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SUMMARY

This project was focused on a very large collection of Palaeolithic flint artefacts made by Henry Stopes in the late 19th Century. Most came from Pleistocene deposits exposed by quarrying in the Swanscombe area of Kent, or from field surfaces in the area. This is a key region for Palaeolithic evidence and one currently under severe development pressure.

The main objectives of the *Stopes Palaeolithic Project* were:

- To identify the locations in the landscape of Stopes' find-spots, in particular: locations i) not already mapped in the Southern Rivers project and ii) where Pleistocene sediments are still present
- To assess the potential for analysis of the artefacts in Stopes' collection to address national and regional Palaeolithic research objectives
- To assess the significance of deposits surviving at sites investigated by Stopes to aid curational decisions in advance of any development impact
- To store and package the Stopes collection in a manner commensurate with the relative significance of its different parts, and to give each artefact item level documentation to enhance its accessibility
- To enhance the display potential and public accessibility of the Stopes collection by gathering more information on the social context under which it was collected and by improving understanding of its provenance
- To identify parts of the Stopes collection suitable for a range of educational, outreach and discovery programmes with an emphasis on social inclusion and direct public access to original artefacts

The project was to a large extent successful in addressing these aims. The Stopes collection, or at least that part of it from Kent, was shown to contain over 10,000 Palaeolithic flint artefacts and another 10,000 later prehistoric ones. Over 90 of Stopes' find-spots were identified, almost 50 of which with Palaeolithic material, and 60 of which with later prehistoric material. This provides a significant addition to present understanding of the number and distribution of prehistoric sites in Kent, and one major new site was identified on a block of land earmarked for imminent major development.

In addition to meeting these curational goals, the project has contributed to a number of community, education and outreach initiatives. The Stopes' collection has formed a core theme of a National Museums & Galleries of Wales exhibition on "Why we Collect", parts of the Stopes collection have been selected for i) guided handling by visitors, and ii) for teaching collections that are issued to institutions at all levels (Primary, Secondary, Higher and Further) across Wales, a summary of the project will be posted on the museum web-site and a series of web linkups, focused on Palaeolithic archaeology and local studies, is planned between Welsh schools and schools in the Swanscombe area. Finally, an index has been made of the archival material consulted in course of the project, and this constitutes a valuable local studies resource that has been lodged at Dartford Borough Library, along with a full copy of the report. Copies have also been lodged with English Heritage, National Museum & Gallery of Wales, Kent

County Council (Archaeology Section) and the Centre for Kentish Studies, Maidstone.

1 INTRODUCTION

This project is focused on the study of a very substantial collection of prehistoric flint artefacts made by Henry Stopes, a private collector, in the late 19th Century. Although the collection has never been completely examined, due to its excessive size, it is clear from inspections that have taken place that it contains huge numbers of both Palaeolithic and later prehistoric material. Most of the artefacts come from the Swanscombe area of Kent, a key region for national Palaeolithic archaeology. The collection is supported by a catalogue giving details of the find-spot location and circumstances of recovery (or on occasion, purchase or exchange) of each artefact. The project was developed in response to the opportunity provided by the Aggregate Levy Sustainability Fund. Almost all of the Palaeolithic artefacts in Stopes' collection were recovered from mineral deposits affected by aggregate extraction. The large size of the collection, its unselective nature and the quality of provenance information combine to make the collection of potential national significance.

The project addresses two main areas relevant to the ALSF funding remit in relation to archaeological projects:

- It addresses *both* academic understanding *and* public dissemination of Palaeolithic archaeological data recovered in connection with previous aggregate extraction
- It helps manage the impact of current development and future extraction, by increasing understanding of the nature and Palaeolithic archaeological significance of surviving intact deposits

The project also addresses research areas highlighted in the recent *Archaeological Research Framework for the Greater Thames Estuary* (Williams & Brown 1999) as necessary for the attainment of specific objectives for Palaeolithic archaeology in the Greater Thames Estuary region. Within the context of the overall regional framework objective of: "*increasing understanding of the physical evolution of the Thames Estuary during the Pleistocene and of the social and cultural strategies of early human populations in relation to changes in environment and climate*" it:

- Identifies locations where primary context sites might be preserved and where evidence relating to current research objectives might be present
- Assesses historic maps and antiquarian records of previous quarrying to locate known artefact collections and determine the extent of significant geological deposits
- Contributes to the assessment of importance of known Palaeolithic archaeological sites and deposits by increasing knowledge of the quality and character of their artefactual content

The project was developed in partnership with the Department of Archaeology and Numismatics at the National Museum and Gallery of Wales (NMGW), in Cardiff, who hold the Stopes collection. The NMGW provided a significant matching contribution to that from the ALSF, by:

- Creating a temporary curatorial post to cover staff-time for conservation and curation of the Stopes collection in conjunction with its proposed assessment

- Covering the costs for materials for curation of the Stopes collection
- Covering the costs for staff time and materials to develop educational and community outreach initiatives and supporting media
- Providing working space and office facilities for the parts of the Stopes project based at the NMGW

2 BACKGROUND

2.1 Project area

The project includes material from across Kent, but the core area of the project is the environs of Swanscombe, northwest Kent (Fig. 1). This area is within the Greater Thames Estuary (cf. Williams & Brown 1999), on the southern side of the Thames Estuary between Dartford and Gravesend. In this area the combination of factors such as rich natural aggregate resources, proximity to the navigable Thames Estuary and proximity to the major population centres of London and southeast England led to rapid expansion of aggregate extraction from c. 1870. Extraction has slowed since the 1960s, probably due to tougher licensing controls, and the fact that most parts of the landscape where substantial areas of useful aggregates were present had already been extracted, apart from where people were actually living or where other uses had prevailed. This has led to a present-day landscape scattered with empty or landfilled quarries in amongst areas of mixed rural, urban and industrial use.

The project area is currently under more severe development pressure than ever before, with a combination of major infrastructural projects (such as the Channel Tunnel Rail Link, the Ebbsfleet International Station and a possible new town around the station) and intensive housing and commercial developments combining to place any areas of surviving natural sediment under threat.

2.2 Archaeological and geological background

The Palaeolithic

The initial human occupation and subsequent settlement of Britain and northwest Europe has taken place against the backdrop of the Quaternary period, characterised by the onset and recurrence of a series of glacial-interglacial cycles. The Palaeolithic covers the time span from the initial colonisation of Britain in the Middle Pleistocene, c. 500,000 years ago, to the end of the Late Pleistocene, corresponding with the end of the last ice age c. 10,000 years ago. Thus the Palaeolithic period occupies almost 500,000 years. This period of time includes at least six major glacial-interglacial cycles (reflected in the global geological record as Oxygen Isotope stages, identified from changes in the proportions of the oxygen isotopes O^{18} and O^{16}) accompanied by dramatic changes in climate, landscape and environmental resources. At the cold peak of glacial periods, ice-sheets 100s of metres thick would have covered most of Britain, reaching on occasion as far south as London, and the country must have been uninhabitable. At the warm peak of interglacials, mollusc species that now inhabit the Nile were abundant in British rivers, and tropical fauna such as hippopotamus and forest elephant were common in the landscape. For the majority of the time, however, the climate would have been somewhere between these extremes.

When climatic conditions allowed, and when access from the continent was possible — after the formation of the Channel, probably some time in the later Middle Pleistocene, access was

only possible during periods of cold climate when sea levels were lower — early hominids were periodically present in Britain, which was at the northern margin of the inhabited world. The archaeological evidence of the period mostly comprises flint tools, and the waste flakes left from their manufacture. These are very robust and resistant to decay, and, once made and discarded, persist in the landscape, eventually becoming buried or transported by sedimentary processes related to climatic change and landscape evolution. Other forms of evidence include faunal dietary remains of large animals, sometimes cut-marked reflecting the stripping of flesh for food or broken open for marrow extraction and, very rarely, wooden artefacts. These forms of evidence are, however, more vulnerable to decay, and it is only very rarely that burial conditions were suitable for their preservation through to the present day. Hominid skeletal remains have also been found on occasion although, again, these are very rare and require exceptional conditions for their preservation.

The Palaeolithic has been divided into three broad, chronologically successive stages — Lower, Middle and Upper — based primarily on changing types of stone tool. This framework was developed in the 19th century, before any knowledge of the types of human ancestor associated with the evidence of each period, and without much knowledge of the timescale. This tripartite division has nonetheless broadly stood the test of time, proving both to reflect a general chronological succession across Britain and northwest Europe, and to correspond with the evolution of different ancestral human species.

The earlier, Lower and Middle, parts of the Palaeolithic period (Table 1) saw the gradual evolution of an Archaic hominid lineage from the first colonisers of Britain (*Homo heidelbergensis*) into Neanderthals (*Homo neanderthalensis*) during the period of almost 500,000 years up to the middle of the last glaciation (c. 35,000 BP). Very broadly speaking, the Lower Palaeolithic is associated with early Archaics and handaxe manufacture (Acheulian), and the Middle Palaeolithic with the development of Neanderthals and increasingly sophisticated flake-tool based lithic technology (Levalloisian and Mousterian), alongside one distinctive form of handaxe, the *bout coupé*.

After 35,000 BP, Neanderthals were suddenly replaced in Britain and northwest Europe by anatomically modern humans (*Homo sapiens sapiens*), who are associated with the later, Upper part of the Palaeolithic. The Upper Palaeolithic is also characterised by cultural changes such as the development of bone and antler tools and the representation of images of animals painted on cave walls or as small antler or bone carvings. The suddenness of this change and the physiological differences between Neanderthals and modern humans, as well as recent DNA studies, suggest that modern humans did not evolve from Neanderthals, but evolved elsewhere, probably in Africa or western Asia c. 125,000 BP, before colonising other parts of the world. In contrast to the Lower and Middle Palaeolithic periods, the relatively recent age of the Upper Palaeolithic, and the fact that, at least in Britain, the period is within the range of radiocarbon dating, means that our understanding of the period is good. It is clear that, at least in Britain, there is a well-defined and clear break between the Middle and the Upper Palaeolithic.

Britain was only occasionally inhabited during the Upper Palaeolithic, much of which coincided with the cold climax of the last glaciation, and no evidence of the period was identified in the part of Stopes' collection studied.

<i>Archaeological period</i>	<i>Human species</i>	<i>Lithic artefacts and other material culture</i>	<i>OI Stage</i>	<i>Date (BP)</i>	<i>Geological period</i>
Upper Palaeolithic	Anatomically modern <i>Homo sapiens sapiens</i>	Dominance of blade technology and standardised tools made on blade blanks, personal adornment, cave art, bone/antler points and needles	2–3	10,000–35,000	Late Pleistocene
Middle Palaeolithic	Early pre-Neanderthals initially, evolving into <i>Homo neanderthalensis</i> after OI stage 5e	Growth of more standardised flake and blade production techniques (Levalloisian and Mousterian), the development of a wider range of more standardised flake-tools, and towards the end, the development of <i>bout coupé</i> handaxes	3–5e	35,000–125,000	
			5e–8	125,000–250,000	Middle Pleistocene (later part of)
Lower Palaeolithic	Archaic Homo — <i>Homo cf heidelbergensis</i> initially, evolving towards <i>Homo neanderthalensis</i>	Handaxe dominated, unstandardised flake core production techniques and simple unstandardised flake-tools Occasional industries without handaxes, based on large flake blanks made by unstandardised core-reduction techniques	8–13	250,000–500,000	

Table 1. Palaeolithic period in Britain

The Palaeolithic in Kent

Kent is a key region for Palaeolithic archaeology. It remained to the south of the ice-sheets that periodically covered most of Britain during the Pleistocene. Therefore deposits from the throughout the Middle and Late Pleistocene, corresponding to the Lower and Middle Palaeolithic, are better preserved than in most other parts of the country. Kent is the richest county in England for Palaeolithic archaeological evidence with almost 450 separate sites (ie. find-spots of one or more Palaeolithic artefacts) producing almost 30,000 artefacts recorded in the recent Southern Rivers Project survey (Wessex Archaeology 1993). The deposits surviving in Kent from this period, and that contain the faunal and artefactual evidence on which our understanding of the Palaeolithic is based, fall into three main groups (Table 2):

- Fluvial sands/gravels
- Colluvial/solifluction deposits
- Clay-with-flints

<i>Sediment class</i>	<i>Find-spots</i>	<i>Handaxes</i>	<i>Cores</i>	<i>Debitage</i>	<i>Total</i>
Fluvial/alluvial	94	6,186	505	16,510	23,200
Colluvial/solifluction, "Head"	286	1,816	122	3,392	5,330
Clay-with-flints	68	252	4	281	537
Total	448	8,254	631	20,183	29,068

Table 2. Palaeolithic artefacts from Kent, as recorded in Southern Rivers Project (Wessex)

Fluvial sands/gravels

Pleistocene fluvial sands and gravels survive as terraces on the flanks of major Kent rivers such as the Lower Thames, the Stour and the Medway, as well as on smaller tributaries such as the Darent. The combination of the cyclical cold-warm climatic changes of the Pleistocene and progressive tectonic uplift of the region have led to staircases of terraces, with older deposits higher and younger ones progressively lower. Generally, the deposits in these terraces have been formed under high energy depositional conditions, and Palaeolithic artefacts and faunal remains found within them have been regarded as transported for unknown distances, as well as dating to a wide time envelope representing a) the period over which the gravel deposit was forming and b) the possibility that they have been derived from an even older body of deposits. However these fluvial sequences can also contain horizons where a hiatus in fluvial activity followed by low energy deposition of fine-grained sediment has led to preservation of a landsurface containing undisturbed evidence of early human activity.

The Pleistocene fluvial deposits of Kent are a nationally significant archaeological resource, representing a sequence of deposition from shortly after the first colonisation of England through to the end of the Pleistocene, and being rich in Lower and Middle Palaeolithic archaeological evidence (Table 2). Although only around 20% of Kent sites come from fluvial deposits, they have produced almost 80% of the Palaeolithic finds. The deposits in northwest Kent are of particular significance, and finds from a few sites in the Swanscombe area have made a disproportionately high contribution, in numbers (Table 3) as well as quality of information, to current knowledge of the Lower Palaeolithic in both Britain and Kent. These deposits are part of the substantial Middle Pleistocene Boyn Hill/Orsett Heath formation preserved on the south side of the Lower Thames in an intermittently occurring east-west trending band from Dartford Heath through Dartford centre, Stone and Greenhithe to Swanscombe and ultimately Northfleet. The deposits in the formation consist of a sequence of predominantly fluvial loam, sand and gravel units laid down by the ancient Thames in the post-Anglian interglacial period between 450,000 and 350,000 BP (late OI Stage 12 to early OI Stage 10) and can be traced up and down the Thames Valley (Bridgland 1994).

<i>Site</i>	<i>Find-spots</i>	<i>Handaxes</i>	<i>Cores</i>	<i>Debitage</i>	<i>Total</i>
Barnfield Pit	1	2,973	259	11,405	14,637
Dierden's Pit	1	88	7	688	783
Galley Hill Pit	1	145	2	116	263
Ricksons Pit	1	152	162	982	1296
Other fluvial sites	90	2,828	75	3,319	6,221
Total	94	6,186	505	16,510	23,200

Table 3. Contribution of key Swanscombe sites (see Fig. 1) to overall Kent Palaeolithic record for fluvial Pleistocene deposits, data from Roe (1968) and Wessex Archaeology (1993)

The sands and gravels of the Boyn Hill/Orsett Heath formation were a desirable aggregate resource in their own right, as well as covering Chalk that was required for cement manufacture. Therefore they have been substantially quarried from the late 19th century onward. The formation is rich in Lower Palaeolithic archaeological remains in the Swanscombe area, with copious material (cf. Table 3) recovered from many quarrying locations (cf. Fig. 1). These were, however, mostly discovered and collected from in the late 19th and early 20th centuries, leading to a tantalising archaeological record dominated by private collections of poorly

provenanced artefacts. Barnfield Pit, Swanscombe (Fig. 1, site 1), is a notable exception, being one of the first Palaeolithic sites in Britain to have been excavated with systematic screening for artefacts and careful attention paid to the stratigraphic context of material (Smith & Dewey 1913 & 1914). Several major subsequent investigations have taken place (Swanscombe Committee 1938; Ovey 1964; Conway *et al.* 1996), demonstrating a deep sequence of mostly fluvial deposits containing both derived and undisturbed lithic evidence (Table 4) in association with a range of biological evidence including molluscan, avian, fish and mammalian remains — amongst which latter the Swanscombe Skull.

Three refitting parts of the Swanscombe Skull were found at the base of the Upper Middle Gravel at Barnfield Pit on separate occasions between 1935 and 1955 (Ovey 1964), and it is one of only four early hominid fossils found in England; the others being a left tibia and two lower incisors from Boxgrove in Sussex, dating to *c.* 500,000 BP and attributed to *Homo cf heidelbergensis* (Roberts *et al.* 1994; Pitts & Roberts 1997). The Swanscombe Skull shows some Neanderthal-type features (Stringer 1985), suggesting physical evolution from *Homo cf heidelbergensis* towards Neanderthals had already begun at the time of deposition of the Swanscombe sequence, although to what extent this was accompanied by behavioural change remains unknown, and a major research question in Palaeolithic archaeology.

<i>Phase</i>	<i>OI Stage</i>	<i>Stratigraphic unit</i>	<i>Height OD</i>	<i>Palaeolithic archaeology</i>
III	11–10/ 10/ 10–8?	Upper Gravel	<i>c.</i> 33–34m	Mostly ovate handaxes, often with twisted profiles and tranchet sharpening, debitage — "Acheulian"
		Upper Loam	<i>c.</i> 32–33m	
		Upper Sand	<i>c.</i> 29.5–32m	None known
II	11	Upper Middle Gravel	<i>c.</i> 28.5–32m	Mostly pointed handaxes with thick partly trimmed butts, often large and well-made but also small and crude, cores, debitage and <i>ad hoc</i> flake-tools — "Acheulian" (Swanscombe Skull level)
		Lower Middle Gravel	<i>c.</i> 26.5–28.5m	
I	11	Lower Loam	<i>c.</i> 25–26.5m	Cores, debitage, <i>ad hoc</i> flake tools, and very occasional crude proto-handaxes — "Clactonian"
		Lower Gravel	<i>c.</i> 22–26.5m	

Table 4. Stratigraphic and archaeological summary of Barnfield Pit sequence, Swanscombe (Smith & Dewey 1913 & 1914; Wymer 1968; Roe 1981; Conway et al. 1996)

Recent work at the Swan Valley Community School (Wenban-Smith & Bridgland 2001), *c.* 1.5km southwest of Barnfield Pit, has shown that the Boyn Hill/Orsett Heath formation extends over a wider area than previously recognised, with a deep sequence of deposits containing artefactual and faunal remains being present in an area mapped (British Geological Survey 1998) as Tertiary Thanet Sand. This inevitably raises a question mark over how much of the wide areas mapped as Thanet Sand in the vicinity of Swanscombe are in fact unrecognised Pleistocene deposits of archaeological significance.

Amongst other significant sites in the fluvial deposits of the Swanscombe area are Dierdens Pit, Ingress Vale (Fig. 1, site 6) and the Globe Pit, Greenhithe (Fig. 1, site 7), where assemblages of particularly well-made ovate handaxes, often twisted, were collected in the late 19th century. Sadly, the stratigraphic context of these assemblages remains unknown, Smith & Dewey's (1914) investigations at Dierdens Pit having failed to recover any similar material. Further afield at Crayford, where the Darent joins the Thames, significant quantities of undisturbed finds were also recovered by Spurrell (1880) from fluvial deposits representing a younger

period than the main Swanscombe sequence. In contrast to the handaxe dominated (with the exception of the basal Clactonian horizons) deposits of the Swanscombe terrace, the deposits at Crayford contained evidence of quite different flint-working techniques, with a predominance of the manufacture of broad Levalloisian blades.

Colluvial/solifluction deposits

This group of deposits includes a variety of sediment types from coarse-grained solifluction gravels to fine-grained silty sands mapped as brickearth. Such sediments have formed under differing depositional processes and consequently the Palaeolithic archaeological material they contain has different taphonomic history and interpretive potential. In general these deposits occur at the base of slopes, on the surface of valley-sides, in dry valleys and in hollows in the landscape — anywhere in fact where sediment destabilised by severe climatic conditions and/or devegetation has accumulated. In northeastern Kent there are also substantial bodies of sediment mapped as brickearth that probably include a significant proportion of aeolian material. Despite their coarse nature, many colluvial/solifluction deposits have slipped only a short distance, leading to the relatively gently burial of archaeological material. The majority (almost 65%) of Kent Palaeolithic sites represent find-spots from colluvial/solifluction deposits, although most sites have produced only small numbers of finds as less than 20% of finds come from such sites (cf. Table 2).

Colluvial/solifluction deposits occur across Kent, and are common in the Swanscombe area, overlying fluvial terrace deposits and filling dry valleys heading north from the North Downs ridge. Many finds have been made from solifluction deposits including material derived from the Boyn Hill/Orsett Heath formation in the Swanscombe and Dartford area, and one of the UK's most significant sites, the prolific Levalloisian site of Baker's Hole (cf. Wenban-Smith 1995) consists of artefacts recovered from soliflucted chalk deposits filling the Ebbsfleet Valley, a small tributary valley of the Thames cut through the Boyn Hill/Orsett Heath terrace immediately to the east of Swanscombe.

Clay-with-flints

Clay-with-flints is a deposit found capping Chalk high ground across the county, particularly along the North Downs. It is one of the commonest Pleistocene sediments in the project area, covering wide areas of the North Downs Chalk bedrock between 5km and 10km to the south of Swanscombe. The deposit has developed *in situ*, probably representing the residual remnants of soils built up throughout the Tertiary and Pleistocene and periodically subject to sub-aerial weathering and degradation accompanying climatic oscillations. It has not been subject to high energy transport processes that have incorporated archaeological material. Therefore any archaeological evidence found in the Clay-with-flints has probably originally been discarded close to its find-spot location. However, the stratigraphic provenance of any material found within the deposit is minimal, and finds from Neolithic, Mesolithic and Palaeolithic periods can all be found conflated at the same horizon. Thus archaeological material from the deposit comes from a palimpsest representing 500,000 years of intermittent occupation.

The Clay-with-flints has not been subject to much development or aggregate extraction due to its location in isolated scenic areas and its undesirable qualities as an aggregate. However there is increasing pressure for development in some Clay-with-flints areas surrounding urban centres, and major infrastructural projects such as roads and railways often traverse significant distances through Clay-with-flint deposits. Despite the lack of development, Clay-with-flints has produced significant quantities of Lower Palaeolithic handaxe finds (cf. Table 2), although the academic significance and research potential of this material is problematic due to its unconstrained

chronological provenance.

2.3 The Stopes collection

Origin

In the second half of the 19th century the expansion of aggregate and Chalk quarrying coincided with the development of Palaeolithic archaeology as a discipline. Henry Stopes (Fig. 2) was one of several private individuals of the period who amassed substantial collections of archaeological and ethnographic material through a combination of site-visits, buying and swapping of artefacts. Stopes' collection was made between c. 1880 and 1902, when he died.

Current location

The collection was bought by the National Museums & Galleries of Wales (NMGW) in Cardiff in 1912 and has been stored there ever since (Walker 2001).

Composition

The collection includes archaeological artefacts and ethnographic objects from all periods and continents. The major part (c. 75% estimated by NMGW) of it represents flint artefacts collected from aggregate quarries and other sites in northwest Kent, and in particular, numerous locations in the Swanscombe area. The collection includes substantial quantities of Palaeolithic material, as well as of later prehistoric flint artefacts and eoliths.

Provenance

All artefacts in the collection are individually labelled with an identifying number relating to the find-spot. The collection is accompanied by the manuscript *Catalogue of the Collection of Flint Implements made by Henry Stopes FGS, FAI* (henceforth, the Catalogue), prepared by Henry Stopes' daughter Marie in the last years of his life, listing all these find-spot numbers, and giving site names and descriptions, such as field names (eg. Merriman Field), farm names (eg. Manor House Farm, Treadwell's Farm), road names (eg. Sandy Lane) and specific quarries (eg. White's No. 5 pit, Bevan's Wash-pit, Milton Street Pit). A few of these names (eg. Milton Street Pit and Oldbury Rockshelters) are already well-known, but most of them are not. Some find-spot details are very broad, particularly for foreign material, and some relate to exchange or purchase rather than location. However, the Catalogue contains detailed information for many sites (Fig. 3), sufficient for them to be relocated by someone familiar with the Palaeolithic sites and 20th century development of the Swanscombe area, especially when accompanied by detailed landscape regression and archival research.

Size

The collection is of remarkable size, occupying, at the outset of the project, almost 200 wooden crates and filling most of a substantial basement room at the NMGW in Cardiff (Fig. 4). The collection weighs several tons, and was last examined, labelled and re-packed by Reginald Smith of the British Museum in 1918. At that point, the size of the collection was estimated at 60,000–70,000 artefacts. Parts of the collection have been discarded since then, and it was uncertain how many artefacts remained. The collection includes assemblages of many thousands of flint artefacts from some specific locations, for instance the Milton Street Pit, Swanscombe.

Previous study

Stopes' collection has remained essentially unstudied since Smith. Some attempts have been made to investigate it, but these have been hindered by the size of the collection. It was briefly

investigated by J. Cook in the late 1970s. She identified material from 67 British Palaeolithic sites, 37 from the Swanscombe area, 10 from other parts of Kent, and 20 from further afield (unpublished report in NMGW archive). Cook's investigation focused upon a metrical analysis of a sample of handaxes from a few of the Swanscombe sites, and the majority of the material was left unexamined. A brief examination by J. Wymer at roughly the same time as Cook drew the comment that it was of surprising significance contrary to his expectation (unpublished letter in NMGW archive). His examination was too swift for any systematic determination of potential, although he did attempt to categorise assemblages from different find-spots into different levels of significance, based on his perspective at that time of the Palaeolithic research framework. Most of the collection has not been touched since it was re-packed by Smith in 1918, and some of it not since it was packed for transfer by Marie Stopes in 1912, since Smith states that he did not examine/repack all of the collection.

Potential significance

The Stopes collection is of particular potential, and stands out from other contemporary private lithic collections by:

- its large size
- its unselective nature, including handaxes, cores and debitage from find-spots
- the complete marking of its constituent artefacts with index numbers relating to find-spots
- the Catalogue, relating the index numbers to specific quarries and locations
- detailed contemporary records of quarry expansion in the main collecting area, with OS surveys in 1865 (1st edition), 1895 (2nd edition) and 1907 (3rd edition)

2.4 Curatorial background

There are two areas of curatorial issues related to the Stopes collection:

- Planning and development control
- Management and curation of the collection

Planning and development control

It was recognised in the 1980s that there was a problem with identifying and protecting the Palaeolithic heritage across the UK in the face of increasing development pressures and aggregate requirements threats. Southeast England and the area of Kent from which the bulk of the Stopes collection came are now under severe development pressure from major infrastructural projects, housing development and the needs of aggregate extraction. The Southern Rivers Project created a basic record of known find-spots mapped onto the Pleistocene geological base map for southeast England (Wessex Archaeology 1993), which has proved of immense value in highlighting areas of potential Palaeolithic/Pleistocene significance in the face of development proposals. However it is inevitable that this project concentrated upon the collation of known find-spots and less time could be spent upon researching the locations of new and poorly (or un-) published find-spots, as represented by numerous artefacts in private and museum collections across the country, such as that of Stopes. He may well have collected from several locations currently not represented in the SRPP and absent from the Kent

Sites and Monuments Record, and identification of such locations would enable them to be identified and any appropriate mitigation to take place in the face of development impacts.

Management and curation of the collection

The collection itself occupies a significant proportion of one of the archaeological store-rooms in the basement of the NMGW. Although the material is in principle available for academic study, its unordered nature and previous lack of investigation made it, at the outset of the project, a resource of unknown potential, and one in which the identification of specific parts was highly problematic. Given limitations of storage space and the general increasing demands for all museum institutions upon storage space for archaeological collections and archives, there was growing pressure for the significance and potential for analysis of the Stopes material to be assessed. This would enable a) identification of its more significant parts and separation of any less significant parts, allowing an appropriate respective investment of time and resources in subsequent storage and packaging, and b) item level documentation, suitable packaging and ordering of the more significant parts to facilitate their accessibility for study and allow the material to play a role in ongoing Palaeolithic archaeological research, as well as a range of community and education projects.

2.5 Regional research context and complementary projects

The English Heritage/Prehistoric Society report *Research Frameworks for the Palaeolithic and Mesolithic of Britain and Ireland* (1999) defined three main areas of focus to guide investigation, curation and dissemination of the Palaeolithic archaeological resource:

- Identification of major academic research themes
- Identification of some specific projects of immediate relevance
- Recognition of the need for pro-active education and dissemination projects to promote wider understanding of the often little or mis-understood Palaeolithic heritage

Research themes

Major national research themes for Lower and Middle Palaeolithic archaeology include:

- Documentation and dating of regional sequences of material cultural change
- Dating artefact-bearing deposits within regional, national and international Quaternary frameworks
- Behaviour of Archaic (pre-anatomically modern) hominids a) at specific sites, b) across the wider landscape
- Behaviour of anatomically modern hominids a) at specific sites, b) across the wider landscape
- Contrasts in Archaic and anatomically modern human behaviour and adaptations
- Patterns of colonisation, settlement and abandonment through the Pleistocene
- The climatic and environmental context of Archaic settlement, and the relationship

between climate/environment and colonisation

- Improved documentation and understanding of hominid physiological evolution
- Investigation of the relationship between evolutionary, behavioural and material cultural change
- Social organisation

The main resource for addressing these themes is the lithic and faunal archaeological evidence contained in Middle and Late Pleistocene contexts. Undisturbed horizons have been highlighted (Roe 1980; English Heritage 1991) as of particular significance for their stratigraphic and chronological integrity, and their fascinating glimpses into short-lived episodes of activity. Disturbed and transported material, such as predominates in fluvial contexts, has in contrast been downgraded in its potential significance, to the extent that some in the current curatorial environment would regard such material as being of insufficient significance to merit any protection or research in advance of destruction. However, besides avoiding the risk of writing off large quantities of the finite Palaeolithic resource just because we don't yet know what to do with it (cf. Chippindale 1989), the study of such material in fact complements the evidence from undisturbed sites by bringing a different chronological and spatial perspective to bear. Collections of transported artefacts represent a time and space-averaged sample, giving a more representative view of lithic production and diversity than the evidence from a few square metres representing one afternoon in the distant past. Such evidence may in fact be of more value in documenting and explaining general patterns of material cultural change, since it is less vulnerable to local heterogeneity caused by, for instance, specific tasks or raw material availability.

Besides the direct evidence of human activity, such as artefacts and cut-marked faunal remains, associated biological evidence plays a central role. It can be used to:

- Reconstruct the palaeo-climate and local environmental context of early hominid activity
- Date the sedimentary context of any archaeological evidence, both through chronometric means such as Uranium series (for mammal bones) or Amino acid dating (for molluscs) and by biostratigraphic comparison (particularly for mammalian assemblages)
- Identify the depositional and post-depositional processes of sedimentary contexts

Even at Middle and Late Pleistocene sites where direct archaeological evidence is absent, the study of any biological evidence has a major contribution to make to Palaeolithic research. As mapping and lithostratigraphic correlations of depositional units become more detailed in an area, accurate dating of even a few key units can provide foundations to tie in the whole sequence, and its contained archaeological horizons, with the wider national and international frameworks. This dating will most likely be achieved from the study of biological evidence — pollen, large vertebrates, molluscs or small vertebrates — from archaeologically sterile Pleistocene deposits. Thus a central aspect of the Palaeolithic archaeological agenda in any region has to be the discovery and study of such deposits.

In summary, the following key points can be made concerning how national Palaeolithic

research goals can be addressed:

- The main evidence is lithic artefacts and dietary faunal remains
- It is essential to know the stratigraphic context of such material
- Evidence from *both* undisturbed primary context *and* disturbed secondary context sites is significant
- The interpretive potential of any archaeological material depends upon understanding of depositional and post-depositional processes that have affected it
- Dating is essential to document the degree and spatial scale of contemporary variability, and the trajectories of cultural stasis and change through the changing climatic framework of the Pleistocene
- Biological palaeo-environmental evidence plays a fundamental role in Palaeolithic research, even on sites without artefacts, by contributing to the construction of chrono-, climato- and litho-stratigraphic frameworks

At the regional level for the project area, in the recent *Archaeological Research Framework for the Greater Thames Estuary* (Williams & Brown 1999, Section 3.2) an overall framework objective was defined for Palaeolithic archaeology and Pleistocene palaeo-environment of:

- *To increase understanding of the physical evolution of the Thames Estuary during the Pleistocene and of the social and cultural strategies of early human populations in relation to changes in environment and climate*

This would be taken forward by the specific objectives of:

- Developing the framework for, and understanding of, environmental and climatic change during the Pleistocene
- Developing knowledge of the evolution of the Thames drainage system at the regional level, and relating this to other regional terrestrial sequences and the global Oxygen Isotope framework
- Developing appreciation of human interaction with this environment through identifying key areas where primary context sites might be preserved and where evidence relating to current research objectives might be located

In summary, despite the intensive history of research in the Swanscombe area, there is still uncertainty over:

- The extent, distribution and sequence of Pleistocene deposits in the Swanscombe area
- The dating and correlation of the regional Pleistocene sequence
- The characterisation of the artefactual content of the major lithostratigraphic units

- The variation and density within major lithostratigraphic units of artefacts
- The locations where significant sites are most likely to be present

Previous research has established that the deposits in the Swanscombe area are of proven significance for investigating these issues at both the national and the regional Kent and Greater Thames levels. And as pointed out in the *Archaeological Research Framework for the Greater Thames Estuary* (Section 3.2), the resource has been greatly depleted by past mineral extraction and development, which increases the significance of surviving deposits.

Specific projects

At the national level, the Southern Rivers and English Rivers Palaeolithic Projects were carried out through the 1990s to establish a baseline survey of the Palaeolithic archaeological resource. These surveys summarised current knowledge of Palaeolithic find-spots on a region-by-region basis, relating them to current Pleistocene mapping. This has led to a basic record in the Kent region (Wessex Archaeology 1993) of deposits that are already known to have produced material, although it is obviously constrained by the accuracy of the mapping of Pleistocene deposits, the lack of knowledge of the stratigraphic and 3-dimensional complexity of the deposits and vagaries of recording and collection on the locations and contexts of finds. There has also been ongoing research as part of development control (eg. Wenban-Smith & Bridgland 2001), where specific sites have been able to be investigated in advance of development under PPG 16.

The recent development of national and regional research frameworks has meant that few projects have yet been developed in response. One that has — the *Crayford Silt Complex Archaeological Deposit* survey (Wessex Archaeology 1998) — has shown by its success the value of such specific projects for both addressing academic research priorities and curatorial needs. Several specific areas of research for Palaeolithic archaeology and Pleistocene palaeo-environment were identified in the *Archaeological Research Framework for the Greater Thames Estuary* (Section 3.2):

- A targeted programme of recording and sampling geological exposures to improve knowledge of geological sequences and their environmental and chronological context, to assess the artefactual content of the deposits and to identify specific sites
- Utilising borehole and associated data for the same objectives
- Compilation of palaeo-geographic maps illustrating the physical evolution of the study area
- Systematic compilation of environmental data to provide palaeoenvironmental frameworks
- Assessment of historic maps and antiquarian records of previous quarrying to locate known artefact collections and identify the extent of significant deposits
- Development of effective assessment techniques for Palaeolithic deposits

Following from the establishment of these well-defined national and regional research objectives

together with identification of these preliminary research areas, a number of projects are now in progress or being planned. These include an ALSF-funded project from Kent and Essex County Councils *Archaeological Survey of Mineral Extraction Sites around the Thames Estuary* (Essex County Council Field Archaeology Unit 2004). In addition to this project, mitigating archaeological research in advance of ongoing development in the area is continually producing new information for the Palaeolithic period. Projects recently completed or in progress include:

- Swan Valley Community School, Swanscombe (Wenban-Smith & Bridgland 2001)
- Channel Tunnel Rail Link and Ebbsfleet International Station
- South Thameside Development Route

Community and education

Despite being one of the three main themes recognised for the national research framework for Palaeolithic archaeology, proposals and projects in the area of community and education are relatively scarce nationally. It is however important that these avenues are invested in alongside the mainstream academic framework. There are several potential strands to explore in such projects, for instance: enhancement of existing museum displays, development of existing archaeological education projects and pro-active engagement with the community. Projects in progress in Kent include:

- A desk-based assessment as part of the Green Grid initiative of the Swanscombe National Nature Reserve (Wessex Archaeology 2004)
- Everyone's Valley — an assessment of the potential for heritage attractions in relation to the large-scale development in and around the Ebbsfleet Valley (joint URBAN, RLE and EH funded)

Complementary ALSF proposals

The aims, objectives and methods of the Stopes project are directly complemented by a number of other ALSF projects. Besides the joint Essex/Kent proposal mentioned above, relevant projects include the *Archaeological Potential of Secondary Contexts* (Hosfield 2004) and the *Palaeolithic Archaeology of the Sussex/Hampshire Coastal Corridor* (Bates *et al.* 2004). While it has already been recognised in the approach adopted here to Palaeolithic significance that the archaeological potential of secondary context sites should not be ignored, the *Secondary Contexts* project may produce specific results of relevance to the assessment and interpretation of Stopes' material from such sites. Conversely, many of the methods and problems of the *Sussex/Hampshire* and *Archaeological Survey of Mineral Extraction sites Projects*, in particular the synthesis of old OS maps with BGS mapping to prepare digital base maps, and the development of an approach to assess the significance of Palaeolithic sites are similar to those proposed in the Stopes project. Solutions found to be useful in one project were then applied in others, leading to cross-project consistency and the avoidance of duplication of effort.

3 AIMS AND OBJECTIVES

Aims and objectives for the Stopes project were developed in relation to the background of national and regional research frameworks for the Palaeolithic/Pleistocene in the Kent/Thames Estuary reg. Different objectives (Table 5) were identified under three areas of project aims —

academic, curatorial and community/education — although clearly there is a high degree of cross-over between objectives in these three areas.

<i>Aims</i>	<i>Objective</i>	<i>Details</i>
Academic	1 Provenance	To identify the stratigraphic context and site location of the artefacts in the Stopes collection, and to relate this to mapped sedimentary units
	2 Research potential	To assess the potential of the artefacts in the Stopes collection for addressing national and regional Palaeolithic research objectives
Curatorial	3 Site location	To identify the locations in the landscape of Stopes' find-spots, in particular: locations i) not already mapped in the Southern Rivers project and ii) where Pleistocene sediments are still present
	4 Site assessment	To assess the significance of the surviving sites investigated by Stopes; where extra information is present in Stopes collection, or as a result of associated archival research, it may enhance or change current understanding of the significance of both known and new sites and sediment bodies
	5 Resource approach	An improved understanding of the significance of the sites investigated by Stopes should enable appropriate evaluation and/or mitigation strategies to be determined in advance of any potential impact from development
	6 Museum curation	To store and package the Stopes collection in a manner commensurate with the relative significance of its different parts, to facilitate enhanced access to the collection for academic research
Community and education	7 Teaching	To enhance the existing use of the Stopes collection for teaching purposes by improving understanding of the provenance of its many parts and by developing new teaching collections
	8 Display	To enhance the display potential and public accessibility of the Stopes collection by gathering more information on both the social and human context under which it was collected and by improving understanding of its provenance
	9 Outreach and discovery	To identify parts of the Stopes collection suitable for a range of outreach and discovery projects with an emphasis on social inclusion and direct public access to original artefacts, guided by dedicated staff and supplemented by a range of media — audio, visual, digital
	10 Local studies	To create an index of the archival sources consulted during the project as a local studies resource for northwest Kent
Reporting	11 Assessment report	To prepare a single integrated project report that incorporates the results of the academic and curatorial objectives
	12 Publication	To publish the results and methods of the project in national and regional journals
	13 Community and popular dissemination	To publish, or publicise, the results of the project in fora that are more widely accessible than academic journals

Table 5. Aims and objectives

3.1 Academic

The two specifically academic objectives (1 and 2) related to identifying the potential for analysis of artefacts in Stopes' collection to contribute to addressing national and regional research questions. These objectives also complement a number of other existing or proposed

projects, in particular the assessment for the Swanscombe Heritage Park (Wessex Archaeology 2004) and the *Archaeological Survey of Mineral Extraction Sites around the Thames Estuary* (Essex County Council Field Archaeology Unit 2004). A significant part of Stopes' collection has probably come from within the areas covered by these projects, and any gain in archaeological knowledge about the deposits (both extant and quarried out) would feed into the overall objectives of the projects to establish a baseline report and qualitative assessments on the geological and historic environment and potential in the project areas.

3.2 Curatorial

The first three curatorial objectives (3, 4 and 5) directly address specific issues raised as regional priorities for the Greater Thames Estuary (cf. section 2.5), namely the identification of primary context sites and locations of relevant evidence for addressing national and regional research agendas, and the development of appropriate techniques of evaluation, mitigation, and assessment of the artefactual content of sediment bodies. In addition, the information gained will enhance understanding of the nature, distribution and significance of the surviving Palaeolithic archaeological resource.

These objectives also directly complement a number of other projects, in particular the joint Essex/Kent County Council *Archaeological Survey of Mineral Extraction Sites* (Essex County Council Field Archaeology Unit 2004). While the remit of the Stopes project is narrower in archaeological period, time (of quarrying) and area, it covers part of the same ground, and the results contribute to the much bigger picture provided by the Essex/Kent project. The Stopes project covered an intensely quarried area of high Palaeolithic complexity in more detail than was possible for the wider area covered in the Essex/Kent project. Conversely, the work of the Kent/Essex project recording the expansion of quarrying in the Swanscombe area after Stopes' collecting ceased (with his death in 1902) is of direct utility in assessing the extent of surviving deposits and the possibility that they contain previously unrecognised Stopes find-spots.

The fourth curatorial objective (6) addresses the practicalities of storage of the Stopes collection, which was still, at the start of the project, mostly in the original early 20th century crates. The timing of the project corresponds with the need of the holders of the material (National Museums & Galleries of Wales) to consider long-term storage priorities and arrangements. The storage location of different parts of the Stopes material, and investment in its packaging, need to be planned in relation to its value as an academic and community resource. Appropriate item level documentation and storage will also enhance its accessibility. This process will bring the collection up to modern, approved standards for the care of archaeological collections and will offer the collection protection from damage and edge chipping.

3.3 Community and education

The community and education objectives (7, 8, 9 and 10) match the third theme identified as a priority at the national and regional levels (cf. Section 2.5). Material from the Stopes collection is already used for teaching, display and discovery/outreach at the NMGW. Discussion with those involved in these aspects established that more detailed knowledge of the context and circumstance of discovery of the material would be of utility in enhancing its existing use for displays and teaching. Existing teaching and display collections needed to be enhanced to reflect a more representative selection of artefacts from the main stratigraphic units and variety of depositional contexts. The discovery of new archival material (for instance letters and photos) would enhance the display and exhibition potential of Stopes collection. Material whose provenance is less certain and is therefore of less academic research potential would be of utility

for the development of handling collections, which could both remain at the museum and be sent out to schools and other interested groups or institutions. The authenticity of any material is an important part of its appeal, and the Stopes collection contains much authentic material without good enough provenance to be of much academic potential.

Ideas developed and work carried out in these areas at the NMGW complement those for projects such as the Swanscombe Heritage Park and Everyone's Valley. There would be benefits if a cross-fertilisation of ideas could take place, and the project aimed to develop links between the NMGW and Kent Education Department, to explore ways in which the presence at NMGW in Cardiff of a significant Palaeolithic archaeological collection from Kent could be used to develop appreciation of the Palaeolithic heritage in schools in both areas.

One aspect of the project was a systematic investigation for archival and documentary material concerned with Stopes' collecting. While this was focused as far as possible to avoid spending time on unrelated material, a large amount of material was consulted that was relevant to a range of interests, although not directly relevant to the Stopes project. A record of all archival sources consulted was kept during the Stopes project, with information on their present location, date and contents, and this is submitted as part of the project end-product to serve as a local studies resource in the northwest Kent area.

3.4 Reporting

The fourth strand of the project objectives concerns dissemination and publication of the results. The main output of the project is this single integrated report (11), which contains as appendices, and in the second A3 volume of maps, the detailed results of the find-spot grouping and location, and the lithic examination. This report also contains the results of the assessments of significance for surviving Palaeolithic sites and for the Palaeolithic assemblages (Appendix 3) and the highlights of these are discussed in Sections 5.4 and 5.5.

It was also hoped that the project would lead to the discovery of sites or assemblages of significance and interest to the Palaeolithic and Quaternary research community. For the curatorial and academic community (12), a publication summarising the results of the project will be prepared, and submitted to a regional or national journal according to the scope and significance of the results. For the wider community (13), it was intended to make a summary of the project accessible via the internet, and to explore other avenues such as public presentations, museum exhibitions and the media for widening accessibility to the project and its results.

3.5 Scope of project

Stopes collection contains lithic artefacts from across the world, and includes archaeological, ethnographic and experimental material. For instance, just one page of the Catalogue includes material from Swanscombe, Africa and India (Fig. 5), and other entries mention such diverse locations as Patagonia (find-spots 378–379), New Guinea (find-spots 17A and 80A), the Easter Islands (find-spot 446) and the tiny island of Antipaxos, south of Corfu (find-spot 408), not to mention numerous other British and European sites, including France, Switzerland, Germany, Scotland, Ireland, East Anglia and the southeastern English counties. All of this material merits consideration of its significance and potential for analysis. However the great majority of the Stopes collection consists of Palaeolithic and later prehistoric material from the Swanscombe area of Kent. This is clear from the original summary of the collection when it was first offered for sale, from the conclusions of those who have subsequently, however briefly, examined it, and from even a brief view of the crates of handaxes and debitage in storage (cf. Fig. 4).

The precise quantity of material from Kent, and the proportions that are Palaeolithic, later prehistoric or natural were unknown at the outset of the project. Examination and consideration of the Palaeolithic material from Kent was identified as the main goal of the project from the start. Firstly, this material had a clear link with past and future aggregate extraction. Secondly, although some of it was without doubt residual, it was anticipated that a large proportion of it was collected from *in situ* sediments, in contrast to the field-surface origin of the later prehistoric and natural material. Thirdly, the Swanscombe region of Kent is a key region for Palaeolithic research, as well as imminent development, and it seemed that this was the region and period for which Stopes' collection was most likely to contain significant material. And fourthly, from what could be estimated of the size of the collection, it seemed feasible within the time-scale of this phase of the Aggregates Levy Sustainability Fund to reach a useful end-product for this part of the collection, whereas to have attempted a wider analysis would have been completely unrealistic.

As it turned out, the great majority of material in the collection proved to be from Kent. The remaining material has not yet been quantified, but it can be estimated that Kent material constitutes *c.* 90% of the Stopes collection. Of this material, approximately half proved to be Palaeolithic, and the other half later prehistoric or natural. At the point when the find-spot location and sourcing was being carried out, it was not known whether any lithics were present from a particular location, and if so, whether that material was Palaeolithic, later prehistoric or natural. Thus the location of all Kent find-spots in the Catalogue has been identified, where possible, whatever the period of the artefacts found.

Finally, while the primary objectives of the project were aimed at considering the potential of the Palaeolithic assemblages, and curating the Palaeolithic archaeological resource, the later prehistoric material was counted, and certain typological and technological aspects were noted. Thus, part of the outcome of the project is also a summary of the nature and distribution of scatters of later prehistoric material across Stopes' collecting landscape. No attempt was made to differentiate between Mesolithic, Neolithic and Bronze Age on the basis of the lithic assemblages, although the presence of key artefact types such as Thames picks, leaf-shaped arrowheads, polished stone axes or Long Blade material was recorded. And no attempt was made to consider the significance or curatorial implications of any of the later prehistoric assemblages or find-spots. Therefore, although as a by-product of the core Palaeolithic remit, the overall outcome of the project also includes information on the nature, richness and distribution of later prehistoric lithic scatter sites.

4 METHODS

The overall approach was to identify the locations of Stopes' find-spots by a combination of archival research, map regression and published sources. Find-spots representing the same location were then grouped together. This process ran concurrently with direct examination of the lithic collections from each find-spot. Once site locations had been established, walkover surveys were made for the more securely located Palaeolithic sites. Stratigraphic provenance (where not already clear from archival records or from entries in the Catalogue) was determined as far as possible from geological mapping and artefact condition. Although it was hoped to clarify the site location and stratigraphic provenance of as much of Stopes' Palaeolithic collection as possible, it should be emphasised that one of the primary objectives of the project was to establish *how much* of Stopes' collection *could* be sufficiently well provenanced to be of

academic value, and not necessarily to succeed in establishing a good provenance for *all* of it. Good provenance and stratigraphic integrity then played a major role in the assessment of research potential for lithic assemblages.

All information on the find-spot location and grouping, assemblage examination, potential for analysis, walkover surveys and site assessments was then collated for the report (Appendices 1–3).

4.1 Find-spot grouping and site location

The first stage in identifying the locations of Stopes find-spots was to go through the Catalogue with a large scale atlas of southern England, identifying find-spots that were obviously in Kent, and eliminating those that were obviously not. Most find-spots had general parish information, alongside more detailed location details, so even if the details were at first enigmatic, the general area was normally easily ascertained. Once this was done, there was an initial list of 175 find-spots. Many of these clearly related to the same site. For instance, at least eight separate find-spot numbers relate to "Great Pit, Milton Street", seven to "Bevans Pit" and nine to "Ash". Following establishment of this initial list, a concurrent process of find-spot location and grouping took place, making use of all the information given in the Catalogue. This often included slightly different details for each site in different entries, enabling development of an increasingly detailed understanding of where specific farms and pits were in relation to each other. Catalogue find-spot entries relating to the same site were grouped together under the primary group name of the first-mentioned find-spot of that group in the Catalogue. To give just one example (Table 6), it can be deduced with confidence that find-spots 14, 27, 593 and 598 all relate to the same site — "The Wash-pit" or "Bevans Wash-pit" — and that Treadwell is the occupier of New Barn Farm. New Barn Farm is shown on the OS maps of the time, just off Southfleet Road to the south of Swanscombe, which allows increased confidence in the identification of the location of find-spot 19 (cf. Fig. 3), which was Treadwell's Hop Ground, near the road to Southfleet.

<i>F-spot group</i>	<i>Find-spot</i>	<i>Find-spot site-name</i>	<i>Stopes' catalogue entry</i>
14	14	The Wash-pit, Swanscombe	Small rough-twisted implement from the Wash-pit, Swanscombe, opposite the farm
	27	Pit opposite New Barnes	Got from pit in London Clay opposite New Barnes. This pit is being <u>washed</u> down to the brickyard, Bevans
	593	Bevan's wash pit	Bevan's wash pit opposite Treadwell, New Barn, Swanscombe. See also no. 27 and no. 598
	598	Bevan's wash pit	Found in Bevan's wash pit, Swanscombe, 17 ft from surface. See also no. 27 and no. 593

Table 6. Example of different find-spot entries in the Catalogue for Bevans Wash-pit

Detailed 25" (c. 1:2,500) OS surveys of Kent were made in 1865, 1895, 1907, 1938, 1954 and regularly thereafter up to the present day. Stopes was active between c. 1880 and 1902, coinciding with a period of rapid quarry expansion, and also with regular OS mapping. Base maps for the areas of Kent covered by Stopes' collecting were prepared, showing quarry expansion during the period Stopes was active against the backdrop of the 3rd OS survey of 1907, showing the landscape shortly after Stopes' death (Fig. 6). The level of road-name

recording, place-name recording and building-name recording (particularly farms) was often sufficient on the contemporary OS surveys, together with the information on quarry expansion, to enable identification of many of Stopes' sites. For instance it is clear from Figure 6 that there was no quarry during Stopes' lifetime to the east of Craylands Lane, between Craylands and Galley Hill. Therefore all of the find-spots identified as Craylands Pit, Milton Street or Craylands Pit, Swanscombe must relate to the pit on the opposite site, rather than the one subsequently excavated and known in the 1930s as Craylands (or, more accurately, New Craylands).

Supplementing the mapping information, there were a number of specific dates given at various points throughout the Catalogue. When these are plotted against find-spot number (Fig. 7), it can be seen that there is complete chaos before find-spot 425, followed by a perfect correlation between find-spot and date thereafter, with a steady increase in gradient, presumably reflecting the decreasing collecting activity of Stopes as he became more ill towards the end of his life. This relationship enabled find-spots beyond 425 to be dated with reasonable accuracy, which facilitated attempts to locate them.

Alongside these avenues of investigation, published references of the time were checked for references to the named sites, and a programme of archival investigation was carried out. In many ways, this latter was a lucky dip exercise, and part of its objective was to make a record of everything found, in case some of it was at some future point in time relevant to someone. However, every effort was made to increase the chances of finding material relevant to Stopes, by concentrating on the period of his collecting, find-spot names given in the Catalogue, and his known haunts and associates. Furthermore, there is a tantalising record in the Catalogue (cf. Fig. 3, find-spot 65, Dierden's) to a map, which unfortunately has not yet been located.

It was clear from the Catalogue that Stopes did a lot of collecting with Benjamin Harrison of Ightham, and some very productive time was spent in Maidstone Museum, where Harrison's original large-scale maps of his find-spots on the North Downs are preserved, along with a number of indexed notebooks, not to mention copious notes and letters. Other useful sources of information included the 1840s tithe maps for field names, and Kelly's Post Office directory for the names and addresses of individuals mentioned in the Catalogue as owning locations where material was found. The following institutions were contacted, and visited where necessary, in the search for relevant archival material:

- Maidstone Museum
- British Museum, London, Department of Prehistory and Europe
- British Museum London, Franks House
- British Geological Survey, Keyworth
- Natural History Museum, London
- University College London
- National Museum & Gallery of Wales, Cardiff
- Dartford Borough Library
- Centre for Kentish Studies, Maidstone
- The Geologists Association, Burlington House, London
- National Monuments Record, Swindon
- Cambridge University Museum of Archaeology and Anthropology
- Geological Society, Burlington House, London
- Ashmolean Museum, Oxford

- Baden-Powell Quaternary Research Centre, Oxford
- Dartford Borough Museum
- Gravesend Historical Society, Blue Circle Archive

Although a few find-spots were too general — such as no. 629, "West Kent" — to be given a location, these investigations were successful, and the location of one site alone (find-spot 757⁵, East Lodge) remains completely unknown. The accuracy of a site's location was allocated to one of three classes:

- Accurate — A specific site, accurately provenanced
- Estimated — Estimated best guess for specific site, with high confidence
- General — General area (eg. parish, village, woods, hill), estimated general area or village

The location of each site was plotted on a series of 1:25,000 A3 maps of the present day landscape, which also showed the Solid and Drift geology.

4.2 Lithic examination

All of the artefacts now present in the Stopes collection were initially washed and sorted into find-spot number order as part of the museum curation (cf. Section 4.7). Then all those that had been identified as from Kent find-spots were examined. Each artefact was individually examined, and attributed to a basic period category (Table 7; Fig. 8, column 1). And for those artefacts interpreted as Lower/Middle Palaeolithic, a more detailed technological attribution was made (Fig. 8, columns 2–3).

<i>Abbreviation</i>	<i>Period</i>	<i>Definition, recognition criteria</i>
PAL	Lower/Middle Palaeolithic	Artefacts thought to definitely be Lower or Middle Palaeolithic, on basis of typology/technology, and sometimes, especially for debitage and cores of size, condition and patination — divided into typological/technological categories as above
UP	Upper Palaeolithic	Artefacts from Upper Palaeolithic, identified typologically or technologically
MLAT	Mixed Later Prehistoric	Artefacts/faunal remains from post-Holocene later prehistoric periods: Long Blade, Mesolithic, Neolithic, Bronze Age, Iron Age and proto-historic; no attempt to distinguish between these periods
ETH	Ethnographic	Artefacts interpreted as of ethnographic origin, although with a Kent catalogue ID
FORG	Modern	Artefacts interpreted as modern, generally experimental or forgeries, sometimes possibly industrial waste
M?	Uncertain	Artefacts, often debitage, which cannot reliably be differentiated as whether Lower/Middle Palaeolithic, later prehistoric or another category
NAT	Natural flint	Pieces of flint, or other stone, with no sign of human intervention, although often heavily naturally battered or plough-damaged

Table 7. Explanations of major period groups

A general estimate was made for each assemblage of the proportion of Palaeolithic material in different conditions, ranging from mint to extremely abraded (Table 8; Fig. 8, columns 6–10).

<i>Condition</i>	<i>Definition</i>
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Mint	As freshly knapped
Sharp/fresh	Sharp to handle, ridges unaffected, but slight abrasion edges
Slightly rolled/rolled	Ridges slightly abraded, edges lightly–moderately battered, smooth to touch
Very rolled	Ridges very abraded, all edges moderately–heavily battered
Extremely rolled	Almost a beach pebble, ridges non-existent or vestigial, heavily battered surfaces

Table 8. Categories of artefact condition

Notes were also taken on technological and typological points of interest, general staining and patination characteristics, and raw material. These details could not be recorded for each artefact due to the size of the collection being investigated and the limited time available for the lithic examination. Furthermore, of course, part of the objective of the project was to identify those parts of the collection that merit more detailed recording of this type, so as to avoid spending time on those parts of no potential significance.

4.3 Walkover survey

Following identification and grouping of all possible find-spots, a walkover survey was made for locations that were accurately known or estimated with high confidence, and which had Palaeolithic assemblages. The following information was recorded:

- Situation of site within the local landscape
- Current site usage and condition, degree of any development impact
- Quantity of surviving sediments — none (0), some remnants in/around site (1), moderately common in/around site (2), abundant in/around site
- Distribution and nature of any visible or mapped surviving sediments
- Imminent threats of development, so far as known or likely

4.4 Stratigraphic provenance

Several strands of information were combined to try and identify the likely stratigraphic source of Stopes' find-spot assemblages. Firstly, a number of find-spots have stratigraphic details recorded in the Catalogue entry (Fig. 9), although even for these some thought needs to be given as to what horizons Stopes meant — by, for instance, "Top gravel and Bullhead" in the case of find-spot 20. Secondly, the locations of find-spots were considered in relation to quarry locations and geological mapping (Fig. 10), which often gave a good indication of the Pleistocene deposit likely to be the source of any Palaeolithic artefacts. In addition to these two primary approaches, the condition and appearance of the assemblage was taken into account, for instance, whether it was mostly heavily rolled or mostly in fresh condition, or whether it was dark-brown stained or white patinated.

4.5 Lithic assessment

Once all the assemblages had been examined, and consideration had been made of their stratigraphic provenance, each Palaeolithic assemblage was assessed for its potential for analysis. Assemblages that consisted only of undiagnostic waste debitage were excluded from assessment. Assemblages were assessed in five areas:

- *Condition* Scored indication of the overall condition of the Palaeolithic lithic material:
 - 0 — None present
 - 1 — Mostly very rolled, maybe some rolled, but none mint/fresh
 - 2 — Mostly rolled, maybe some v. rolled, with few mint/fresh

- 3 — Varied, reasonable amounts mint/fresh as well as rolled
- 4 — Mostly mint or fresh

- *Provenance* Scored indication of how reliably the Pleistocene stratigraphic provenance of material from a find-spot is known or can be estimated:
 - 0 — Not at all
 - 1 — Mixed/general formation, various possibilities
 - 2 — Reasonable likelihood for prime suspect
 - 3 — Reliably known

- *Integrity* Scored indication of the probable degree of spatial transport and stratigraphic derivation within the presumed Pleistocene context (if known):
 - 0 — Unknown, no information on context
 - 1 — All or almost all residual or well-transported/derived
 - 2 — Mixed transported/derived and little-disturbed material
 - 3 — Assemblage thought to be consistently little-disturbed

- *Group value* Scored indication of whether the collection from a find-spot has extra significance in relation to other extant material, in terms of period, location, stratigraphic context and technology/typology:
 - 1 — Duplicates current knowledge
 - 2 — Moderate addition to current knowledge
 - 3 — Significant new information on existing group/material

- *Rarity* Scored indication of whether the collection from a find-spot is significant in relation to its rarity in terms of period, location, stratigraphic context and technology/typology
 - 1 — Extensive similar material
 - 2 — Moderately rare
 - 3 — Fills significant gap in knowledge

After assessment in each of these areas, an overall assessment of lithic potential was derived by multiplying all of the scores together. The rationale for this was so that a value of zero in any of the three key areas of condition, provenance or integrity would carry sufficient weight to reflect no potential for analysis. It is recognised that a purely numeric approach such as this is anathema to some. However, the numbers are merely an expression of qualitative judgements of value, and applying the same approach to all assemblages provides an empirical basis for comparing their significance on a fixed range of criteria. Some experimentation took place before ending up with the product of the five assessment criteria as the basis for the overall assessment, to ensure that the results generally matched more subjective and intuitive judgements over which assemblages were important, and which relatively worthless. The final numeric end-product is not intended to provide a precise ranking of relative importance of every site in relation to each other, but to highlight groups of sites of higher, medium and low significance.

4.6 Site assessment

Find-spots that i) had produced Palaeolithic material and ii) had their location accurately known, were visited for a walkover survey (cf. Section 4.3) and assessed for their significance. The abundance of surviving deposits, as recorded in the walkover survey, was not included as part of

this assessment. It was thought that very important sites could have sparse remnants, and conversely that a relatively unimportant site could have abundant surviving deposits, so including this aspect could confuse the overall picture. However, sites that were shown to be completely quarried away or otherwise destroyed were not assessed. Four factors were taken into account for the site assessments:

- *Condition* Scored indication of the overall condition of the Palaeolithic lithic material:
 - 0 — None present
 - 1 — Mostly very rolled, maybe some rolled, but none mint/fresh
 - 2 — Mostly rolled, maybe some v. rolled, with few mint/fresh
 - 3 — Varied, reasonable amounts mint/fresh as well as rolled
 - 4 — Mostly mint or fresh

- *Bio-potential* Scored indication of the presence and diversity of biological evidence
 - 0 — None/Unknown
 - 1 — Imprecise reports, or some probability on basis of reasonable inference
 - 2 — Reliable reports of large vertebrate remains, and reasonable possibility of other biological evidence
 - 3 — Reliable reports of large vertebrate remains and other categories of biological evidence such as molluscs, small vertebrates and pollen

- *Group value* Scored indication of whether the collection from a find-spot has extra significance in relation to other extant material, in terms of period, location, stratigraphic context and technology/typology
 - 1 — Duplicates current knowledge
 - 2 — Moderate addition to current knowledge
 - 3 — Significant new information on existing group/material

- *Rarity* Scored indication of whether the collection from a find-spot is significant in relation to its rarity in terms of period, location, stratigraphic context and technology/typology
 - 1 — Extensive similar material
 - 2 — Moderately rare
 - 3 — Fills significant gap in knowledge

Three of these criteria are also used in assessment of the potential for analysis of the lithic assemblages. However, in this instance, the overall site assessment is derived from the sum of these criteria, rather than the product. This gives an entirely different flavour to the end product, reducing its range and reducing the impact of zero or low scores in different areas. This was thought to reflect the reality of the field situation, in that some sites would have no biological evidence, but interesting lithic material, and vice-versa, and both types of site would be of significance for their potential contribution to Palaeolithic research.

4.7 Museum curation

This aspect of the project was carried out by the National Museums & Galleries of Wales, under the direction of Elizabeth Walker, Collections Manager in the Department of Archaeology and Numismatics. The Stopes collection is currently housed in the NMGW,

Cardiff where it is packed into *c.* 200 wooden crates. It has received little attention in the past, beyond basic sorting, most of which was undertaken in 1918 by Reginald Smith of the British Museum. At the outset of the project some crates were labeled "unsorted" and it was hard to locate individual items or even groups of items listed in the original catalogue. The collection was originally wrapped in newspaper, and at one stage in its history, prior to the 1970s, it was stored in a sub-basement that was prone to regular flooding, and as a result much of the newspaper disintegrated leaving a residue on the artefacts.

A Curatorial Assistant was initially employed to wash and clean the collection, and organise it by catalogue number, prior to the lithic examination. The markings were lost or illegible on several artefacts, and these had to be put aside and excluded from further analysis. All objects without visible markings were examined under ultraviolet light, and in some instances this allowed otherwise invisible markings to be identified. This task ran concurrently with the identification of which find-spots were in Kent, and material from these was set aside for lithic examination. After examination of the Kent assemblages, which included basic sorting of the collection by technological category (cf. Fig. 8), each artefact was individually packaged in a minigrip bag. These bags were then placed in new cardboard boxes with the required padding to prevent chipping. Each box was fully documented to NMGW inventory level and allocated a unique unit number. The find-spot grouping and technological summary information was then entered onto the NMGW Computerised Collections Management Database System.

5 RESULTS

5.1 Find-spot grouping and site location

The grouping of all of Stopes' Kent find-spots are summarised in Appendix 1. There were 175 separate Kent find-spots in the Catalogue, which proved to represent 92 separate sites. Only two find-spots resisted identification of their location. Firstly, was White's no. 5 Pit (find-spot group 24); this was variously described as being at Greenhithe and Northfleet, but no record was found of its precise location. White's no. 4 Pit was the Great Pit, Swanscombe, and it is possible that Stopes used the wrong number. However, it is clear that the site is in the general area of the Swanscombe/Northfleet/Greenhithe triangle.

Secondly, was the site of East Lodge (find-spot 757⁵, one of a group given by AS Kennard); No published or archival references were found for this site, although there are a number of Lodges in the area of Fawkham, including a North Lodge, and it is possible that East Lodge was in the vicinity. The National Grid Reference for each site is given in Appendix 2, which also specifies how accurately the site was located. Of the 92 sites, more than half were accurately located or estimated with high confidence (Table 9). Once the assemblages from these sites were taken into account (cf. Section 5.2), almost 40 sites with Palaeolithic material and almost 30 sites with later prehistoric material had had their locations accurately identified or estimated. Many sites had both Palaeolithic and later prehistoric material, although several lacked either Palaeolithic or later prehistoric material, or on occasion both.

<i>Period</i>	<i>Accurate</i>	<i>Estimated</i>	<i>General</i>	<i>Unknown/NA</i>	<i>Total</i>
Palaeolithic sites	18	11	19	1	49
Later prehistoric sites	14	14	30	2	60
Total sites	28	19	41	4	92

Table 9. Site location by assemblage period

The site locations (besides a couple of outliers that were too generally located to merit a map all to themselves) are shown on the series of maps (A 1 to A 11) that constitute Volume 2 of this report, against the backdrop of the present-day landscape and Drift and Solid geological mapping. The great majority of sites were concentrated in the immediate vicinity of Swanscombe (map A 2), a few in the Darent Valley (map A 3), several on the North Downs near Ash (map A 5), several in the neighbourhood of Ightham (map A 6) — these latter being a result of Stopes' association with Benjamin Harrison — and there were a few isolated find-spots on the other maps (Table 10).

<i>Map</i>	<i>Locale</i>	<i>Number of find-spots</i>
A 1	Dartford	3
A 2	Swanscombe	53
A 3	South Darent	5
A 4	Hartley	1
A 5	Ash, Stansted	8
A 6	Ightham	7
A 7	Gravesend	1
A 8	Higham	2
A 9	Knockolt, Biggin Hill	-
A 10	Westerham	1
A 11	Sevenoaks	1

Table 10. Number of Stopes' find-spots in map areas A 1 to A 11

There is no benefit in going through the explanations behind the location and site grouping of every find-spot, but four of the more important sites are worth reviewing.

Great Pit, Milton Street, Swanscombe (find-spot group 2)

No less than 19 find-spot numbers are attributable to the site. Several distinct names were used by Stopes for the site, including Craylands Pit and Barnsley Field Pit. It is clear from the records of quarry expansion that the Craylands Lane Pit to the east of Craylands Lane (Smith & Dewey 1914: 188; Dewey 1932) was not opened in Stopes' lifetime, and so he must have been using the name "Craylands" for the Great Pit. No archival or published references could be found for "Barnsley Field" or "Barnsley Field Pit", but the site of the Great Pit, later of course named Barnfield Pit by the Associated Portland Cement Company, lay adjacent to Barnes Field, so it seems reasonable to link the Barnsley Field find-spots as all from "Great Pit". Being able to relate the assemblages from all these find-spots to one site greatly increases the amount of lithic material known from this key site.

The Wash-pit, Swanscombe (find-spot group 14)

Four find-spot numbers are attributable to this site. The site is of interest as Stopes is the only person to have recorded material from the site, and before the *Stopes Palaeolithic Project* the existence and location of the site were completely unreported. The 1910 edition of the 6" geological survey for Kent, Sheet X (NW), shows a quarry in a "slipped mass of mainly London Clay" to the west of Southfleet Road, opposite New Barn Farm. This seems sufficient to be confident that the attribution is correct, and it is clear from the various information recorded in the Catalogue for the site, that the pit was owned by Bevans, and material from it was being "washed" somehow down to his brickyard, which is shown on the 1895 OS Survey at c. TQ 613

742, to the northeast of find-spot 26. The site is also of significance as it is currently a) being affected by landscaping and road building in the vicinity of the Channel Tunnel Rail Link Ebbsfleet International Station, and b) is adjacent to a major area of planned mixed urban development in Eastern Quarry, Swanscombe.

Bevans Pit, Swanscombe (find-spot group 26)

Eight find-spot numbers are attributed to this site. While it is clear that Bevans owned and ran several quarries in the Swanscombe area, when all the information given for these find-spots is taken together (alongside the information for find-spot 26C, see below), it seems inescapable that this site is in fact the original Baker's Hole, located at c. TQ 611 740 (cf. Wenban-Smith 1990 & 1995). A tiny quarry is shown at the site on the 1865 OS survey, and this was already fully excavated by 1895, exploiting the Chalk that was close to the surface in the centre of the site. The Chalk was buried by increasingly thick sand and silt deposits towards the edges of the quarried area, which had to be removed before the Chalk could be reached. It was presumably from these overlying deposits around the edges of the site that Stopes obtained most of his finds, and the expansion of the quarry ceased when these became too deep to make their removal economic in the context of late 19th century technology. By the 1950s, increased mechanisation and a different global economy had changed the economics of removal of this overburden, and excavation resumed.

In the present day, almost the whole of the Ebbsfleet Valley east of Southfleet Road has been extracted. Interestingly, the site-name "Bevans Pit" is still in local colloquial usage, although for the quarried area to the north of the footpath from Swanscombe to Northfleet, which although quarried in a small way before 1895, was mostly quarried in the years after 1900.

Bevans Pit, Cutting to (find-spot group 26C)

There is only one find-spot in this group, but the site is of interest because it is evidently the same site as Spurrell's Tramway Cutting (Spurrell 1883), which was the first recorded location of Levalloisian material in Britain, and which Spurrell also describes as being a "beach". Although Spurrell does not give a location for his site, its location has already been reasonably securely deduced (Wenban-Smith 1995). The information in Stopes' Catalogue provides additional confirmation over the location of the site.

5.2 Stopes' lithic collection

Overview

In total, there were over 24,000 lithic pieces present in the part of the Stopes collection examined (Table 11). Of these, over 11,000 were Palaeolithic artefacts (PAL), over 6,000 were mixed later prehistoric material (MLAT) and over 4,000 were natural pieces of flint (NAT). Besides these, there were small quantities of uncertain period (M?), ethnographic pieces (ETH) and a certain number of forgeries (FORG). Detailed breakdowns of the numbers of artefacts from each period for each site group, and for each of the separate find-spots contributing to a site group, are provided in Appendix 3. Several sites had no material present at all in the surviving collection. It is well documented in the archival material associated with Stopes' collection that pieces regarded as of no interest have regularly been weeded out and discarded. This process was started by his wife shortly after his death, and then continued in the years leading up to the sale of the collection to the NMGW in 1912. Further weeding took place on at least one occasion following the purchase of the material. Therefore it seems likely that the missing material from find-spots in the catalogue has at some point been discarded, or is among the part of the collection with lost or illegible marking. Nonetheless, considering the large amount of natural

pieces that are still present in the collection, it is hard to imagine that much of substance has been lost.

Most sites had a combination of Palaeolithic, later prehistoric and natural material. There was normally a predominance of either Palaeolithic or later prehistoric, and sites of both these periods had large quantities of natural on occasion.

<i>Assemblage size</i>	<i>PAL</i>	<i>MLAT</i>	<i>NAT</i>	<i>FORG</i>	<i>ETH</i>	<i>M?</i>	Total
1,000–10,000	1	1	1	-	-	-	
100–1,000	3	8	8	-	-	7	
10–100	17	21	14	1	-	8	
1–10	28	30	33	2	2	11	
0	43	32	36	89	90	76	
Total assemblages	49	60	56	3	2	26	
Total no. artefacts	11,427	6093	4156	23	3	2,499	24,201

Table 11. Site-group assemblage sizes and total counts for different periods

Palaeolithic

There were a total of 49 sites with Palaeolithic material. Table 11 also shows the distribution of assemblage sizes for Palaeolithic sites, and Table 12 shows the distribution of quantities of specific types of artefact within assemblages. A detailed listing of the 49 Palaeolithic assemblages in size order is given in Appendix 4. One Palaeolithic site in particular has huge quantities of material — find-spot group 2 (Great Pit, Swanscombe). This site has over 9,600 artefacts, including over 4,600 handaxes, as well as over 2,100 pieces of natural flint. A notable feature of the handaxe assemblage is the high proportion made on flakes, and, although almost all are pointed, the great variety of size and quality. There are hundreds (maybe thousands) of small and extremely crude pointed handaxes, often made by only a few poorly directed flake removals, alongside hundreds (again, or thousands) of carefully shaped and neatly made forms, some of them of great size and exquisitely flaked. The Great Pit assemblage also includes a number of Clactonian cores and huge Clactonian flakes and notched flakes. The majority of the Great Pit assemblage is moderately or very abraded, although a reasonable number are in fresh condition

After Great Pit, there are three Palaeolithic sites with between 100 and 1,000 artefacts: find-spot group 26 (Bevans Pit) with over 660 artefacts, find-spot group 65 (Dierden's Pit) with over 440 artefacts and find-spot group 22 (Top fields, Milton Street) with over 130 artefacts. The latter site is essentially Great Pit by another name, since all of the material is probably field-surface finds derived from the gravel deposits quarried at Great Pit. Similarly, a substantial proportion of the material from Bevans Pit was also probably recovered from the Great Pit deposits, which extend eastwards under Swanscombe village into Bevans Pit. The Bevans Pit material also includes a high proportion of Levalloisian flake and blade material similar to that from Smith's and Burchell's Baker's Hole and Ebbsfleet assemblages (Wenban-Smith 1996).

The Dierden's Pit material is of particular interest, since it is a sizeable assemblage from a deposit which attracted much attention at the time of its discovery by Stopes in 1900, but was never satisfactorily investigated. The collection contains almost 120 handaxes, 16 of them made on flakes, and also 16 flake-tools. The range of typological forms of the handaxes is similar to Great Pit, although there is a higher incidence of fresh condition material. In contrast, the flake-tool assemblage is quite different to any of the Great Pit material. Firstly, the proportion of flake-tools

to handaxes is 10 times greater than for the Great Pit assemblage. And secondly, rather than being *ad hoc* bluntly backed edges, the Dierdens Pit flake-tools are often large with unifacially flaked sharp edges reminiscent of the Upper Industry at Hoxne (Wymer & Singer 1993).

Beyond these there are 17 Palaeolithic sites with 10–100 artefacts, and 28 with 1–10. Some sites are single find-spots of one or a few handaxes, and some sites contain just debitage, with no handaxes. Which of these are of more interest than others is considered further below (Sections 5.4 and 5.5). Almost half of the sites had no Palaeolithic material, or at least none surviving in the present collection.

<i>Assemblage size</i>	<i>HA</i>	<i>HAF</i>	<i>C</i>	<i>FT</i>	<i>DEB</i>	<i>PER</i>	<i>MISC</i>	Total
1,000–10,000	1	-	-	-	1	-	-	
100–1,000	2	1	-	-	2	-	-	
10–100	9	3	2	3	7	-	-	
1–10	23	8	8	5	27	4	2	
0	14	37	39	41	12	45	47	
Total assemblages	35	12	10	8	37	4	2	
Total no. artefacts	4,584	758	103	106	5866	8	2	11,427

Table 12. Palaeolithic assemblage sizes and technological breakdown

Later prehistoric

Consideration of the later prehistoric material was beyond the remit of the project, although a certain amount of information was collected as a by-product. There were 60 sites with later prehistoric material. There is one very prolific later prehistoric site (find-spot 5, The Mounts) with over 2,600 artefacts, eight with quantities of between 100 and 1000 artefacts and the remaining 52 with 1–100 artefacts (Table 11). Several sites had pieces of polished Neolithic flint axe-heads, leaf-shaped arrowheads, Thames picks and other distinctive material. Long Blade material was also present at The Mounts, and possibly two other sites as well (find-spot 34, Botany Pay Pit, and find-spot 54, Hartley). Sites that have later prehistoric material are listed in Appendix 2, which also summarises which sites have Neolithic axe-heads or arrowheads. The details of how much later prehistoric material is present at each site, and notes on what it consists of, are given in Appendix 3.

Natural

One characteristic of Stopes' collection is the large quantity of natural flints. In total 56 sites have some natural pieces (Table 11). At one of these (find-spot group 2, Great Pit) there are over 2,100 natural pieces, many of them tiny rolled flint chips (find-spot 2). There are eight sites with between 100 and 1000 natural pieces. Foremost among these are find-spots 43 (Johnson's Field) and 44 (Dundel's Farm), which have respectively 180 and 344 large pieces of natural, cracked and battered flint. The large collections of natural flint in Stopes' collection are a product of their time, in that Stopes believed them to be eoliths, and while accepting that the stones had not been shaped, believed them to have been battered by use. Despite the fact that many of Stopes' eoliths have probably already been discarded over the years, the size of the remaining collection provides a salutary insight into their perceived significance at one time.

Forgeries

Three assemblages contained artefacts (always handaxes) interpreted as forgeries. Some of these

were already recognised by Stopes or other previous workers on the collection, but some of them were identified during this project. The main criteria for identifying a forgery was suspiciously fresh flaking in relation to the condition of any remaining cortex, and evidence of highly unskilled knapping combined with very careful attention to planform shape. On several of the forgeries, the flaking around the edges is very fresh, and the plan view of the handaxe is neatly symmetrical, yet the flaking has failed to achieve any thinning, leaving a blunt and heavily step-fractured edge. The majority of the forgeries (20 of them) are in the huge assemblage from Great Pit, Swanscombe, and the remaining ones are in the assemblages from Dierden's Pit (2 of them) and Bevans Pit (1 of them).

Forgery must always have been tempting in light of i) the relatively high price offered by collectors for implements and ii) the chance for the quarry labourers to put one over the gentry who roamed the land looking for bits of stone. It is possible that several forgeries are still present in the collection, and in others. However, this poses no problem to typological analysis, since the fact that they remain undetected indicates that they fit in with the overall typological characteristics of the assemblage anyway. They may pose more of a problem for other analyses, for instance which concern the identification of sites with fresh condition material, and studies of raw material source based on cortex condition. Despite these problems, forgeries are probably too rare to have any real impact on Palaeolithic research, although they are of interest in their own right, so far as they reflect contemporary perceptions of the tools they are attempting to duplicate — for instance an excess of attention to handaxe planform and a lack of attention to balance, edge-profile and cross-sectional shape and thinning.

Ethnographic

Despite the selection of find-spots that only related to Kent, three pieces included in the study appeared to be of "ethnographic" origin, which includes modern experimentation and uses such as gunflint or wall-dressing. Two pieces of ethnographic material were associated with find-spot 28 (One-tree field). One of these was a gunflint, either genuine or experimental. The other was a fish-tailed arrowhead of a form unprecedented in the British archaeological record. It is most likely from the Americas, and was somehow wrongly labelled, or it may have been a result of modern experimentation. The other piece categorised as ethnographic came from find-spot 31 (Bartholomew's Field), and appeared to be a crude home-made handaxe.

Uncertain

Artefacts in this category were often debitage for which it was not possible to know whether it was Palaeolithic or later prehistoric. Large size and signs of great antiquity such as heavy abrasion, strong staining or white patination were generally taken as a sign that debitage was more likely to be Palaeolithic. Yet the degree of patination, staining and abrasion on much material that was obviously later prehistoric on typological grounds (such as Thames picks, cores and discoidal scrapers) demonstrates that even much later prehistoric material can also show these signs, so they cannot be taken as definitive of the Palaeolithic.

The main other group of material that was labelled uncertain were pieces which might have been natural or might have been crude core, tools or lumps of debitage. One of these (find-spot 67, from site 36, Ash) is of interest since it was universally admired in the period 1890 to 1910 as "the finest pre-palaeolith known", and was much exhibited. To the present eye it is a heavily abraded and scratched lump of flint that could just possibly have been worked in a very small way, possibly as an *ad hoc* late prehistoric tool of some sort.

5.3 Stratigraphic provenance

The stratigraphic provenance of each assemblage is considered on a site-by-site basis in Appendix 3, based on the combination of site location, archival and published records, and assemblage condition. There were six main groups:

- *In situ* (geologically) material from the Boyn Hill/Orsett Heath formation in the Swanscombe area
- *In situ* (geologically) material from colluvial/solifluction and fluvial deposits filling the Ebbsfleet Valley
- Residual surface material, derived from the Boyn Hill/Orsett Heath formation in the Swanscombe area
- Residual surface material derived from now-destroyed Plateau Gravel and London Clay sites to the south of Swanscombe
- Residual surface material, derived from colluvial/solifluction deposits and fluvial deposits further away from Stopes' core Swanscombe collecting area
- Residual surface material derived from Clay-with-flints and Plateau Gravel sites on the North Downs

Unfortunately, and despite the detail sometimes given in the Catalogue, no assemblages were identified for which it was possible to relate a reasonable quantity of lithic artefacts to a specific stratigraphic unit. No archival material was located that gave any more information than was already available from published sources on the stratigraphic context of Stopes' assemblages. The majority of material could be related to the Swanscombe Boyn Hill/Orsett Heath formation, whether from geologically *in situ* deposits, or derived from these as surface finds. However, some consideration is needed as to whether this level of provenance is sufficient for any useful contribution to Palaeolithic research, and if so, which questions might be addressed (cf. Section 5.4). The provenance of the five main lithic assemblages collected from *in situ* deposits is reviewed below.

Great Pit, Swanscombe (Site-group 2)

It is clear from the quantity of handaxes in the collection that the majority of the assemblage from this site comes from the Lower Middle Gravel and the Upper Middle Gravel (cf. Table 4), which have been proven to be the main handaxe-bearing deposit by subsequent research. This deposit is also the most extensive of the Boyn Hill/Orsett Heath formation in the area, so artefacts from it would have made the greatest contribution to the site collection. It is, however, clear from the large Clactonian cores and flakes in the collection that some material was also being recovered from the Lower Gravel.

The part of the collection grouped under find-spot 20 is probably the most representative sample of the material, as it was mostly found by Stopes and his immediate family. This is labelled by Stopes as from "the top gravel and Bullhead". It seems likely that by "Top Gravel" he was referring to the Middle Gravel of Smith & Dewey's later investigations (1913 & 1914), since the find-spot assemblage includes almost 1800 typical Middle Gravel handaxes. What he meant by "Bullhead" is uncertain, although he cannot have been recovering material from what we now

call the Bullhead Bed, which is the distinctive flint nodule horizon dividing the Cretaceous Chalk from the Tertiary Thanet Sand. The assemblage from find-spot 20 must also include material from the Lower Gravel, since there is a low, but sizeable, quantity of distinctive Clactonian cores, flakes and notched flake-tools.

It is clear from the accumulated records of research in the Swanscombe area that there is also archaeological material in the sequence of deposits above the Middle Gravel. However, over the years it has proved much harder to find a site where these occurrences can be accurately recorded. Perhaps the most specific report is that of Dewey & Smith (1914), where an assemblage of white-patinated twisted ovates is recorded from the base of a deposit that overlies the Upper Middle Gravel. And there are other records of white-patinated ovates from the Upper Loam and Upper Gravel. It is probable that Stopes' Great Pit assemblage also contains material from these upper layers, but it is unfortunately not possible to separate it out from the great quantity from the Middle Gravels. Wymer (1968) attempted this on the basis of patination, but such an approach is problematic, since white or cream-patinated material can be found in the Middle Gravels. If a large-scale study on patination, staining and condition was done on material of known provenance from the Swanscombe sequence, this could provide a template on which to base sub-division of Stopes' huge collection.

Bevans Pit (Site-group 26)

A substantial proportion of the material from Bevans Pit was also probably recovered from the same Boyn Hill/Orsett Heath deposits as are present at Great Pit, which extend eastwards under Swanscombe village into Bevans Pit. Therefore despite the large size of the assemblage, its stratigraphic provenance is particularly poor, since there are such a wide range of deposits from which individual items could have been recovered. Not only are there the Boyn Hill/Orsett Heath deposits, but there are also the complex suite of later colluvial/solifluction and fluvial deposits that fill the Ebbsfleet Valley. And it is clear from the typological and technological range of Stopes' Bevans Pit assemblage that material from the full range of deposits is included. Frustratingly, no material from find-spot 597 ("stones touching bones and tusks of mammoth etc") was still present in the collection.

Dierdens Pit (Site-group 65)

This site was one of Stopes' major discoveries. He attached great importance to the richness of the molluscan and faunal evidence alongside the lithic artefacts, which allowed, he thought, improved dating of the overall Swanscombe sequence. However, it is clear from the diversity of material recovered from the site over the short period of its existence, that its stratigraphy was localised and complex, and the interpretation of any surviving collections from the site is consequently constrained. Stopes' handaxe collection from the site is full of pointed forms similar to those from the Great Pit Middle Gravels, although there are also several large flake-tools. However Newton's (1901) handaxe collection contains twisted ovate and cordate forms, as did Relph's according to Smith & Dewey (1914). The site was later reinvestigated (at a different location to where Stopes, Newton and Relph had recovered their handaxes) by Smith & Dewey (*ibid.*) who failed to rediscover the same deposit, finding instead a manifestation of the Lower Loam. According to Kerney (1971), the suite of molluscs associated with Stopes' lithic collection are characteristic of the Rhenish group, suggesting dating to the later part of the Late Temperate sub-stage, and broad equivalence to the Upper Middle Gravel at Great/Barnfield Pit.

The typological variety of extant and reported collections from Dierden's Pit suggest that deposits were present that were different from those that have been so carefully investigated and

recorded in Great/Barnfield Pit, and that they are likely to be rich in biological evidence. However, without more precise knowledge of the stratigraphic sequence, and of the context and associations of specific artefacts in present collections, it is not possible to use these collections to advance our understanding.

The Wash-Pit, Swanscombe (Site-group 14)

This site was regarded at the time of Stopes' activity as being adjacent to a slipped mass of London Clay, and this clay deposit was presumably exploited for brick-making. More recent work in the area [during December 2003 to March 2004] has identified a complex sequence of deposits in the area, including solifluction deposits, a lake-fill sequence and fluvial gravels. The southern margin of the Boyn Hill/Orsett Heath formation is also nearby. While the range of material recovered by Stopes is of interest for identifying the range of deposits present, and their potential correlations, there is no indication of from where in this complex stratigraphic sequence any of it came.

Globe Pit, Greenhithe (Site-group 758)

In contrast to Dierden's Pit there are good published records of the stratigraphic sequence (Priest 1912; Smith & Dewey 1914). Handaxe assemblages from the site, including that of Stopes, are dominated by ovate and cordate forms atypical of the Great/Barnfield Pit Middle Gravels. There is a very contorted sequence of gravels and brickearth, and the artefacts are reported mostly to have come from thick areas of brickearth, overlying gravels that *may* be equivalent to the Middle Gravels.

5.4 Potential for lithic analysis

An assessment of relative potential of each assemblage for lithic analysis was made using the product of scores in five relevant areas, as described in Section 4.5. Assessment was not done for assemblages that only had debitage. Appendix 5 lists all the assemblages in their rank order of potential. As discussed above, the precise value of the overall product score is of less importance than general grouping into high, medium and low. All sites bar seven have a score in single figures, which is probably a fair reflection of their lack of potential for more detailed typological analysis, given that they are mostly residual surface sites. A few of these (no. 7 — Merriman Field, no. 5 — The Mounts and no. 31 Bartholomew's Hill) have particular potential relating to their location in the landscape, and these are considered below.

Those sites that scored more highly include four sites that have already figured strongly in previous sections of this report for their large quantity of material and their relatively secure (albeit imperfect) stratigraphic provenance — Great Pit, Dierden's Pit, Globe Pit and The Wash-pit. Alongside these, the sites of Swanscombe Church, Galley Hill Tram-tracks and Swanscombe Wood are highlighted as of greater potential. What all these sites have, to a differing degree, is generally either or both of i) a prevalence of sharp condition artefacts and ii) the potential to add to our understanding of the archaeological record of the region. A number of sites, and in particular Bevens Pit, were regarded as so poorly provenanced as to have a value of zero for provenance, inevitably giving rise to an overall score of zero. While there are without doubt large quantities of nice artefacts in the large Bevens Pit assemblage, and rare representative specimens of Levallois technology, the lack of information on their provenance makes them of no value for analysis. They can of course play a useful role in areas such as display and education.

Globe Pit, Greenhithe (Site-group 758)

This site has already been considered in some detail above. There is less of a question-mark over

the assemblage provenance than many others, and the material is in fresh condition, and consequently likely to be of high integrity. It has high group value in that it clearly typologically and stratigraphically complements the vast quantities of material recovered from Great Pit and other sites in the Swanscombe Middle Gravels. And it is rare, in that sites with archaeological material from the later stages of the Boyn Hill/Orsett Heath formation are hardly known in the area, although Dierden's Pit and Craylands Lane (East) may be other examples.

Swanscombe Church (Site-group 687)

Despite the low quantity of material, this site scores highly on the basis of its uniformly fresh condition, its relatively secure provenance and its group value. The handaxes are so fresh as to arouse suspicion of forgery, although one should be able to rely on the integrity of the clergy, who were involved in the assemblage recovery — although of course they may have originated from the actual grave-diggers. Given that they are not forged, the fact that they came from graves means that, considering the topographic location of the church and cemetery at c. 35–39m OD, we can be confident that they are from the Upper Middle Gravel, and possibly its upper part. And the high group value resides in the security of the stratigraphic provenance, and the way in which this complements the much larger quantity of material that is less well provenanced.

Dierdens Pit (Site-group 65)

Despite uncertainty over the stratigraphic provenance, the flake-tool part of Stopes' assemblage is not met with at any other site in the region, so far as is known, which makes analysis and reporting of this of potential value. From previous records, it seems clear that the deposits at Dierden's discovered by Stopes are from the Upper Middle Gravel or above in the Swanscombe sequence, and so analysis of the collection can contribute to an understanding of the broad typological range within this overall phase of the formation, although it cannot contribute to a more detailed understanding of typological change through the course of the build-up of the Middle Gravel and later deposits.

Great Pit, Swanscombe (Site-group 2)

As with Dierden's Pit, there is uncertainty over the stratigraphic level of the assemblage from this site. In fact there is greater uncertainty, since the assemblage from the site includes material from the full range of the Great/Barnfield Pit sequence — Lower Gravel, Lower Loam, Lower Middle Gravel, Upper Middle Gravel, Upper Loam, Upper Gravel. However, we can be sure that the great majority of the handaxe element of the assemblage comes from the Middle Gravels, since handaxes are lacking in the Lower Gravel and Lower Loam. There may be some handaxes from higher in the sequence, although there cannot be many since material from the higher levels is so rare. Furthermore, one of the advantages of Stopes' completely indiscriminate approach to the selection of artefacts is that the assemblage is not biased towards nicer-looking handaxes in the same way as most other collections from the site. The huge size of Stopes' Great Pit assemblage provides a good opportunity to investigate the full range of handaxe types present in the Middle Gravel, as well as their relative proportion.

The other aspect of current research that could usefully be addressed by Stopes' Great Pit assemblage is the relationship, or otherwise, between handaxe typology and raw material source. It has been suggested that pointed handaxes are the product of restrictions imposed by exploitation of a derived fluvial gravel source. Stopes' Swanscombe handaxe assemblage is predominantly pointed, and examination of cortical distribution and state on such a large assemblage could provide a useful contribution to this debate, in that it could be investigated how much of the assemblage was made on fresh Chalk flint, and how many of the handaxes

were clearly made on raw material pieces that would not have been suitable for ovate manufacture.

This investigation could be combined with a comparative study of staining and patination in other assemblages, such as that of Wymer's 1955–1962 excavations (Ovey 1964) or Wenban-Smith & Bridgland's (2001) work, which are securely provenanced to the Middle Gravels. This would establish the range of patination and staining that occurs in the Middle Gravels, and could provide a more empirical basis than preconceptions of handaxe typological development for identifying those parts of Stopes' Great Pit assemblage that originated from the Middle Gravels, and those that did not. worth doing a sample, such as find-spot 20.

Given the huge size, and varied collecting history, of the total Great Pit assemblage, it would be best to take one of the more reliably provenanced find-spot assemblages, such as from find-spot 20 — which was mostly found *in situ* by Stopes and his family — as a sample.

Galley Hill Tram-tracks (Site-group 752)

This assemblage has arrived at a high score primarily as a result of its fresh condition and stratigraphic integrity. Although it highlights the location as of potential significance (cf. Section 5.5), the small size of the assemblage and the large quantity of material from the same stratigraphic horizon means that there is little to be gained from further analysis.

The Wash-Pit, Swanscombe (Site-group 14)

The assemblage from this site has a very insecure provenance, and scores moderately in all other areas. Current investigations in the neighbourhood of the site have shown that the local Pleistocene deposits are complex and varied, and of very uncertain age. They may include deposits from any horizon of the Boyn Hill/Orsett Heath formation, as well as later fluvial or colluvial/solifluction deposits. Despite the interest of the site (cf. Section 5.5) the provenance of the material found in the neighbourhood is too insecure for there to be any value in further analysis. However, if current work in the area provides distinctive patterns of condition, patination and staining that clearly relate to specific stratigraphic horizons, then it may be worth revisiting the Stopes' assemblage to see if any of this material could then be more precisely provenanced, in which case its typological analysis would become of value, in broadening the typological range associated with specific horizons.

Swanscombe Wood (Site-group 29)

The assemblage from Swanscombe Wood is of interest since it probably came from residual deposits capping high ground above the banks of the Boyn Hill/Orsett Heath formation river channel. The material is in relatively fresh condition, which distinguishes it from the assemblages from Bartholomew's Hill (Site-group 31) and The Mounts (Site-group 5) which are from the same location and context. The material from all three sites can be considered together as a group. Despite its residual context, and the consequent lack of certainty over its period of deposition, it seems most likely that the bulk of the material was deposited broadly contemporary with the intense occupation attested by the prolific finds in the Middle Gravels at the base of the high ground, c. 500m to 1km to the north. Thus the assemblage provides an indication of the extent of handaxe transport and manufacturing away from the most likely source of raw material, and it would be interesting to see if any differences in handaxe typology are associated with this separation.

Merriman Field, Ightham Common (Site-group 7)

This site is of interest since it is well away from areas of Chalk bedrock and Clay-with-flints that would have provided ready sources of raw material for tool manufacture. The presence of flint tools in such areas thus provides important evidence of the movement of Palaeolithic people and their tools around the landscape. The collation and analysis of information from such sites can thus help develop an impression of the range of Palaeolithic movement away from sources of raw material and the areas of landscape habitually occupied.

Complementary investigations

Besides consideration of whether or not any of Stopes' assemblages merit further lithic analysis, further work could also be done building on the basic technological categorisation already carried out. It was already recognised before this work on Stopes' collection that Swanscombe was an incredibly rich area for Palaeolithic evidence. And perhaps this has been so well recognised for so long that its potential import has been overlooked. Stopes' Swanscombe collection represents a significant proportion of the British Palaeolithic archaeological record. Before this project, approximately 8,250 handaxes were known from Kent sites, of which almost 3,000 came from Barnfield Pit alone (cf. Tables 2 & 3). According to Derek Roe, from whose original (1968) survey these figures are generated (pers. comm.), these figures exclude the material in Stopes' collection, which has been shown to contain over 4,500 handaxes from this one site, not to mention that the majority of the remainder come from other Swanscombe sites. This means that this one site has produced almost 60% of the handaxes in Kent, and over 15% of the entire British handaxe collection, which constitutes almost 39,000 apart from those in Stopes' collection (Roe 1968: vii). And these figures are further inflated if one takes into account the large collections from other sites in the immediate Swanscombe vicinity that without doubt came from the same gravel horizons.

No other site in Britain approaches the richness of Swanscombe. Whether this is an accident of accessibility and quarrying intensity, or a real aspect of the archaeological record should be investigated. There is certainly scope for a comparative study of handaxe density along different stretches of the Boyn Hill/Orsett Heath formation, and indeed other gravel formations along the Thames Valley and in other regions such as the Solent Basin, where the data gathered as part of the ALSF project *Palaeolithic Archaeology of the Sussex/Hampshire Coastal Corridor* (Bates *et al.* 2004) could be directly slotted into such a study. Increased understanding of the macro picture of handaxe concentration through space and time in English river basins may also throw light on Palaeolithic behaviour and site formation, and could ultimately contribute to understanding of the broad settlement history of Britain through the Palaeolithic.

<i>Site-group</i>	<i>Site-name</i>	<i>Research framework issue</i>	<i>Suggested analysis</i>
758	Globe Pit, Greenhithe	Typological change late-Boyn Hill/post-Middle Gravel	Typology, raw material source (cortex)
687	Swanscombe Church	Typological range intra Upper Middle Gravel, or possibly later deposit	Typology, raw material source (cortex)
65	Dierdens Pit	Typological and technological range intra later half of Boyn Hill/Orsett Heath formation	Typology, raw material source (cortex)
2	Great Pit, Swanscombe	Typological range and distribution of various types intra Middle Gravels (mostly — with some input	Typology, staining/patination, raw material source (cortex)

		from Upper Loam/Upper Gravel)	
752	Galley Hill Tram-tracks	Minor contribution to typological range within Middle Gravels	-
14	The Wash-Pit, Swanscombe	-	-
29	Swanscombe Wood	Investigation of Palaeolithic occupation in different local landscape zone,	Typology, raw material source (cortex)
31	Bartholomew's Hill		
5	The Mounts		
7	Merriman Field	Palaeolithic movement and tool transport away from raw material sources	Typology, raw material source (cortex)

Table 13. Potential for analysis of lithic assemblages

5.5 New sites and development impact

Only sites with Palaeolithic material and which had their location accurately known were assessed for their significance. Only fifteen sites fulfilled these conditions. All were visited and their current status, the quantity of surviving Pleistocene sediment and any imminent threats were recorded. As described in Section 4.6, the assessment was based on the sum of four criteria:

- Condition of the artefact assemblage
- Presence and quality of biological evidence
- Group value
- Rarity

The overall results of the assessment, together with the individual site scores for the amount of surviving sediment and the other assessment criteria are given in Appendix 6. All sites with a score of >5 are considered as of proven importance, and labelled as such in the overall site list given in Appendix 2. All the remaining sites are regarded as of potential significance, rather than as of proven insignificance. These include those in Appendix 6 with scores of 5 or less, as well as all other sites for which the location was not well enough established for a site visit to take place. The presence of a significant site may initially only be reflected in a low level of residual material, so the limited amount of material found at many sites is not a definitive reflection of their lack of potential, just an indication that high potential has not been proven. This is for instance the case at Oldbury, where there is no justification for identifying an important site at the location of Stopes' find, but where B. Harrison's work in another area identified significant deposits (Harrison, B, 1892; Harrison, E, 1933). The list of higher-scoring sites in Appendix 6 contains few surprises, with most of the sites (Dierden's Pit, Great Pit — ie. Barnfield Pit, Globe Pit, Bevans Pit — ie. Baker's Hole) already well-known as of high significance and highlighted as such in the Palaeolithic review of the *Southern Rivers Palaeolithic Project* (Wessex Archaeology 1993).

Several other sites (Galley Hill, Mansion House and Swanscombe Church) are within the area of the Boyn Hill/Orsett Heath formation at Swanscombe, which is, again, well-recognised as a source of significant Palaeolithic evidence. It is worth highlighting that two of these (Mansion House and Swanscombe Church) are beyond the currently mapped limit (British Geological Survey 1998) of the Boyn Hill/Orsett Heath formation. It is now well-established, however, following archaeological work at Swan Valley Community School (Wenban-Smith & Bridgland

2001) and Eastern Quarry (Wenban-Smith 2002) that this formation extends much further south than presently mapped, and includes the entire area of Swanscombe village. Stopes' finds at Mansion House and Swanscombe reiterate this point, and also serve to emphasise that significant evidence is not necessarily deeply buried in the Boyn Hill/Orsett Heath formation, but occurs within the normal range of services impacts and foundation trenching.

This leaves two new sites of hitherto unrecognised significance: The Wash-pit and Merriman Field.

The Wash-pit, Swanscombe (site-group 14)

This site is situated at the eastern end of Eastern Quarry, Swanscombe, immediately to the west of Southfleet Road, which heads south out of Swanscombe along the west side of the quarried areas of the Ebbsfleet Valley. The site is marked as a quarry on the 2nd (1895) OS survey, and was visited on the Geologists' Association excursion to Swanscombe in 1890, although it was not named and the locational details given are a little ambiguous (Spurrell 1890). Spurrell described the sequence as consisting of masses of brickearth over gravel, and reported discovery of handaxes and mammoth teeth in the brickearth.

Little quarrying has taken place since the late 19th century, and, although filled in and the edges rounded off, there is presently a dip in the landscape that marks the general area of previous quarrying. This is surrounded by arable fields, with an electricity transformer sub-station to the southwest, and the vast quarried area of Eastern Quarry further to the west. Within the last 6 months (ie. in the second half of 2003) bulk ground extraction (in relation to construction of the Channel Tunnel Rail Link and the Ebbsfleet International Station) took place to the west of Southfleet Road, and immediately to the south of the old Wash-pit site. This exposed a complex sequence of solifluction deposits, lake-fill sediments and fluvial gravels, with a buried palaeo-landsurface at the top of the lake-fill sequence containing (possibly Clactonian) artefactual evidence, and extending westward into Eastern Quarry. Furthermore, the sediments contain pollen, molluscan and mammalian remains. Stopes' assemblage from the site is very varied, and there is no way of knowing from which of the presently recognised stratigraphic horizons each piece came, if indeed the same sequence is now visible as was present in the original quarry. However, it is clear that artefactual evidence is abundant in the site area, along with the diverse biological evidence revealed in the recent work.

Mitigation archaeological investigations are currently taking place — scheduled to last from February to April 2004 — on the areas impacted by the CTRL, immediately to the west of the pre-2003 route of Southfleet Road. However there are still substantial areas of uninvestigated deposits remaining in the eastern end of Eastern Quarry, which is earmarked for major development and urban expansion as part of the planned regeneration of the Ebbsfleet/Swanscombe area. Some archaeological evaluation took place in the northeast corner of Eastern Quarry — "Area B" to the north of the old Wash-pit site — in September 2002, and this demonstrated the presence of Boyn Hill/Orsett Heath deposits with rich archaeological evidence (Wenban-Smith 2002). However the area around the Wash-pit site — "Area C" — remained unevaluated due to a combination of i) difficulties with access and ii) the expectation, based on understanding at that time, that this area would be to the south of any Boyn Hill/Orsett Heath deposits, which were thought to be the only formation in the area of Palaeolithic significance. However, the results at Area B, together with Stopes' records of finds at the Wash-pit and the CTRL investigations, have now highlighted Area C as a proven area of prime Palaeolithic significance, with *in situ* artefacts on a palaeo-landsurface and a complex and varied

Pleistocene sequence rich in diverse and well-preserved biological evidence. Field evaluation in advance of any development in this part of Eastern Quarry is, therefore, essential to i) determine the areas of preservation of Palaeolithic remains, and ii) develop a development strategy that either avoids impact upon them or undertakes appropriate mitigating excavations.

Merriman Field, Ightham Common (Site-group 7)

In contrast to the Wash-pit site, the lack of published reports, recent investigations and present exposures make it very difficult to assess in more detail the nature and extent of the Pleistocene deposits at the site. The site is located in a lightly wooded and scrub covered area on the south side of Ightham common. Geologically, the site is located on the outcropping surface of the Folkestone Beds, where their capping in hard Ightham Stone has made them resistant to erosion, and formed the raised area of land that constitutes Ightham Common. There was a quarry nearby to the southwest, open at the time of Stopes' collecting, where, presumably, Ightham stone was being extracted from the top of the Folkestone Beds. The surface of the Folkestone Beds is capped at its highest parts by areas of residual deposit, and one of these occurs close by the Merriman Field site to the west. It is most likely that Stopes' Palaeolithic finds from the site, which constitute two small pointed/sub-cordate handaxes and a couple of flakes, derived from this patch of residual overburden, or from a smaller unmapped residual deposit at Merriman Field itself.

Given the palimpsest nature of archaeological material from these residual deposits, and the consequent lack of chronological integrity of any finds, it is debatable how much interpretive potential they have. Clearly, given the variations in typology that are known within the Boyn Hill formation, and, as currently understood, the lack of chronological patterning in handaxe typology through the Palaeolithic, it is hard to use the typological profile of small residual collections to date them. However, as discussed above, there are major questions concerning the movements of people, and the locations of tool manufacture and discard in relation to raw material sources, that can be addressed through residual evidence. Since Merriman Field is located away from any flint raw material sources, the recovery of flint handaxes is significant, and can contribute to overall understanding of the Palaeolithic, without being unduly concerned about the precise phase of the Palaeolithic from which they came.

5.6 Henry Stopes

Henry Stopes was born in Colchester on 17th February 1852, and died, a little prematurely, in Swanscombe on 5th December 1902. Thus Stopes' adult life coincided with the pinnacle of the Victorian era of British Empire, a time when Britain was generally believed, especially by Victorian Englishmen, to be at the forefront of the world's cultural, intellectual and scientific advancement. Whatever the merits of this perspective, there can be no denying that major scientific advances did take place at the time, rooted in the development of a somewhat empiricist scientific approach, with almost no question beyond resolution by the accumulation of copious and minutely measured data. Stopes was born into a family of brewers, becoming a partner with his father at the age of 20, and establishing his own business engineering brewing equipment and premises at the age of 28. The family business must have been reasonably prosperous because Stopes was able to marry at 25, and, again at the age of 28, embarked with his wife on the grand tour of Europe and north Africa, which was part of a Victorian gentleman's education. This must have been a somewhat aspirational move for the young Stopes, since he was clearly not born into the aristocracy for which the tour was the norm, in relative contrast to his wife who came from the Edinburgh Carmichael family, traceable, she claimed, back to 1100. Her great-grandfather helped design

Edinburgh's New Town and her father J.F. Carmichael was a respected landscape painter. According to Hall (1977) she described him in her obituary of him as "bred a brewer", possibly reflecting a sense in herself of having "married beneath her station".

Stopes was passionate about fossils from a young age, having found a fossil echinoid in the playground at the age of 8, and despite having been whipped for taking it to bed overnight (according to the memory of his daughter Marie Stopes, cf. Appendix 8, no. 127). It is also possible that his later interest in archaeology, besides being perceived by him as making a contribution to the general scientific advances in knowledge of the era, was enhanced by its gentlemanly associations. Consciously or sub-consciously, this may also have been stimulated by a desire to be more fully accepted into what he might have perceived as the more rarefied social world of his wife. In contrast to the exploits of the likes of Lord Elgin, which clearly required considerable private wealth and time unfettered by the need to earn a living, men such as Stopes — and of course women, although at this era the arenas of female accomplishment were generally separated, although the boundaries were beginning to change, under the influence of the likes of Stopes' wife, who (cf. Hall 1977) was a leading, and early, figure in the Women's Suffrage movement — who wanted to buy into the scientific and intellectual achievements of the era needed to find something closer to hand and more economically accessible.

The collection of Palaeolithic artefacts fitted the bill perfectly. The issue of the Antiquity of Man, and the identification of humanly worked flints in ancient gravels, was the seminal controversy of the day, and their collection was relatively meritocratic, being primarily dependent upon understanding and diligence. This is not to suggest that such thoughts were actively present in Stopes' mind, nor those of contemporaries such as Spurrell, Harrison and Abbott. But it does not seem unreasonable to situate the archaeological activity of the Palaeolithic collectors of that time as to a certain extent socially aspirational, and to consider whether Palaeolithic archaeology was at one end of an archaeological spectrum which had classical archaeology at its apex. Be that as it may, Stopes was completely hooked on the accumulation of flint artefacts, an obsession which left his wife with many debts after his death, resulting in her having to sell his collection (cf. Walker 2001).

One of the first finds in Stopes' collection was a shell from the Red Crag on the Essex coast (Stopes, H, 1881; Stopes, M, 1913). This has on it a very crudely carved, but unmistakably human, representation of a human face. The specimen divided scientific opinion into those who accepted it, however reluctantly, as bona fide evidence of human workmanship at this impossibly early Pliocene era, and those who regarded this as entirely ridiculous, a notion hard to refute in light of the cartoon qualities of the carved image, which is reminiscent of a caricature of a snowman, with a round eyes, a triangular nose and a wide smiling mouth. Although a committee of the Prehistoric Society carefully considered, and rejected, the possibility of forgery, it seems impossible to believe that the object is a genuine artefact from the Red Crag. This is not to cast aspersion on Henry Stopes himself, but to suggest that maybe he was the victim of the finder's ulterior motives. According to Marie Stopes (1913: 325), the finder was initially a committed atheist, and produced the carved shell as evidence contradicting biblical orthodoxy. However, he was apparently then converted and wished to destroy the shell, but Henry Stopes tricked him into handing it to him for one last examination, and then said "Now you shall fight me for it, I am not going to have scientific evidence destroyed" — an approach to social negotiation he had apparently successfully applied on other occasions in relation to the persuasion of smokers to desist in his wife's

presence [cf. Hall 1977: 19 — "proper protest was lodged with the right authorities, but I have reason to believe that my height and width of chest, and perhaps the vigorous Saxon I can employ when required, had more to do with her freedom from persistent annoyance than any attempt to respect law or etiquette by these men"]. Clearly there were also advantages in being attached to a man "bred a brewer".

Whatever the origin of the carved shell, Stopes was a committed believer, and this coloured his subsequent collecting focus. Besides amassing his huge collection of genuine artefacts, including large numbers of waste flakes usually ignored by more selective collectors, he collected equally large numbers of completely natural pieces of flint, in the belief that use of these would have been the inevitable stage of human technology that would precede actual tool manufacture. He was, of course, a great friend of Benjamin Harrison of Ightham, who was such a strong advocate of eoliths. Indeed Harrison's autobiographical notes (cf. Appendix 8, no. 60) state that it was Stopes who encouraged him to keep on in his belief and his collecting, and "felt sure of my case, kept on and world attended, never ceasing to work".

Stopes' collecting was indefatigable, if not obsessive, and he deliberately moved to Mansion House, Swanscombe (now demolished, but on the site of the Veterinary Surgery, Swanscombe Street) so as to be in a good location for improving his collection. According to Marie Stopes (cf. Appendix 8, no. 127), whose mythologising in relation to the heroic nature and academic brilliance of her father should not be underestimated, he was the first to recognise the prolific artefactual content of the Swanscombe gravels. He would take his whole family to search the local quarries "for days at a time ... with our separate bags, like the three bears — father with a big one, mother with a medium-sized one, and my sister and I with little bags. We brought home to his collection not only the best and handsomest ones, but all the scraps of stone which showed any sign of human workmanship. These father laid out on an enormous table erected in the garden at Swanscombe on the lawn under a big mulberry tree. There sometimes a thousand or more flints were laid out in rows, ranging from very rough simple specimens ... to more perfect types".

As well as forming his large collection, Stopes' spoke regularly at the annual meeting of the British Association for the Advancement of Science, where apparently he had met his wife (Hall 1977), with a number of short papers presented between 1880 and 1896, mostly on material from the Swanscombe site. Perhaps Stopes' greatest triumph was his discovery in 1900 of the site at Dierden's Pit, Ingress Vale (Stopes, H, 1900a, b), which was the first location where prolific faunal and molluscan remains were recovered in association with handaxes from the Boyn Hill/Orsett Heath deposits. Stopes also published two book reviews in the general cultural magazine *Athenaeum* (Stopes 1897a, b), which although not with his name attached, are reported as having been written by Stopes in Kennard's biographical lecture (Bromehead 1949), as well as referred to in the obituary published at his death (Anon 1903). In contrast to his papers, which are extremely brief and matter-of-fact, the reviews are eloquent and loquacious, not to mention almost libelous. Although he clearly had an issue over eoliths to pursue, it nonetheless seems a little excessive to sum up the 2nd edition of John Evans (1897) classic *Ancient Stone Implements* as "... entirely inadequate, and in few points brought up to date". Appendix 7 gives a full listing of Stopes' published papers, as well as two posthumously presented by his wife in 1903.

Stopes became ill in his late 40s, and having been advised that he should stay in the open-air, spent the last part of his life adding to his flint collection from the Swanscombe. He is buried

in the cemetery of St. Peter and St. Paul's Church at Swanscombe, on top of the body of gravels from which he rescued so enthusiastically their scientific spoils. Unfortunately no handaxes were found in course of his interment, which would have been a fitting tribute. It was reported in the obituary published in the Geological Magazine shortly after his death (Anon 1903) that the workmen of Swanscombe village felt they had lost a friend, and probably very few of the gentleman archaeologists of the Victorian age could claim such a tribute.

5.7 Community and education

Material from Stopes' artefact collection plays a major role in a number of community accessibility and education projects coordinated by the National Museum & Galleries of Wales. Drawers with a range of artefacts from the collection are kept in the Glanely Gallery, where they can be handled by visitors to the museum, guided by a trained facilitator. In addition to these the museum educational service maintains 20–30 sets of the main Palaeolithic tool types for lending out to educational institutions at all levels, from Primary to Higher. These resources have been developed and enhanced following the increased information on typology, stratigraphic provenance and site location provided by the project.

In addition to these concrete resources, a number of reporting avenues (cf. Section 5.8) are aimed at disseminating the more interesting and accessible results to the wider community beyond archaeological academia and the curatorial environment. A concise web-based summary of the project has been prepared, which will be hosted at both the National Museum and Gallery of Wales and the University of Southampton's web-site, as well as hopefully being made available through English Heritage. In addition it is intended to create video-links between schools in Wales and the Swanscombe area, and to use the material from Stopes' collection and information on his collecting activities to stimulate discussion on a number of areas, including: the Palaeolithic, heritage management and development impact, the role of amateur collectors, the contrast in the present and past landscapes and any related archaeological issues which arise.

Finally, all archival references consulted during the project, whether or not they contributed materially to the project aims, are listed in Appendix 8, which also gives their holding institution and notes on their content. This is intended to serve as a local studies resource for archival material, and copies of the appendix, along with the rest of the full report, will be lodged with Kent County Council and Dartford Borough Library.

5.8 Reporting

The primary reporting vehicle for the project is this report, which provides detailed information on Stopes' find-spot groupings and site locations (Section 5.1; Appendices 1 and 2), on the lithic material recovered from each site and individual find-spot (Section 5.2; Appendices 3 and 4), on the stratigraphic provenance and potential for analysis of Stopes' lithic assemblages (Sections 5.3 and 5.4; Appendices 3 and 5) and on the significance of the surviving deposits at Stopes' sites (Section 5.5; Appendix 6). As well as to English Heritage, the report has been distributed to those parties with the most direct interest in Stopes' collection and history (National Museum & Gallery of Wales; Dartford Borough Library), and those responsible for the arising curatorial implications (Kent County Council Heritage Conservation Group).

It was also hoped, and it has proved to be the case, that the project would lead to the discovery of sites or assemblages of significance and interest to the Palaeolithic and Quaternary research

community. Other potentially significant aspects of the project that merit publication include the methodological approach to interpretation of 19th century archaeological collections, the methodology and strategy for discriminating the significance of Palaeolithic find-spots and the fascinating insight into the intellectual and emotional landscape of collectors such as Stopes, operating on the fringes of the late 19th century academic establishment, as revealed in the quantity of contemporary archival material examined during the project. For the curatorial and academic community, a publication summarising the results of the project will be submitted to the Kent regional journal *Archaeologia Cantiana*, which also has an essentially national circulation. For the wider community, web material summarising the Stopes project will be posted at both the University of Southampton and the National Museum & Gallery of Wales web-sites. There have also been initial representations from two separate independent television producers on the possibility of using the story of Stopes and his collection as the basis of some sort of television documentary. Whether anything comes out of this remains to be seen, but clearly such a development would reach a large public audience. Work-in-progress on the Stopes project has also been presented at a number of public seminars and conferences over the course of the project, and now it is finished, it is hoped that a final presentation might at some point take place, which can for the first time outline the full results of the project.

6 POTENTIAL FOR FUTURE WORK

The main objectives of the project have been satisfactorily accomplished. For the first time in a century, Stopes' huge flint collection has been entirely curated and catalogued by site and artefact type. The sites have for the most part been identified, and those that are of importance have been highlighted. However, the work done to date has also opened up a number of avenues for further work. Although there is substantial cross-over, these can, broadly, be grouped into areas of:

- Academic research
- Curatorial enhancement
- Community dissemination and education

Academic research

Firstly, as discussed in Section 5.4, a number of the lithic assemblages from certain find-spots have potential for further analysis to contribute to Palaeolithic research (cf. Table 13). Given the size of the assemblage from find-spot 20 (Great Pit/Barnfield Pit) this would be a substantial undertaking, probably requiring at least one year, particularly bearing in mind the benefit of a concurrent comparative study of more securely provenanced assemblages from the same site, in order to try and develop an understanding of whether condition, staining and patination can be used to relate artefacts to specific horizons.

Secondly, the project has highlighted the number of sites in the Swanscombe area from which it is known that important material has been recovered in the course of previous aggregate extraction, but for which crucial details of provenance are lacking — in particular Dierden's Pit, Globe Pit and The Wash-pit. Sediments are known to survive at these sites, and the next essential step in improving our understanding of the Palaeolithic in the key Swanscombe region should be some targeted fieldwork to reinvestigate these sites. A number of techniques would be appropriate, and in particular boreholing and trial-pitting with a mechanical excavator.

Thirdly, while not entailing further examination of Stopes' collection or new field investigations,

the work already done could be built on by carrying out a wider ranging GIS-based study investigating the volume of sediments quarried and handaxe density in the Swanscombe area, and comparing this with extensions of these terraces in the Middle and Upper Thames valley, as well as with other major fluvial basins, for instance the Solent in southern England. In this latter case, the relevant data has been collected as part of the ALSF project Palaeolithic Archaeology of the Sussex/Hampshire Coastal Corridor (Bates *et al.* 2004), so the proposed further work would build on the results of both this and the Stopes projects.

Curatorial enhancement

In the course of the project a substantial amount of Benjamin Harrison's archival material was examined. It became clear in the course of this examination that, while many of Harrison's actual artefacts are missing, his archive includes an index of every single one, with details of its find-spot and often an illustration. While the Southern Rivers Project has used the map in Harrison's archive to identify his find-spots, it is not certain whether this includes all the sites where Harrison found material, and no account has been taken of the nature of the material found, many of which on the map may be eolith sites. Although, again, a time-consuming exercise, a detailed investigation of Harrison's archive could have significant curatorial benefits, in improving understanding of the distribution of Palaeolithic sites on aggregate resources in north Kent. Such an investigation would also be of academic interest, as well as having the potential for dissemination into the wider community.

The field research mentioned above would also aid in curation of the Palaeolithic resource by developing understanding of the Palaeolithic framework in the Swanscombe region, and improving understanding of the nature of deposits, and their distribution and extent at certain key locations identified as of high significance.

Community dissemination and education

One of the aspects of the project that has aroused greatest interest during its course has been the level of detail and the volume of archival material that has been identified. This has produced an abundance of insights into the Victorian world in general, and the world of amateur archaeological collectors such as Stopes and Harrison, both of whom played a central role in some of the more contentious academic debates of their era, and in the growth of Palaeolithic archaeology as a discipline. Besides copious details on the debate over eoliths, which in itself is a classic epistemological case-study of how an academic idea is formed, debated and, in this case left behind, the material contains numerous anecdotal details of the use of, for instance, flint knapping as part of Palaeolithic research, and the motivations behind those who participated in early Palaeolithic work. Above all, it provides the human side to the history of the study of stone tools, widely thought to be a particularly arid area of the archaeological project.

Although a few of the archival details found have been quoted in this report, so much more remains. Furthermore, although a certain amount of archival material was located, it is clear that much more is in existence but could not be located in the time allocated in the project programme. For instance Henry Stopes' diaries are somewhere in existence, along with the map mentioned in the Catalogue, not to mention secondary sources such as Kennard's original text of his biographical lecture on Stopes, which incorporated much family material provided by Stopes' daughter Marie.

One way of bringing this material to a wider audience would be preparation of a non-academic text, aimed at a general audience, which focused on the interwoven lives of Stopes and Harrison.

At the same time as following their journey as archaeologists and collectors, making maximum use of archival detail, the story could be told of the growth and dissemination of understanding of the Palaeolithic past, and the debate over eoliths, all situated within the wider context of the late Victorian era.

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