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ACKNOWLEDGEMENTS

Thanks to the many volunteers – David Green (Trident Student), Christine Jackman, Claire Jones, Sheila Keyte, Kirsty Stonell, Mary Walkden, David Webb, Roger Wilkes and Philip Wimbleton – who helped in the processing and sorting of these samples. Thanks also to Phil Piper (University of York) for scanning the dry-sieved remains and providing a preliminary faunal species list.

1.0 INTRODUCTION

1.1 This document details the sub-surface archaeological recording and investigation carried out at Silbury from 2000 to the present day.

1.2 Surface recording and analysis (topography) undertaken during this period is reported on elsewhere (Field 2002) as is geophysical investigation and analysis (Kirkbride 2002a, Kirkbride 2002b, Linford 2001, Linford and Martin 2001).

1.3 The recording and investigation exercises reported upon here are:

(1) Shaft evaluation;
(2) Watching brief (fencing on the summit);
(3) Summit excavations;
(4) Deposits in the side of the crater;
(5) Deep coring from the summit;
(6) Shallow coring on the north face of Silbury;
(7) Watching brief (badger control works);
(8) Watching brief (fencing around base of Silbury)

1.4 Recording exercises nos. 1-6 formed part of the English Heritage programme to investigate problems with preservation within the mound (Harding 2004). Recording exercises nos. 7 and 8 were carried out alongside more general management measures to enhance the conservation and public appreciation of the Hill.

1.5 This document presents factual data on the, an assessment of the potential of the data and proposals for further work on that data

1.6 At present it is not clear whether there will be further primary data collection as part of the either the investigation programme or remedial works. The proposals for further work are dependent upon the knowledge of whether such further works will or will not take place

1.7 If no further data collection is being proposed than the proposals for further work presented here will be re-worked into a final updated project design for analysis and dissemination.

1.8 If further data collection is envisaged the proposals for further work detailed here will be re-worked into a new project design.

1.9 All of the recording and investigation work reported upon has been carried out by staff from the former Centre for Archaeology (CfA) and its archaeological contractors.

2.0 ON-SITE EVENTS {E}

2.1 {E1} Remote recording after the shaft fill collapse

2.1.1 On 12th July EH staff from SW Region and Conservation Engineering carried out an inspection of the interior of the shaft using a video camera attached to a rope.

2.1.2 The images obtained were used in a desk-based assessment of the potential for archaeological recording (McAvoy 2000a).

2.1.3 The archive record for this event consists of:

- a VHS video cassette (video 1);
- a video copy on digital tape (video 2).

2.2 {E2} Shaft evaluation

2.2.1 An evaluation within the shaft took place on 9th August 2000. Staff from Graham Daws Associates, specialists in rock mechanics and confined space working, carried out an initial assessment of the stability of the shaft. Staff from English Heritage then inspected the deposits in the sides of the shaft at first hand.

2.2.2 The archive record for this event consists of:

- a measured drawing of the dimensions of the shaft (drawing 117);
- digital colour photographs (photos 151-164, PhotoCD 1)
- a digital video tape (video 2);

2.2.3 The results of this work can be found in an internal CfA report (McAvoy 2000b).

2.3 {E3} Remote recording after the first shaft collapse

2.3.1 Between the 4th and 8th December the cavity to the SW of the shaft and its southern side collapsed to the surface of the Hill, leaving the shaft sides intact on its remaining sides. A photographic record of the sides of the collapse was made by EH staff from Conservation Engineering.

2.3.2 The archive record produced consists of:

- digital photographic images photo numbers 00, CD 00

2.4 {E4} Watching brief during fence construction on the summit

2.4.1 A watching brief was carried out by CfA staff on the 11th and 12th December, during the erection of a post-and-wire fence on the summit around the collapsed shaft.

2.4.2 The fence required 28 wooden uprights, each set in holes approximately 0.3mx0.3m across by 0.7m deep. Posts were set approximately 2.5m apart in holes excavated mechanically by 10-inch powered auger

2.4.3 The results of this work can be found in an internal CfA report (Cromwell 2000).

2.4.4 The archive record produced consists of:

- digital photographic images photo numbers 165, (Photo)CD 2
- digital plan _____

2.5 {E5} Remote recording after the second shaft collapse

2.5.1 The eastern and western sides of the shaft collapsed between 15th-17th December 2000, leaving a large crater on the summit.

2.5.2 Direct access to the archaeological deposits and features exposed in the sides of the crater was not possible because of Health & Safety concerns. However a remote record was made by CfA staff between January and August 2001. Features were spatially referenced using a reflectorless Electronic Distance Meter (EDM) and were periodically photographed.

2.5.3 The archive record produced consists of:

- Digital survey data
- Digital colour images
  photo numbers 166-71, 241, (Photo)CD 3; 173-76, (Photo)CD 4;
  241 (Photo) CD 5

2.6 {E6} Geophysical survey on the summit

2.6.1 A survey using magnetic, earth resistance and ground penetrating radar (GPR) techniques was conducted on the summit by CfA staff beginning on 28th February 2001.

2.6.2 The results of this exercise can be found in a CfA report (Linford and Martin 2001).

2.7 {E7} Excavation on the summit

2.7.1 Small-scale excavation was carried out on the summit by CfA from 14th – 18th May 2001.The objectives were to:

- determine the immediate context and significance of the deposits which are and have been visible in the sides of the hole;
- determine whether the previously recorded chalk retaining walls continue on the west and east sides of the summit;
- locate and provide further information on the 'pit' on the east side of the summit;
- recover artefacts and biological material that will provide information on the local economy and environment;
- return the areas investigated to their pre-excavation condition.

2.7.2 Two trenches (A & B) were opened up to the east and west of the crater adjacent to areas where the archaeological deposits were most intact and visible in the sides. Trench B was also sited over the west side of the large 'pit' anomaly. Excavation was limited to the depth required to expose structural features, which were then left *in situ*.

2.7.3 After excavation both trenches were backfilled, incorporating chalk from a quarry at Mere, near Salisbury, to replace the sediment removed for processing, and re-turfed.

2.7.4 The archive record of this exercise consists of:

- 15 context records
- 14 drawing records
- 75 photographic records
- 14 drawings on 7 A4 permatrace sheets (redrawn onto 5 A3 sheets)
- 1 box index form
- 1 abbreviated small finds record, 13 small finds records
- 13 bulk find records
- xxx sample evaluation records
- Digital colour images
  177-87, 196-7, 235-40 {Photo)CD 3; 197-202, 205-14, 234 (Photo) CD 4
- 6 Black and White films

2.8 {E8} Analytical Earthwork Survey and Investigation

2.8.1 This survey and investigation was carried out by staff from the EH Archaeological Investigation team during May and June 2001. The survey used GPS to record and investigate Silbury and its surrounding landscape and researched the documented history of the Hill.

2.8.2 The results of this work can be found in an interim report (Field 2001) and a final report (Field 2002).

2.9 {E9} Geophysical survey on the summit and slopes

2.9.1 Electrical profiling was carried out on the summit and flanks of the Hill by CfA staff in June 2001.

2.9.2 The results of this work can be found in a CfA report (Linford 2001).

2.10 {E10} Recording and sampling the deposits in the crater

2.10.1 Direct access within the crater became possible when other works were being carried out on the summit. Recording and sampling of the deposits in the crater sides was carried out by CfA staff on 9th and 10th August 2001.

2.10.2 All of the deposits in the faces of the hole were cleaned as best as possible but much of the exposed surfaces consisted of slumped or collapsed deposits. It was decided to only record the northern face as this contained all the evidence for post-medieval activity relating to the shaft and later events, and was fully representative of the Neolithic deposits which could be observed around the sides of the hole.

2.10.3 The drawn section of the northern face was 9.7m long with a maximum depth of 2.6m. All the deposits were described and photographed using standard CfA recording procedures and three contexts were sampled for environmental evidence.

2.10.4 In addition the localised movement of crater material to level the base of the hole was monitored for artefact recovery.

2.10.5 Recording the face of the hole produced the following records:

- Digital colour photos 242-76 (Photo) CD 6

2.11 {E11} Coring 1

2.11.1 The crater on the summit was infilled and five boreholes (nos. 1-5) were drilled from the summit of Silbury by Geotechnical Engineering Ltd (sub-contacted to Cementation Skanska) between 22nd August and 20th September 2001.

2.11.2 The boreholes were required to house instrumentation for a subsequent seismic survey and their contents were removed as intact cores.

2.11.3 A CCTV down bore-hole survey was carried out in borehole 4 in September 2001 and this was repeated with better results in August 2002.

2.11.3 The cores are housed at the CfA base at Fort Cumberland, where they were recorded.

2.11.4 The archive record for this work consists of:

- Two VHS video cassettes;
- Digital images copied from the videos;
- Digital colour photos 282-300, 471 (Photo) CD 5; 277-81 (Photo) CD 6; 472-81 (Photo) CD 7; 481-88 (Photo) CD 8;

2.12 {E12} Geophysical survey 3

2.12.1 A seismic tomographic survey was carried out by Cementation Skanska in September 2001. This had essentially two components, cross-borehole recording and borehole to surface recording.

2.1.2.2 The results of this work can be found in an interim report (Skanska 2001).

2.13 {E13} 1968 tunnel entrance re-exposure

2.13.2 The archive record for this work consists of:

- Digital colour photos 489-99 (Photo) CD 8

2.14 **{E14} Geophysical survey 4**

2.13.1 A further surface survey was carried out on the north face of the Hill by Skanska in February 2002.

2.13.2 The results of this work can be found in a report (Skanska 2002a);

2.14 {E15} Coring 2

2.14.1 Staff from CfA carried out an evaluation of an anomaly on the north face of the Hill in August 2002.

2.15 **{E14} Geophysical survey 5**

2.15.1 The cross-borehole component of the original seismic survey was at a higher-resolution in April 2002.

2.15.2 The results of this work can be found in a final report (Skanska 2002b).

2.16 {E16} Coring 3

2.16.1 Two further cores were drilled from the summit by Geotechnical Engineering Ltd in March 2003 as part of a geotechnical survey undertaken by Skanska.

2.16.2 The results of this work can be found in a report (Skanska 2003).

2.17 {E17} Watching brief 2

2.17.1 CfA staff carried out a watching brief in September 2003 during works to prevent further badger access to two sett entrances on the east and north-west sides of the Hill.

2.17.2 The record of this work consists of:

2.18 {E18} Watching brief 3

2.18.1 CfA staff carried out a watching brief in August 2004 during works to construct a new fence around the base of the Hill and alongside the A4.

2.18.2 The record of this work consists of:

2.20 {E19} 1968 tunnel re-exposure

2.20.1 Staff from CfA and Conservation Engineering re-exposed the entrance to the 1968 tunnel in xxx and

2.20.2 The record of this work consists of:

2.21 {E21} Geophysical survey 6

2.21.1 Staff from xxxx carried out a resistivity and magnetic survey of the field on the east side of the Hill.

2.21.1 The results of this work can be found in ().

3.0 WORK ON EARLIER 1968 ARCHIVE

3.1 {E22} 1968 archive

3.2 {E23} 1968 turf

3.3 {E24} dating 1968 materials

4.0 STRUCTURE AND STRATIGRAPHY

4.1 {E1} Remote recording after the shaft fill collapse

4.1.1 This remote recording demonstrated that there was:

- collapse to a depth of *c* 10m within the shaft;
- a possibly lateral gallery or adit to one side of the shaft;
- a very distinctive layer of white chalk visible in the sides of the shaft and 'gallery'.

4.2 {E2} Shaft evaluation

4.2.1 Archaeological deposits were exposed in the walls of the shaft and cavity to a maximum depth of 13.5m from the top of the mound and two distinct phases of construction, each of differing character, were observed.

4.2.2 The earlier construction phase (from at least 13.5m to *c* 10.2m depth) is composed of well-modulated bands of chalky soil and chalk.

4.2.3 The later construction phase (from *c* 9.8m upwards) is composed primarily of chalk rubble although there are soil lenses and quite thick layers of pale grey ?decayed chalk. No structural remains were noted although it must be emphasised that there was no systematic observation of these deposits. In addition the north side of the shaft was almost completely hidden by clay which could have been spilt during the original excavation in 1776-7.

4.2.4 These construction episodes of construction are separated by a dense layer of very white chalk, and above this, a layer containing sarsens and large chalk blocks.

4.2.5 The dense chalk layer represents a major event within the overall construction of the mound. Typically 0.08-0.12m thick and found at a depth of *c* 10.2m from the top of the shaft, this layer was present on all sides of the chamber and was slightly convex at its base.

4.2.6 Whilst the dense chalk is essentially a continuous band this is interrupted in two adjacent areas and these interruptions might represent *in situ* features. If man-made, then these could have been small pits or post-holes cut through the chalk or they may be the remains of upstanding features around which the chalk had been laid. Alternatively these features may be a result of trees or bushes rooting on the top of the chalk. There is, however, a possibility that these putative features are merely soil adhering to the exposed surface.

4.2.7 The layer above the dense chalk was fairly thick (*c* 0.4m) and contained frequent sarsens and large angular chalk blocks that may have been associated with an *in situ* activity prior to the later construction phase. In places this layer was beneath a further thick pale grey layer with small ?flint inclusions.

4.2.8 The lower construction phase appears to have used soil and chalk derived from the stepwise cutting away of the local soil profile. The nature of the deposition sequence can be interpreted as resulting from either systematic mechanisms of excavation and transport or 'structured deposition' during construction. This clearance of the landscape could be related to the scarping of the adjacent slopes and/or the initial excavation of quarries or ditches

4.2.9 The banded soil and chalk of this construction phase appears to be similar in composition to a deposition sequence recorded at the edge of the primary mound (Whittle, construction step d). The layers in this sequence are described as a laminated heap of chalk and 'Toblerone' (a mixture of brown clay-with-flints and small chalk fragments). Interestingly, this sequence lay directly beneath a steeply sloping layer that is described as trampled chalk.

4.2.10 The dense chalk layer can be interpreted as having been deliberately laid down, perhaps to create a bright white capping or possibly a coating for the earlier construction phase. Alternatively the chalk layer could have been a platform or have been associated with construction.

4.2.11 The upper construction phase may have used material derived from the deeper excavation of ditches or quarries.

4.3 {E3} Remote recording after the first shaft collapse

4.3.1 The images show:

- that the upper part of the mound is composed of fairly homogeneous chalk;
- detail of a developed soil profile within an earlier crater.

4.4 {E4} Watching brief during fence construction on the summit

4.4.1 The turf was cut by spade as a complete "plug" for each hole. It was fairly consistent, being approximately 0.08m thick with dark brown clayey silt soil that contained frequent chalk fragments approximately 10mm in diameter.

4.4.2 Below the turf, most of the holes came down onto large chalk fragments *c* 7-10mm diameter in a matrix of dark brown clayey silt. The chalk fragments constituted about 80 percent of the mix. There were occasional flint nodules averaging 0.1m in longest dimension.

4.4.3 Holes 2, 5, 6, and 7 had a soil/chalk mixture below the turf closer to 50:50 in ratio. This seemed to carry on the full depth of the holes. Hole 14 was unique, in that it had a layer of pure dark brown silt 0.3m thick extending from just below the turf, with a sharp transition to chalk fragments in a silt matrix of the 80:20 ratio mentioned above. The transition was at a uniform depth around the circumference of the hole, suggesting that it cut through a layer or large feature of some kind.

4.5 {E5} Remote recording after the second shaft collapse

4.5.1 The northern side of the shaft formed the northern side of the crater and recording in January captured the location of slight surviving elements of the eastern and western walls.

4.5.2 The north face of the crater also provided a section through the early crater seen after the first shaft collapse and the photography recorded the soil profile and a complex sequence of backfilling into the crater.

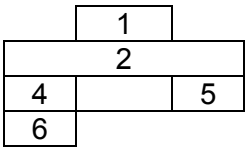
4.5.3 These strands of evidence later disappeared due to further minor erosion of the crater sides.

4.6 {E7} Excavation on the summit

Trench A

4.6.1 This trench was 3m long and 1.5m wide (4.5 sqm) and was located on the west side of the hole. Excavation took place to a general depth of 0.4m across the trench but to 0.5m within the limits of a possible circular feature (see below).

4.6.2 The stratigraphic sequence for this trench is:



4.6.3 The volume of material excavated (litres) was:

Context	Total vol. excavated	Dry sieved	Bulk sampled
2	680	590 (87%)	90 (13%)
4	290	200 (69%)	90 (21%)
5	90	60 (67%)	(33%)

4.6.4 The removal of the topsoil **[1]** revealed an underlying layer of small chalk fragments and peagrit **[2]** over the entire trench. Showing through this layer was some flint and sarsens. The surface of layer **[2]** was gridded out into 1m by 0.75m rectangles for sampling and artefact/ecofact recovery and location.

4.6.5 Layer **[2]** was removed down to a more compact layer **[4]** with more clay than **[2]** again present across the trench. Structured deposition of chalk became evident at this level represented by a line of chalk blocks perhaps delineated or cut through by a circular feature, on the north side of the trench.

4.6.6 Layer **[4]** was removed, leaving the chalk blocks in situ, down to a very compact layer **[6]** of pale brown silty loam, again present across the trench. The area within the circular pattern of chalk blocks was excavated **[5]** and was soft brown silt.

4.6.7 Further chalk blocks and rubble were uncovered at the base of **[5]**. At this point excavation ceased as it was clear that the structural evidence could not be understood without a wider area being exposed.

Trench B

4.6.8 This trench was 4m long and 1.5m wide ($6m^2$) and was located on the east side of the crater. Excavation in general took place across the trench to a depth of 0.35m-0.45m but reached a depth of 0.75m in the east end of the trench, to the east of wall **[7]** (see below).

4.6.9 The stratigraphic sequence for this trench is:

		3	
		8	14
			9
			15
			11
			10
13	7	12	

4.6.10 The volume of material excavated (litres) was:

Context	Total vol. excavated	Dry sieved	Bulk sampled
8	680	590 (87%)	90 (13%)
14	250	220 (88%)	30 (12%)
9	180	120 (66%)	60 (33%)
10/11	270	170 (63%)	100 (37%)
12	30	-	30 (100%)

4.6.11 The removal of the turf and topsoil **[3]** exposed a surface of small chalk fragments and chalk peagrit **[8]** over most of the trench and a very similar layer **[14]** at the eastern end, sloping noticeably downwards at the east end of the trench. The surface of layers **[8]** and **[14]** was gridded out into 1m x 0.75m squares for sampling and artefact recovery and location.

4.6.12 Layers **[8]** and **[14]** were removed exposing a very substantial wall **[7]** running North-South and occupying most of the trench. The wall was composed of a chalk rubble core, with chalk at 0.10-0.20m in size, between two chalk faces made of larger blocks c 0.35-0.40m in size.

4.6.13 At the west end of the trench was a short length of possible chalk walling **[13].** At this end excavation ceased above a layer of compact pale brown silty chalk **[12]** that either lay against or had been cut through by the walls.

4.6.14 At the east end of the trench the removal of layer **[14]** exposed the cut for the pit **[15]** indicated by the geophysical and topographic surveys. This was cut through two layers **[10]** and **[11]** and was filled by layer **[9]**, a loose pale brown silty loam with chalk fragments.

4.6.15 It is possible that **[14]** was the final infill of this pit. Alternatively this ayermay have formed at a later date infilling a depression caused by the underlying pit.

4.6.16 Layer **[11]** consisted of large chalk blocks loosely lying against the east side of wall **[7]**. It contained a large number of voids and fell easily away from the sloping face of the wall. Layer **[10]** was beneath this at the east limit of the trench and was composed of very compacted chalk rubble.

5.0 ARTEFACTUAL DATA

5.1 {E1} Shaft evaluation

5.1.1 Votive objects had been deliberately placed in the shaft and cavity between 12th July and 9th August. These were a cloth bull, a small nightlight, a black crystal and a knotted rope. The objects were left undisturbed.

5.2 {E2} Watching brief

5.2.1 Two postholes produced finds but as these were excavated by mechanical auger the finds are essentially unstratified. One posthole fill **[17]** produced four sherds of pot, along with a nail and a piece of modern wire lead complete with a miniature three-pin plug. Posthole fill **[18]** produced three large sherds of medieval pot, including a substantial piece of rim.

Ceramics

5.2.2 The pottery has been preliminarily identified (Dr Alan Vince, *pers comm*) as being fragments of Newbury Group B, with sand, flint and limestone inclusions, and with an earliest start date of late 12th / early 13th century.

5.3 {E7} Excavation on the summit

Ceramics

5.3.1 Thirteen fragments of pot were collected, one or two from each of the following contexts: **[1, 2, 4, 8, 9, 10/11, 14, 16]**. Brief initial studies by Sarah Jennings, Rob Perrin and Pam Braddock have confirmed that almost all of these fragments are of similar fabric to those collected during the watching brief (identified as Newbury Group B, with sand, flint and limestone inclusions, and with an earliest start date of late 12th / early 13th century; Dr Alan Vince, *pers comm*).

5.3.2 It is therefore presumed that almost all of the pottery assemblage is early medieval in date. The only possible exception to this is a single small sherd from context 4, which has been identified (Frances Healey, *pers comm*) as being part of a Beaker with chalk and grog inclusions, and exterior stamped decoration.

Ceramic building material

5.3.3 A single fragment of post-medieval tile was recovered from **[3]**, and four tiny fragments of ?post-medieval brick were collected from **[10/11]**. Context **[9]** yielded a small fragment of ceramic building material, possibly a form of baked clay, but this is too small to be diagnostic, and is presumed to also be post-medieval in date.

Clay pipes

5.3.4 Two clay pipe stem fragments were collected, from **[2]** and **[14].**

Metalwork

5.3.5 Modern detritus, such as tent pegs, screws, bottle caps, bottle glass, ring pulls, and scraps of tin foil, was noted (collected and later discarded) within **[1]** and **[3]**.

5.3.6 Only twelve metal objects were collected, to be classified as small finds (the antler pick was also classified, as small find no 200100854). All metal objects have been subject to X-Radiography, as part of archive completion.

5.3.7 Of greatest note within this small find assemblage is a prick spur (sf no 200100851) from within **[14]**. Near-complete, with slender D-sectioned sides and rectangular terminals, and a short neck, which terminates in a quadrangular, lozenge-shaped goad, the prick spur is likely to be of mid-late 12th century date (cf no 319, p131, in Clark 1995).

5.3.8 The other small finds all consist of miscellaneous structural or domestic ironwork; one handle fragment (sf no 200100852), one bar fragment (sf no 200100856), four nail fragments (sf nos 200100855, 858, 859, 860), one pin (sf no 200100862), and three unidentifiable amorphous lumps, simply classified as 'objects' (sf nos 200100857, 861, 863). These latter small finds do not easily yield an idea of date range; it is likely that they are all post-medieval in date. It is not anticipated that any further work on this assemblage will be necessary at an analysis stage,

Coinage

5.3.9 One Roman copper alloy coin (sf no 200100853) was recovered from **[5]**.

5.3.10 Several modern coins, ranging from an 1881 half-penny to a 1956 six-pence, were collected from **[1, 3, 8]**.

Lithics

5.3.11 The material in greatest abundance was flint; 67 fragments were collected from within **[2, 4, 5, 8, 9, 10/11, 14]**. That this quantity of flint was present within a large chalk structure is not surprising; a brief initial study of some of the assemblage has confirmed (Dr Andrew David, *pers comm*) that none of these fragments appear to be worked or utilised, and can be assumed to be natural.

5.4 {E11} Coring 1

5.4.1 Lithics

5.4.1.1 A small assemblage (n=9) was collected during processing of core 5 and was appraised by Dr Jonathan Last.

5.4.1.2 There are no definite flakes in the assemblage. There are a few small pieces that have been struck but it is not possible to be sure that this is from knapping. The assemblage is composed of:

Possible chips/debitage from flint working: **[1509, 1511]** (small piece); **[1515]**;

Chunks/nodules with 1-2 flake removals (?naturally bashed/drilling): **[1508a, 1508b]**;

Probably natural: contexts **[1510, 1511]** (larger pieces); **[1513]**.

5.4.2 Other finds

The only other finds comprise five fragments of animal bone from context 1509, six tiny fragments of shell from context 1516, and one small fragment of ?iron waste, also from context 1516.

5.5 Summary of potential

5.5.1 The finds assemblage does not yield a great deal of information relating to either the construction or the usage of Silbury Hill. With the exception of the Roman coin and the possible Bronze Age pot sherd, the only closely dateable finds are the prick spur and the pot sherds, all of which are suggestive – at this stage – of a mid-12th to mid-13th century date.

5.5.2 The date of the bridle bit, collected in the eighteenth century, has been suggested by Evison (1969) as 9th or 10th century, although later thinking by Andrew Reynolds (in AAHRG 2001) has put it as 11th century, '…associated with the late Anglo-Saxon military activity on the summit of the hill'. This 11th century date also fits with the few artefacts collected during the 1970 excavations.

5.5.3 This, together with the presence of a few scraps of post-medieval ceramic building material and clay pipe stems, along with the modern-day rubbish, confirms the continuation of usage of the site through time.

6.0 ENVIRONMENTAL DATA

6.1 {E1} Shaft evaluation

6.1.1 A 0.5kg sample was taken from the uppermost layer in the sequence below the dense chalk. This provided a few fragments of charcoal of which *Corylus avellana* (hazel) and cf. Pomoideae (hawthorn) could be identified. Mollusc shells were absent but the residue contained possible Greensand grit (Mark Robinson, pers comm.)

6.2 {E7} Excavation on the summit

6.2.1 Sampling strategy and quantification

6.2.1.1 Three forms of environmental sampling were carried out during the summit excavation:

- soil samples from on-site dry sieving;
- soil samples for bulk processing (i.e. general biological samples);
- column samples for recovery of molluscs.

6.2.1.2 Where homogenous layers were present, the layer was divided into 1m^2 grid squares and a 30 litre whole earth sample was collected from alternate and opposing grid squares. In circumstances where it was possible to collect more than 30 litres of soil, additional soil was collected.

6.2.1.3 Soil samples that were dry-sieved on site were sieved over an 8mm mesh. An environmental assistant or supervised volunteers processed all bulk soil samples off-site using water flotation.

6.2.1.4 The flots were sieved to 0.25mm and the heavy residues were washed over a 0.5mm mesh sieve, and both were air-dried. Supervised volunteers sorted 100% of the >4mm fraction of the heavy residues by eye, under the supervision of Gill Campbell or Wendy Smith. With the exception of one sample (630) the <4mm fraction was not sorted during this stage in the post-excavation programme

6.2.1.5 The number of bulk soil samples and dry-sieved sampled collected and a list of the material retained from these sampling programmes is summarised below in Table 00.

Dry-sieved Samples				
Total no of samples collected	Sample nos used	Material Retained	Box No	Samples nos included in Box
21	501-506, 512-524; 530	Charcoal	2	520
Bulk Soil Samples				
14	602-603, 606, 611, 614-615, 618-624; 630	Flots	2	602-603,606, 611, 614-615, 618-624 , 630
		Charcoal (>4mm fraction of Heavy Residue)	2	603, 619, 620
		Representative sub-sample molluscs (>4mm fraction of heavy residue)	2	630
		Unsorted <2 mm fraction and 66% 2-4 mm fraction of heavy residue	6	
		Unsorted <4 mm fraction of heavy residue	3	614, 615, 619, 620
		Unsorted <4 mm fraction of heavy residue	4	602, 6023, 606, 611
		Unsorted <4mm fraction of heavy residue	5	621, 622, 623 624

Table 00: Record of samples collected and material stored from Silbury

Sample	**Context**	**Sample Vol. (L.)**	**Charred Plant remains**	**Molluscs (land snails)**	**Animal bone**	**Charcoal**
501	2	90	-	6	7	-
502	2	60	-	10	4	-
503	2	90	-	c 40	c. 30	-
504	2	130	-	11	4	-
505	2	120	-	c 100	c. 50	-
506	2	100	-	14	c. 50	-
511	8	70	-	4	c. 50	-
512	8	160	-	4	c. 50	-
513	8	90	Sample possibly sorted on site. No evaluation form filed.			
514	8	140	-	12	3	-
515	8	70	-	21	c. 100	-
516	8	60	-	15	7	-
517	14	140	-	14	55	-
518	14	80	-	20	25	-
519	9	120	-	3	1	-
520	4	70	-	8	5	3
521	4	70	-		2	-
522	5	60	-		18	-
523	4	60	-	8	c. 40	-
524	12	40	Sample possibly sorted on site. No evaluation form filed.			
530	10/11	170	-	2	-	-

Table 00: Evaluation of charred plant remains and charcoal from dry-sieved samples.
*With the exception of samples 513 and 524, all other dry-sieved samples were sorted by Wendy Smith at CfA.

				FLOT				HEAVY RESIDUE			
Sample	**Context**	Sample Vol **(L)**	**Flot Vol (ml)**	**Charred plant remains**	**Molluscs (land snails)**	**Animal bone**	**Charcoal**	**Charred plant remains**	**Molluscs (land snails)**	**Animal bone**	**Charcoal**
602	2	29	250	-	++++	+	+	-	N/R	***	-
603	2	26.5	200	-	++++	-	+	-	N/R	****	*
606	2	27	300	-	++++	+	-	-	N/R	***	-
611	8	27	300	-	++++	++	-	-	N/R	***	-
614	8	26.5	250	-	+++	+	-	-	N/R	****	-
615	8	29.5	300	-	++++	+	+	-	N/R	***	-
618	14	31.5	300	-	++++	-	+	-	N/R	***	-
619	9	48.25	275	1 charred free-threshing wheat grain	++++	++	+	-	N/R	****	*
620	4	31	105	-	++++	+	+	-	N/R	***	*
621	4	25.5	80	-	+++	+	+	-	N/R	**	-
622	5	27.5	100	-	+++	++	-	-	N/R	***	-
623	4	28.5	100	-	++++	+	-	-	N/R	***	-
624	12	28	20	-	++	+	+	-	N/R	***	-
630[1]	10/11	87.5	100	1 charred cereal/ Lg. grass	++++	++	+	-	N/R	****	-

Table 00: Evaluation of charred plant remains and charcoal from Silbury Hill (661) bulk soil samples.

[1] In all cases except sample 630, 100% of the >4mm fraction of the heavy residue was sorted for ecofacts and artefacts.
In sample 630, 100% of the >4 mm fraction and 33% of the 2-4 mm fraction of the heavy residue were sorted.

Key to symbols used:

3 = present
- = not observed
N/R = not recovered whilst sorting, although present in all samples
+ = < 10 items present
++ = 10 – 50 items present
+++ = 50 – 100 items present
++++ > 100 items present
* = 1-3 items
** = 4-10 items
*** = 11-50 items
**** = >50 items

6.2.2 Charred plant remains and charcoal

Fieldwork and Laboratory Method

6.2.1.1 Charred plant remains and charcoal recovered from on-site dry sieving or bulk soil samples. One-third of the 2-4mm fraction of the heavy residue for sample 630, however, was sorted and is reported on here. With the exception of two samples (513 and 524), all dry sieved samples were sorted by Wendy Smith. The flots were rapidly scanned by Wendy Smith, using a standard low-power binocular microscope, at a magnification of x12. The results for the bulk processed soil samples presented here are based on both the heavy residues and the flots.

Discussion

6.2.1.2 The sampling programme had two main aims:

- to determine if interpretable charred plant remains (including charcoal) were present;
- to determine if sufficient quantities of charcoal survived to support a dating programme.

6.2.1.3 It is clear that the sampling programme has not produced assemblages of charred plant remains (including charcoal) that are of interpretable value. There are also only a few samples (520, 603, 619 and 620) which have produced small quantities of charcoal.

6.2.1.4 Only two charred seeds were recovered. A free-threshing wheat (*Triticum* sp.) grain was recovered from sample 619 **[9]** a pit fill dating to the post-medieval period) and an indeterminate caryopses of either a large wild grass or a cereal was recovered from sample 630 **[10/11]** chalk rubble layers against a possible chalk wall **[7].**

6.2.1.5 Most samples contained modern insects, root matt, worms and worm casts, which suggests that these contexts are likely to contain modern contamination, which may well include charred plant remains. As a result, it is not recommended that this material is used for the dating programme.

Conclusion

6.2.1.6 The sampling programme has not produced any assemblages of charred plant remains (including charcoal) that are of interpretable value. Given the large quantity of modern contaminants (insects, roots, worms, etc) in these samples, the antiquity of the charred plant remains recovered is somewhat in doubt.

6.2.3 Animal bone

Introduction

6.2.3.1 Animal bones were recovered from dry-sieved samples and from the heavy residues from flotation, and are present in the flots themselves. In addition, a few animal bones were recovered by hand. This report describes the types of material present in the animal bone assemblage and discusses whether they hold potential to inform on economy, environment and site formation.

Methods

6.2.3.2 Soil samples of 30lt or more were recovered from alternating 1m^2 grid squares, for discrete layers. The remaining soil from discrete layers or features was dry-sieved through an 8mm mesh on site, and the volume of soil (and grid square where appropriate) was recorded. The soil samples were processed using water flotation; the flot was collected on a 0.25mm mesh and the heavy residue was collected on a 0.5mm mesh. In the laboratory, the >4mm fraction of the heavy residues was completely sorted for animal bones. The smaller fractions were not sorted except for 30% of sample 630 **[10/11]** (see Smith and Campbell 2001).

6.2.3.3 For the purpose of this evaluation, all animal bone was quickly scanned and the taxa present and approximate quantities were recorded. The flots and unsorted residues were scanned, in order to evaluate presence and abundance of taxa. Sheep deciduous teeth were identified following Payne (1985). Phil Piper (PhD candidate, University of York) provided a general list of the microvertebrates (order, family, genus or species) observed in the samples. Species presence and the approximate quantities of bone are indicated in Table 00. The number of ilia (part of pelvis) was noted as this bone is diagnostic in frogs and toads and provides an idea of the minimum proportion of identifiable amphibian bones in the samples (Bohme 1977).

Results

6.2.3.4 *Hand-collection*: Only a few fragments of cattle, pig, red deer and bird were recovered by hand, from contexts **1**, **3**, and **5**, all of which may be disturbed layers. A red deer antler tine recovered from a deposit of chalk rubble (**11**, obj no. 851) is reported on separately below.

6.2.3.5 *Dry-sieved samples (>8mm*): The dry-sieved samples include remains of cattle, sheep/goat, pig, deer, hare, fox, small mammals (voles), and a few bird remains, including possible domestic fowl (samples 515 **[8]**; 518 [**14]**; 523 **[4])**. Many amphibian remains (mainly frog and some toad) are present, in particular in samples 503, 505, 506 **[2],** 511 and 515 **[8**].

6.2.3.6 A very large red deer radius is included in sample 502 **[2].** The size of the bone is similar to that recorded for specimens from Mesolithic Star Carr (Legge and Rowley-Conwy 1988), and is larger than the modern red deer elements in the CfA skeleton reference collection. Unfortunately, both layers **[2]** and **[8]** are probably mixed so the provenance and date of the animal remains are uncertain. The integrity of layer **[14]** is also uncertain.

6.2.3.7 *Heavy residues (>4mm and 2-4mm (Sample 630 only*): The animal remains from the >4mm fraction of the heavy residues include a few sheep/goat, pig, and canid (possibly dog and/or fox) teeth and bones, hare and bird bones. A few small

mammal bones and teeth, including voles and mole, were observed. Amphibian remains are present in large quantity in most samples, in particular in 603 (context 2), 614 (context 8), 619 (context 9), and 630 (context 10/11). The 2-4mm fraction from sample 630 includes many amphibian bones, which may include smaller species than observed in the >4mm fraction, as well as smaller elements of the larger taxa. The unsorted 2-4mm residues, from other samples, in particular 614 and 615 **[8**] include a large proportion of amphibian remains.

6.2.3.8 Contexts **[9], [10]** and **[11]** are pit fills of chalk rubble which also contain some small fragments of ?brick of post-medieval date, below **[14]** which contains 12th century metalwork.

6.2.3.9 *Flots:* A few animal bones are included in the flots (see Smith and Campbell 2001). These include mainly amphibia, but one rodent bone was observed in sample 622 **[5].** Sample 630 includes many more amphibian bones than in the other samples, including possible metapodia and phalanges.

Discussion

6.2.3.10 A wide range of taxa is present in the samples from Silbury, including a few bones and teeth of the common domestic mammals, cattle, sheep and pig, as well as wild animals including red deer, fox and hare. Less common taxa include birds and small mammals. The vast majority of the finds however, consists of amphibian bones, recovered in the dry-sieved and flot heavy residues. The potential of the assemblages to inform on economy, environment and site formation is considered below. Unfortunately, the stratigraphic integrity and date of most contexts is uncertain, so this limits the value of any further work on these materials.

6.2.3.11 *Economy:* The assemblages from dry-sieving and flotation (heavy residues) yielded few remains of large domestic or wild animals, and will not inform on economy of the local population. At most it can be said that the remains of domestic and wild animals are present and may indicate local farming and hunting. Of interest are the red deer antler tine, which was found in the possible Neolithic layer of chalk rubble, and the large red deer radius, which from its size suggests a prehistoric origin.

6.2.3.12 *Environment:*The sieved and floated assemblages yielded a large quantity of amphibian and fewer small mammal remains, which inform on local environment. The morphology of the innominate bone (which makes up 10-20% of amphibian bones in each sample), indicates that both frog and toad bones are present, including common toad (*Bufo bufo*) and common frog (*Rana temporaria*). Other species may also be present (also Phil Piper, pers. comm. 2001).

6.2.3.13 *Site formation:* The possible presence of domestic fowl in [8] suggests that this layer includes intrusive and/or mixed material. It is thought that domestic fowl were introduced to Britain in the Iron Age (Crawford 1984; Zeuner 1963), so their presence at Silbury Hill would postdate mound building. The remains of hare may be from intrusive burrowing animals.

6.2.3.14 The large quantity of amphibian bones throughout the samples is intriguing. It is not certain if the remains are from pit trap victims, which fell into open spaces, including pits or voids in collapsed rubble, whether they were present in predator pellets or faeces, or in the soils that were used to build the mound. It is unlikely that the amphibian assemblage results from raptor pellets; amphibians make up only a small

proportion of raptor diet and few other animals feed solely on frogs or toads (Phil Piper pers. comm. 2001b).

6.2.3.15 Ponds form today at the base of the mound, and the ditches fill up with water also, providing an ideal habitat for waterfowl and no doubt amphibians. If these environments existed in the past, a natural amphibian death assemblage may have formed locally, which may have then been transported in the sediments onto the mound. Species composition, bodypart distribution and taphonomic alteration may help to elucidate the origin of the assemblage, which would inform on site formation, including the use of building materials and exposure of features.

Conclusions and proposals for further work

6.2.3.16 The assemblage includes few macroremains, but many microvertebrate, mainly amphibian, bones. While most of the remains are from poorly stratified layers, two contexts merit further consideration, the fill (9) of pit 15 and the chalk rubble (10/11) in Trench B. The microvertebrate assemblages from these contexts may inform on site formation and should be assessed. A proportion of the <4mm fraction of the heavy residues should be sorted and assessed also.

Antler tine 200100854

6.2.3.17 This was found …..

6.2.3.18 The specimen consists of a broken tine (part nearest the tip) which shows breakage and polishing at the tip. It is 122mm long and 2mm across at its broadest breadth. The size and shape of the tine, and the strong surface pearling (knobbly modelling) indicate that the antler is from a red deer. The specimen is robust and is probably from a large and/or old male. The size and surface development are very similar to tines on an antler of a modern 20+ year old red deer at the CfA (Davies 1997, AML #8). The position of the tine is uncertain; while the tine is not markedly curved, it is not possible to say whether it is a brow tine or from another location on the antler.

6.2.3.19 The breakage and polishing at the tip of the tine are not dissimilar to modifications observed on the tines of the unshed antler of the above-mentioned skull. Antlers may be damaged in various ways. During the rut stags fight with their antlers. Occasionally red deer have been observed to use their antlers for breaking branches while searching for food (Corbet and Southern 1977), and they will also rub their antlers against trees when velvet, which covers the antler during the first months of growth, is being shed (ref???). All of these activities may result in chipping, breakage and polishing.

6.2.3.20 Antler was commonly used for making various objects throughout the prehistoric and historic periods, and was collected once shed or obtained from hunted animals. The origin of this antler, however, is uncertain. The availability of only a single tine does not allow us to say whether it is from a hunted animal or from a shed antler, and we cannot say whether the tine is culturally modified. Antler picks from Stonehenge (Sergeantson and Gardiner 1995) show that the tines were in some cases reduced to relatively straight but short pointy stumps, while others are longer and better preserved. The Silbury specimen is very well preserved, but it undoubtedly was much longer than its current form. The tine may be waste from an antler that was collected and/or used for working, or it may be from an antler pick. However this cannot be confirmed with any certainty; the modifications are similar to breakage and wear that occur naturally to antlers during a stag's lifetime.

Context	Sample	Macrofauna*	Birds	Microfauna**	Innominate***	Observed taxa (other than frog/toad)
		N	N	N	N	
Dry-sieved (>8mm)						
2	501	1	1			pig, crow size bird
2	502	1				red deer radius
2	503	5		20	nc	fox, antler
2	504	2				fox, antler
2	505	6		30	nc	deer tooth, hare/small carnivore, frog, toad
2	506	1	1	40	7	water vole
8	511	3		30	6	Cattle, sheep, pig, frog, toad
8	512			50	10	frog, toad
8	514	1		1		
8	515	2	1	100	16	juvenile domestic fowl, sheep, pig, common toad,
						common frog, water vole
8	516			6	2	Frog
14	517			2		
14	518	2	1	11		pig, domestic fowl, hare?
9	519			2		
4	520	2		2		sheep/goat, pig
4	521			2		
5	522			10	1	
4	523	6	1	10	1	domestic fowl, fox, hare
Heavy residues (>4mm fraction): 630* 30% of 2-4mm fraction						
2	602	1		25	3	sheep, frog
2	603	4		120	10	Canid, vole, mole
2	606	5		35	4	sheep/goat, canid, water vole, , other vole
8	611	1		40	12	Pig
8	614			250	50	Mole
8	615	1		30	6	sheep/goat
14	618			20	2	
9	619			100	10	
4	620			30	4	
4	621			7		
5	622	2		30	6	bird (thrush-corvid size), vole
4	623	4		10	4	Canid, fox, mole?
10; 11	630			150	20	frog, toad
10; 11	630*			250	15	vole,
Hand-collected remains						
1		1		1		Lagomorpha
3		4	1			cattle, sheep/goat, domestic fowl, large cervid
4		1				Cattle

Table xx: Distribution of animal remains in dry-sieved samples and heavy residues (N)
N: approximate counts (N) for macrofauna and birds-recordable elements; for microfauna-all remains
*hare to cattle size; Microfauna**: almost exclusively amphibia;
*** Amphibia innominate counts included in microfauna total

6.2.4 Assessment of molluscs

Introduction

6.2.4.1 The aims of the excavation included the sampling for molluscs of both Neolithic chalk rubble walls known to exist on the top of the mound and the infilling between them. The purposes of the molluscan investigation were to obtain information on general environmental conditions, the origin of the deposits and whether or not the tops of the wall had remained exposed after the completion of the monument.

Quantification

6.2.4.2 Five columns totalling 18 samples were taken from the sides of the trenches for molluscs. A further three individual samples were also taken. The mollusc samples are slightly over 1kg each and they come from the full range of contexts. In addition, shells were saved from bulk samples of around 80 litres which were dry-sieved through an 8mm mesh on site.

Data Collection and Method Statement

6.2.4.3 It was decided to assess four samples from Trench B to cover the range of archaeological deposit types: Sample 669 from the top of a chalk 'wall' **[7],** Sample 665 from loose rubble **[11]** found against the wall, Sample 666 from the fill **[9]** of a pit **[15]** and Sample 663 from a layer **[14]** beneath the topsoil in which an early medieval spur was found.

6.2.4.4 1kg of each of these samples was washed over onto a 0.5mm mesh to float off shells and the residue was also sieved over a 0.5mm mesh. Both flots and residues were then dried. For the purpose of the assessment, the flots were scanned under a binocular microscope at x12 magnification and an estimate made of the abundance of each species identified. The results are given in Table 00. *Cecilioides acicula* has been excluded from the estimated total because it is an intrusive burrowing species.

Column / Section	555	554		554	
Sample	669	665	666	663	
Context	7	11	9	14	
Cochlicopa sp.	-	-	+	-	
Pupilla muscorum (L.)	+	+	+++	-	
Vallonia costata (Müll.)	-	-	-	+	
V. excentrica Sterki	-	-	+	+	
Vallonia sp.	+	+	+	+	
Vitrea cf. *contracta* (West.)	-	++	+	+	
Oxychilus cellarius (Müll.)	-	++	-	-	
Cecilioides acicula (Müll.)	+	-	+	++	
Clausilia bidentata (Ström)	-	-	-	+	
Helicella itala (L.)	+	+	+	+	
Trichia hispida gp.	++	+	+++	+++	
Cepaea sp.	-	+	+	+	
Estimated total excluding *Cecilioides acicula*	15	25	75	50	

Table 00: Assessment of Land Snails + present, ++ 6-10, +++ 11+

6.2.4.5 The snail shells from the dry bulk sieving were dirty and not readily identifiable, beyond it being obvious that the majority are *Arianta*/*Cepaea* sp. Therefore, a selection of them were washed, dried and identified under a binocular microscope. This confirmed that *Arianta arbustorum*, *Cepaea hortensis* and *C. nemoralis* are all present. There are also a few large specimens of *Helicella itala* and *Trichia hispida* gp.

Preliminary Interpretation

6.2.4.6 Useful quantities of well-preserved shells are present in most of the samples. Not surprisingly, the lowest concentration of shells is present in Sample 669, from the top of a possible chalk 'wall' **[7].** They comprise catholic species *Trichia hispida* gp. plus a few shells of open-country species such as *Helicella itala*. They do not comprise a rock-rubble fauna and probably represent shells worked by earthworm action through a covering soil into the top of the wall.

6.2.4.7 The highest concentration of shells occurs in Sample 666 **[9]** from the fill of pit **[15],** which also contains ?brick fragments of post-medieval date. The assemblage is dominated by *Trichia hispida* gp. and an open-country species, *Pupilla muscorum*. Two other open-country species *Vallonia excentrica* and *Helicella itala* are also present. They suggest open, probably grassy, conditions on the top of the mound as the pit filled.

6.2.4.8 Sample 663 from the general layer **[14]** beneath the topsoil also contains *Trichia hispida* gp. plus open-country species, although *Pupilla muscorum* is absent, suggesting that there had been a change in open conditions.

6.2.4.9 In contrast, the molluscs from Sample 665 **[11]** from loose chalk rubble against 'wall' **[7]** are mostly two woodland species that are also very characteristic of buried rock-rubble habitats, *Vitrea* cf. *contracta* and *Oxychilus cellarius*. They probably lived underground in the voids between the chalk fragments.

6.2.4.10 The snails from the bulk sieving are mostly catholic species that can occur in both open and wooded habitats. However, the presence of *Arianta arbustorum* implies that there were at least a few tussocks of grass on the monument to provide it with humid sheltered conditions.

Potential for Further Analysis

The assessment has shown that the samples contain useful quantities of well-preserved land snails that are capable of providing palaeoenvironmental information about the monument. The full analysis of a sequence of samples expanded from the sequence that was assessed has the potential to provide details of general environmental conditions and the state of the chalk rubble constructions, as specified in the research aims. The main limitation is the lack of close dating for the post-Neolithic contexts. The potential of the shells from the coarse-sieved samples is less although the identification of shells from those contexts from which 1kg samples are to be analysed in detail is likely to confirm the identity of some of the larger species only represented by shell fragments in the 1kg samples.

Proposals for further work

Recommendations

It is recommended that a stratigraphic sequence of samples be analysed in full for molluscs from Trench B to cover the full sequence of deposits. The species of snail present in the coarse sieving from each of these contexts should also be identified, although they will not need to be

quantified. The results should be interpreted so as to provide information on the structure of the monument and to provide a general palaeoenvironmental sequence. It is not thought necessary at this stage to analyse the samples from Trench A, which are regarded as giving a less good sequence, nor to analyses samples from Trench B which duplicate the basic sequence.

Samples for Analysis

It is recommended that the following samples from Trench B be analysed: Samples 669, 665, 666, 670, 663, 662.

6.3 {E10} Recording and sampling the deposits in the crater

6.3.1 Animal bone

Antler tine 200100864

6.3.1.1 A further fragment of an antler tine was recovered during the cleaning of the deposits exposed in the sides of the crater. As with the first tine, the size of this specimen and strong pearling of the antler surface suggests it is from a red deer. The specimen is split lengthways, and measures 156.5mm in length and 32.6mm at its greatest breadth. The shape of the fragment and the presence of much cancellous bone suggests that it is from part of the beam of from the base of a large tine, rather than from near the tip of a tine, where the bone would be more compact (MacGregor 1985, 12).

6.3.1.2 Wear is visible at one end of the fragment on the external surface, on part of the internal broken edges of the cancellous bone, and on part of the edges lengthways (to 100-200mm from the end). The origin of the wear, whether natural or cultural, is uncertain. The antler may have been partly broken during the stag's lifetime, through rubbing, digging or fighting but is unlikely that it would have broken lengthways. It is more probable that the splitting occurred after deposition, once it had lost some collagen and become more brittle. Alternatively the antler may have been worn through human use but is is uncertain if it was:

- Collected from a hunted animal or once shed, split intentionally and used
- Used then abandoned after which it split
- Collected in its broken state and used.

6.3.1.3 With regard to the first suggestion, possible abrasion may be seen on the split edges, in addition to the wear described above, but this may have occurred after deposition. There are no obvious toolmarks. One very fine incision is present on the worn external surface but the origin of this is also uncertain.

6.4 Cores

6.4.1 Evaluation of Macroscopic Plant and Invertebrate Remains from Core 5

Introduction

6.4.1.1 As part of a programme of investigating the stability of Silbury Hill, a late Neolithic monumental chalk mound in North Wiltshire, English Heritage had a series of cores taken through the mound in 2002 to look for voids. The cores also gave the opportunity to investigate the sedimentary composition of the structure and to evaluate the range of biological remains which are present in the sediments. To this end, Core 5 was analysed in detail.

Methods

6.4.1.2 Core 5 was over 50 m long. However, the bottom 20 m comprised geological deposits while the top 29 m was the chalk rubble dump of the mound. A length of core of about 1 m which extended from the top of the geological deposits (clay-with-flints) through the subsoil, the truncated Neolithic topsoil, overlying layers of trampled and dumped soil and into the bottom of the chalk rubble dump was evaluated. Details of the sequence are given in Table 00.

Height m. OD	Context	Vol (ml)	Deposit	Macroscopic Biological Remains
157.70 157.66	1522	75	chalk dump	~
157.66 157.62	1522	140	chalk dump	~
157.62 157.58	1523	90	chalk and soil dump	Coleoptera indet.
157.58 157.54	1523	120	chalk and soil dump	moss, charcoal indet., insect indet.
157.54 157.50	1523	70	chalk and soil dump	Diptera puparium indet.
157.50 157.46	1523	60	chalk and soil dump	~
157.46 157.42	1523	100	chalk and soil dump	insect indet.
157.42 157.38	1523	80	chalk and soil dump	Formicidae indet.
157.38 157.34	1523	150	chalk and soil dump	moss, *Quercus* sp., charcoal, Coleoptera indet.
157.34 157.30	1523a	125	trampled dumped soil	moss, *Sambucus nigra* seed, charcoal indet., *Geotrupes* sp., Diptera puparium indet.
157.30 157.26	1523a	130	trampled dumped soil	moss, *Chenopodium album* seed, charcoal indet, *Stenus* sp., *Myrmica* sp.
157.26 157.22	1523a	140	trampled dumped soil	moss, *Sambucus nigra* seed, charcoal indet., *Calathus* sp.
157.22 157.18	1523a	110	trampled dumped soil	*Picris echioides*, charcoal, Carabidae indet, Diptera puparium indet.
157.18 157.14	1523a	75	trampled dumped soil	moss, carbonised *Corylus avellana* nut shell frag, charcoal indet, *Phyllopertha horticola*, *Dascillus cervinus, Barynotus obscurus*, Diptera puparium indet.
157.14 157.10	1523a	200	trampled dumped soil	~
157.10	1523a	100	trampled dumped soil	moss, charcoal indet., Coleoptera indet., *Vertigo*

157.06				*pygmaea*
157.06 157.02	1523a	150	trampled dumped soil	moss, *Stellaria* sp. seed, charcoal indet., *Silpha atrata*, *Aphodius* sp., Diptera puparia indet., Bibionidae adult indet.
157.02 156.98	1523a	150	trampled dumped soil	moss, seed indet., charcoal indet., *Philonthus* sp.
156.98 156.94	1523a	75	trampled dumped soil	moss, charcoal indet., Aleocharinae indet.
156.94 156.90	1523a	130	trampled dumped soil	moss, *Ranunculus* cf. *acris* seed, *Carex* sp. seed, charcoal indet., *Barynotus obscurus*
156.85 156.84	1524	80	trampled dumped soil	moss, *Montia fontana* seed, *Sambucus nigra* seed, charcoal indet., Coleoptera indet.
156.82 156.81	1524	75	trampled dumped soil	*Montia fontana* seed, *Urtica dioica* seed, *Phyllopertha horticola*
156.80 156.79	1524	60	trampled dumped soil	moss, charcoal indet., Curculionidae indet.
156.79 156.77	1525	40	truncated topsoil	moss, *Ranunculus* S. *Ranunculus* sp. seed, *Stellaria* sp. seed, *Leontodon* sp. seed, charcoal indet., *Loricera pilicornis*, *Aphodius* sp., Curculionidae indet.
156.77 156.75	1526	50	subsoil	charcoal indet., Coleoptera indet.
156.75 156.73	1527	30	subsoil	~
156.73 156.70	1528	100	subsoil	~
156.70 156.66	1529	50	clay-with-flints	charcoal indet., Coleoptera indet.
156.66 156.62	1529	140	clay-with-flints	~

Table 00: Macroscopic Plants and Invertebrate Remains from Core 5, by Context and Sample

6.4.1.3 The subsoil **[1528-1526],** the truncated topsoil **[1525]** and the more organic of the dumped deposits **[1524-1523a]** were sampled in 20 mm units. The clay-with-flints **[1529**], the less organic dumped soil **[1523]** and the chalk rubble **[1522**] were sampled in 40 mm units. The samples, mostly of around 100 ml, were washed over onto a 0.2 mm sieve to recover any light organic material and the wash-over kept wet. The heavy residue was then sieved down to 0.5 mm and dried. The flots and residues were scanned under a binocular microscope and any remains observed were identified.

Results

6.4.1.4 The results for the presence of remains are given in the database Table 00 on a sample by sample basis, which also gives context details and sample volumes. A full taxonomic list for Core 5 is given in Table 00.

6.4.1.5 The charcoal is mostly in fragments of less than 2mm cubes so is extremely difficult to identify. The preservation of organic remains is variable but some samples from the buried topsoil **[1525]** and the trampled dumped soil **[1523a, 1524]** showed good preservation. Preservation in the chalk and soil dump **[1523]** is poor and remains are almost entirely absent from the clay-with-flints **[1529],** the subsoil **[1526-1528]** and the chalk rubble dump **[1522].**

	WATERLOGGED PLANTS Bryophyta indet.	moss
	WATERLOGGED SEEDS *Ranunculus* cf. *acris*	meadow buttercup
	Ranunculus Sect. *Ranunculus* sp.	buttercup
	Stellaria sp.	chickweed
	Montia fontana ssp. *chondrosperma*	blinks
	Chenopodium album	fat hen
	Urtica dioica	stinging nettle
	Sambucus nigra	elder
*	*Picris echioides*	ox-tongue
	Leontodon sp.	hawkbit
	Carex sp.	sedge
	seed indet.	
	CHARRED SEEDS *Corylus avellana*	hazel
*	CHARCOAL *Quercus* sp.	oak
	charcoal indet.	
*	COLEOPTERA (Beetles) *Loricera pilicornis*	
	Calathus sp.	
	Carabidae indet.	
	Silpha atrata	
	Stenus sp.	
	Philonthus sp.	
	Aleocharinae indet.	
	Geotrupes sp.	
	Aphodius sp.	
	Phyllopertha horticola	
	Dascillus cervinus	
	Barynotus obscurus	
	Sitona sp.	
	Curculionidae indet.	
	Coleoptera indet.	
	OTHER INSECTS *Myrmica* sp.	ant
	Formicidae indet.	ant
	Bibionidae indet. - adult	fly
	Diptera indet. - puparium	fly
	Insect indet.	
	MOLLUSCA (Snails) *Vertigo pygmaea*	

Table 00: Macroscopic Plant and Invertebrate Remains from Core 5* not previously recorded from beneath the mound

Discussion

6.4.1.6 Preserved organic remains had been anticipated from the base of the mound because they had been found from the old ground surface and the turf stack during the tunnelling of Silbury Hill in 1968-70 (Whittle 1997, 16). What had not been appreciated was that organic material survives up to 0.83 m above the surface of the buried topsoil. While the relationship between the dumped and trampled deposits found in Core 5 and the turf stack revealed by the tunnelling is not clear, it is thought possible, on the basis of this evidence, that there could be organic survival in the turf stack deposits to their top.

6.4.1.7 The occurrence of charred plant remains has not previously been recorded from the base of the mound. However, the inclusion of a 'kernel' of *Corylus avellana* as well as nut shell fragments in the list of seed and fruit fragments from the 1968-70 tunnel samples, suggested that carbonised material had been recovered during the earlier work (Williams 1997, 33).

6.4.1.8 The macroscopic plant and insect remains identified from Core 5 were mostly species which had been recorded in the earlier work (Evans 1972, 266-7; Robinson 1977; Williams 1997). Of the three new taxa, *Picris echioides* (ox-tongue) is a weed which readily grows in disturbed calcareous grassland while *Loricera pilicornis* is a beetle of damp ground. The *Quercus* sp. (oak) charcoal was presumably from wood brought to the site.

Proposals for further work

The assemblages from the core samples are too small for it to be worth analysing them quantitatively. However, they do show the extent of organic survival to be anticipated should any re-excavation of the tunnels provide an opportunity for further sampling. Likewise, the discovery of a charred hazel nut shell fragment serves as a reminder that sampling for charred plant remains should be incorporated into any further excavation programme.

6.4.2 Assessment of pollen from core 5

Data collection

6.4.2.1 22 pollen samples were taken from Core 5 (see below). 16 samples were selected and sent for preparation using standard methods (including HF and staining with safranin) by Lis Højlund Pedersen of Roskilde University, Denmark. Known concentrations of exotic (Lycopodium) spores were added to enable the pollen/spore concentration to be calculated if required.

6.4.2.1 Five traverses of each slide were scanned and the frequency of exotic spores, degraded (unidentifiable) pollen, identifiable pollen and fungal spores was noted. The slides were also scanned for charcoal fragments but no convincing evidence of these was found.

Context	**measurement/position**	Scanned	**breadth of sample**	Comment
1522	775		10mm	
1522	**770**	*	**10mm**	
1522	768-769		10mm	organic lump in chalk
1522	**765**		**10mm**	**first 10 - 20 mm of 1522**
1523	**763**		**10mm**	**top 10 mm of 1523**
1523	**762**	*	**10mm**	**next 10 mm of 1523**
1523	761		10mm	next 10 mm of 1523
1523	**755**	*	**10mm**	
1523	745		10mm	
1523	**735**	*	**10mm**	
1523	**725**	*	**10mm**	
1523	**715**	*	**10mm**	
1523	**705**	*	**10mm**	
1523	**695**		**10mm**	
1524	**top**	*	**10mm**	
1524	middle		10mm	
1524	**bottom**	*	**10mm**	
1525	**top**	*	**5mm**	
1525	rest		10mm	
1527		*	**10mm**	
1528		*	**10mm**	**? wrong context number**
1529	**top**	*	**10mm**	**? wrong context number**

Table 00: Pollen samples removed from Core 3 on 28/11-2002
BOLD = prepared for analysis
1529 is the lowest context sampled and context 1522 is the highest in the sequence

Results and discussion

6.4.2.3 The concentration of pollen and spores on almost the slides was exceedingly low. On these slides almost all the few pollen grains and spores which were detected were so degraded that identification was impossible. A very few could be identified: Poaceae (grasses), Alnus (alder), Plantago (plantain), Liguliflorae (Dandelion family), Tilia (Lime) and Filicales/Polypodium (ferns). All of these are robust microfossils which tend to preserve when other less robust pollen and spore types have degraded. It therefore seems reasonable to conclude that the pollen and spore spectra present are functions of differential preservation rather than representing assemblages initially present. For this reason detailed analysis of these samples is not recommended.

6.4.2.4 Two adjacent samples (**[1525]**/top and **[1524**]/bottom) were found to contain fairly abundant pollen, most of which was well preserved. Five traverses produced the following counts:

	1525/top	1524/bottom
Corylus	14	1
Alnus	4	0
Quercus	1	0
Tilia	0	1
?Carpinus	1	0
Poaceae	9	3
Plantago	5	1
Liguliforae	3	1
Caryophyllaceae	1	0
?Rosaceae	0	1
Filicales	6	2
Polypodium	1	0
Lycopodium (exotic)	Abundant	Abundant

Proposals for further work

A full count of at least sample **[1525]/**top would seem to be worthwhile. The decision to carry out further work should be made also in the light of the results of the geoarchaeological, plant macrofossil and insect analyses.

6.4.3 Geoarchaeology

6.4.3.1 The cores are largely composed of 30+ metres white chalk rubble with small lengths of around 1 – 2 m of brown or black deposits towards the base. The general area of these dark basal deposits for Cores 1-5 is shown on Fig. 6. They consist of the buried land surface materials and valley gravel subsoils, and in turn usually overlie a few metres of solid chalk. It is uncertain exactly what type of soil profile would have occupied the land surface before construction. The nearest exposure of a soil developed on valley gravel is about 100 m east of Silbury Hill (see Figure 2), and this has 10-15 cm of relatively dark humic topsoil overlying a further 10 cm or so of lighter brown soil (Figure 7). Assuming this represents a typical valley gravel soil, then Cores 1, 2, 4 and 5 do not appear to contain complete buried profiles.

6.4.3.2 Core 3 contains a deep clay and flint deposit over the geology, which could be a full profile assuming considerable variability in the valley gravel make-up, and that the organic matter had been oxidised away. However, the preservation of dark organic materials elsewhere in the cores suggests that this latter process would be unlikely to have occurred. Aside from some uncertainty about Core 3, then, the general state of the old ground surfaces in the cores is consistent with there having been a phase of de-turfing for the building of the stack. The truncated surfaces thus do not have in-situ topsoils, but are marked in some cases by dark organic bands, or by red iron staining (Fig. 6, Core 1, 1145-8; Core 5, 1525-8), both of which could result from trampling.

6.4.3.3 Primary mound material in the cores is variable. In the turf stack deposits of Core 6, very dark (10 YR 2/1) material is preserved over about 20 cm, but the more general case is mixtures of trampled chalky topsoil, valley gravel materials and pure chalk.

6.4.3.4 The interface of the primary mound material and the long cores of chalk rubble representing the upper part of the hill are, in most cases, not marked by iron staining.

Solid iron pans are not present at all in the cores, but some micro-panning is visible in one part of Core 5 (157.7-157.65 m OD). This exposure is similar to the excavation photographs (Figures 3 and 4) and at a microscopic level, it is possible to find manganese deposition forming small near-dendritic patches (Figure 8) associated with the pans. These are typical products of fluctuating redox conditions, with iron and manganese entering solution where conditions are reducing, then crystallising out where conditions are oxidising.

Conservation

A summary of the biological material preserved within the primary mound at Silbury is given in Table 2. The preservation of insects, plant remains and molluscs within the turf stack represents the remains of a Neolithic chalk landscape. This landscape was established before the construction of the mound, remarkably early given that it results from managed grazing, and that much of the rest of Britain was largely wooded at this time. The remains are unique and of international importance. Our recent investigations have shown that macroscopic remains are preserved not only within the turf stack but also in the dumped soil layers immediately sealing it. Furthermore, the examination of Core 6 would suggest that no deterioration of macroscopic material has occurred in the turf stack away from the tunnels since the 1968-70 excavations. By contrast, pollen preservation within the turf stack and dumped soil layers is poor to non-existent. It is only in the old ground surface that conditions are sufficiently acidic to preserve pollen in reasonable quantities. Here, insects and plant macroscopic remains are also generally well-preserved, but land snails are absent. Conversely, the high pH levels in the turf stack have led to the destruction of pollen and fern spores but have ensured the survival of mollusc shell.

An important factor in the overall preservation state is that these deposits are unlikely ever to have dried out completely due to the protection afforded by the mound. In addition, temperature fluctuations, which may play a part in decay, will have been negligible.

Type of evidence	Old ground surface	Turf stack	Capping layers
Pollen	Pollen reasonably abundant, mainly well preserved.	Pollen very sparse and degraded. Only a few robust types identifiable.	Pollen sparse and degraded. Only robust types present.
Molluscs	None present.	Present. The periostracum, or proteinaceous coat of many of the shells preserved in the humic layer. Degraded in the chalky soil and only robust fragments in the subsoil materials.	Molluscs present.
Plant macrofossils	Good preservation.	Good preservation in the dark humic layer (actual turf). In the general matrix less so, and absent from the subsoil materials	Good preservation but material fragmentary.
Insects	Good preservation.	Good preservation in the dark humic layer (actual turf) but some surface damage. Less abundant in other parts of this deposit but good surface condition in the subsoil materials.	Good preservation but material fragmentary.
Bone	None found.	Some burnt bone.	None found.

Table 00. Preservation of biological remains within Silbury Hill based on investigation carried out on the cores and Evans samples.

5. PROPOSALS FOR FURTHER WORK

5.1 Structural and stratigraphic data

5.2 Artefactual data

The only material worthy of further study – and mainly for dating - is the Roman coin and the pottery assemblage, as well as possibly the flint assemblage, as suggested above.

5.3 Environmental data

5.3.1 Animal bone

The assemblage from Silbury Hill 661 includes few macroremains, but many microvertebrate, mainly amphibian, bones. While most of the remains are from poorly stratified layers, two contexts merit further consideration, the fill (9) of pit 15 and the chalk rubble (10/11) in Trench B. The microvertebrate assemblages from these contexts may inform on site formation and should be assessed. A proportion of the <4mm fraction of the heavy residues should be sorted and assessed also.

5.3.2 Molluscs

It is recommended that a stratigraphic sequence of samples be analysed in full for molluscs from Trench B to cover the full sequence of deposits. The species of snail present in the coarse sieving from each of these contexts should also be identified, although they will not need to be quantified. The results should be interpreted so as to provide information on the structure of the monument and to provide a general palaeoenvironmental sequence. It is not thought necessary at this stage to analyse the samples from Trench A, which are regarded as giving a less good sequence, nor to analyses samples from Trench B which duplicate the basic sequence.

It is recommended that the following samples from Trench B be analysed: Samples 669, 665, 666, 670, 663, 662.

1kg of each sample should be washed over onto a 0.5mm sieve to float off shells and the residue should also be sieved to 0.5mm. The dried flots and residues should be sorted under a binocular microscope for shells which should be identified using a reference collection. A table of results should be prepared, giving the minimum number of individuals represented by the fragments for each species in each sample. The results should be used to draw up a molluscan diagram.

5.3.3 Pollen

A full count of at least sample 1525/top would seem to be worthwhile. The decision to carry out further work should be made also in the light of the results of the geoarchaeological, plant macrofossil and insect analyses.

	Structure and stratigraphy		
	ARTEFACTUAL DATA		
	Ceramics (early medieval)		

	Ceramics (prehistoric)		
	Coin		
	ENVIRONMENTAL DATA		
	Molluscs		
	Sieving and sorting of samples	Tech	3
	Identification of shells	MR	2
	Preparation of report	MR	1.5
	Pollen		
	Full counts of sample 1525	DER	

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(Crawford 1984; Zeuner 1963),

Evidence from the Evans samples

Site Formation Evidence

Three irregular blocks of turf stack stratigraphy were received by John Evans from the 1968 excavations. One of these (TS1) seems to be a compressed chalk soil profile with a strongly

organic surface layer, possibly trampled and still rich in chalk and other calcareous remains. The two others (TS2 and 3) appear to be thin turves from a decalcified valley gravel soil profile (see Fig. 9). Between each turf layer, there was moss still in its growing position; a sample of this moss is being used to produce a radiocarbon date. In thin section it can also be seen that many of the turf/turf junctions in TS2 have growths of vivianite in them suggesting biologically rich (phosphate) and wet (reducing) conditions (Fig. 10). Again, these conditions cannot be thought of as ubiquitous throughout the hill, and must represent localised areas of wetness and reduction.

All three lumps were presumably made up of materials cut from the spur on which the hill is situated, so it seems likely that different superficial soils were present at the start of construction. These would probably consist of the decalcified valley gravel soils on the main body of the spur, and a shallow chalk profile further south (closer to chalk slope).

Biological evidence

28 pollen samples were taken from TS1, TS2 and TS3 and prepared using the standard methods. The concentration of pollen and spores was extremely low and most were so degraded as to make further identification impossible (D. Robinson, 2002). Those that could be identified were robust types such as Poaceae (grasses), Asteraceae (dandelion family), *Alnus* (alder) and Filicales/ *Polypodium* (fern) spores indicating the differential preservation of pollen in these deposits (D. Robinson, 2002).