the red deer antler later recovered from a waterhole (feature 559665) exposed

during the stripping of PSH02 (Brown *et al.* in prep). But such discoveries are the subject of future analysis.

Appendix I

Catalogue of flint illustrated in Figure 1.

Fig.	Object number:	Object:	Site code:	Site name:	Area:	Feature:	Cut:	Deposit:	Description:
1.1	3531	Handaxe	WPR 98	Western Perimeter Road	—	Topsoil	—	100000	Heavily rolled and iron-stained. Found in a land drain.
1.2	4019	End scraper	GAI 99	Northern Taxi Way	1B	Ditch	214003	214009	End' scraper made on elongated thermal blank. Iron-stained.
1.3	1853 & 2307	Polished axe fragment with indirectly refitting flake.	WPR 98	Western Perimeter Road	C4	Pit	129091 & 129106	129092 & 129107	Fragment of Neolithic polished axe, repaired and reground before used as core; flake 2307 from deposit 129107 refits.
1.4	212	Leaf-shaped arrowhead	WPR 98	Western Perimeter Road	A6	Tree-throw hole	180045	180046	Leaf shaped arrowhead, missing distal tip. Similar to Green's type 3C (v) (Green 1980, 71, Fig. 28).
1.5	699	Serrated blade	WPR 98	Western Perimeter Road	A6		148110	148109	Bladelike distal-trimming flake with serrations on right-hand edge, c 11 teeth per 10 mm. Use-wear. Almost certainly bullhead derived - possesses characteristic dark green cortex, although lacks yellow banding. Probably soft-hammer struck. Some slightly invasive retouch to left-hand edge, presumably for backing purposes.
1.6	19	Chisel arrowhead	WPR 98	Western Perimeter Road	A3	Ditch	149021	149022	Some possible use-wear / impact damage to tranche edge. Similar to Green's type e (Green 1980, 101, Fig. 37).
1.7	890	Levallois core	WPR 98	Western Perimeter Road	A8	Pit	127021	127016	Probably hard-hammer reduced, limited platform edge abrasion in places. 52 g.
1.8	712	End-and-side scraper	WPR 98	Western Perimeter Road	A6	Tree-throw hole	125108	125109	Retouched on preparatory flake with proximal break. Use-wear.
1.9	3532	Oblique arrowhead	WPR 98	Western Perimeter Road	—	Topsoil	—	100000	Roughly-made oblique arrowhead, extremes of tip and tang missing. Similar to Green's type f (Green 1980, 102, Fig. 38).
1.10	1431	Oblique arrowhead	WPR 98	Western Perimeter Road	—	Topsoil	—	100000	Neatly retouched on fairly thick blank. Unusually long barb. Bifacial retouch on left-hand edge, direct retouch only on right-hand edge. Similar to Green's type f (Green 1980, 102, fig. 38).

Appendix II

Categories used for the classification of the struck flint assemblage.

	Category:	Sub-category:
Debitage	Flake/broken flake	Primary flake Secondary flake Tertiary flake Levallois flake Flake from a polished implement Unclassifiable waste
	Blade/broken blade	Blade Bladelet bladelike flake
	Core preparation flake	Core face/edge rejuvenation flake Rejuvenation flake tablet Crested blade
	Axe/adze sharpening flake	Axe/adze thinning flake
	Burin spall	Burin spall
	Microburin	Microburin
	Chip/sieved chip	Chip Sieved chip
Cores	Core/core fragment	Single platform flake core Multi-platform flake core Levallois/other discoidal flake core Keeled core Single platform blade core Opposed platform blade core Multi-platform blade core Unclassifiable blade core Core on a flake Unclassifiable core
	Nodule	Partially worked nodule
Retouched tools	Retouched blade/flake	Retouched flake Retouched blade(let) Unclassifiable retouch
	Scraper	End scraper Side scraper End-and-side scraper Disc scraper Thumbnail scraper Unclassifiable scraper
	Knife	Backed knife Scale-flaked knife Unclassifiable knife
	Microlith/backed bladelet	Microlith
	Serrate/denticulate	Serrated piece Denticulate Notched piece
	Piercer	Awl/piercer Spurred piece Burin
	Fabricator	Fabricator
	Arrowhead	Laurel leaf Leaf-shaped Chisel Oblique Barbed-and-tanged Unfinished arrowhead Unclassifiable arrowhead
	Axe/core tool	Flaked axe Polished axe
Other	Hammerstone	Flint hammerstone
	Unclassifiable	Natural

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