

Assessment of samples for plant remains from Silbury Hill

Samples for assessment of macroscopic plant remains from deposits likely or known to contain biological remains preserved as a result of anoxic conditions were selected following the completion of the excavation in collaboration with Jim Leary and with reference to the draft matrix and stratigraphic summary. Samples thought to contain only charred plant remains, and larger samples taken principally for the recovery of artefacts were subject to flotation. All floated samples were assessed. The assessment sought to address the research questions posed in the Project Design, establish the potential of this material recovered for further research and to examine the nature, state of preservation and concentration of the any plant remains present.

Methodology

The samples taken for general biological analysis (GBA) proved quite difficult to process. The organic layers in particular were very compacted. After some experimentation with different techniques including freezing, soaking in hot water, boiling, and the addition of hydrogen peroxide it was found that freezing the sample, allowing it to defrost, and then soaking overnight in initially hot water, achieved the best results. It has been shown that freezing of compacted organic rich samples as a way to aid processing does not cause damage to delicate biological remains and is generally the most efficient method of processing this type of material (Vandorpe and Jacomet, 2007).

Samples were wet sieved down to 180 microns using a simple wash over technique. This mesh size was used in order to ensure full recovery of mites. The resulting organic fractions were scanned under a binocular-dissecting microscope at magnifications up to x 50. Brief notes were made on the abundance and preservation of insects, molluscs and other invertebrates to aid the specialists undertaking the study of these remains. The occurrence of different macroscopic plant remains in the samples was recorded along with information on their abundance, preservation and condition. Preliminary identifications were made and possible interpretations of the larger assemblages put forward. A brief summary of the material recovered from each sample was produced (see Table 1, and below) for the research archive

Any insects and other invertebrate remains, small bones and artefacts were sorted from all fractions > 500 microns and passed onto the appropriate specialists. The < 500micron fraction was scanned for plant remains and kept for examination by the insect specialist or added to a separate sub-sample taken specifically for the recovery of insect remains and subject to paraffin flotation onto a mesh of 180 microns.

Samples thought likely or known to contain only charred plant remains and or molluscs recovered from the tunnel (SDD5, 8, 9) were assessed during the excavation and subsequently checked in the laboratory. Samples from the recovered from the summit excavations and remedial works on the slope of the Hill (SDD6 and SDD7) were all assessed in the laboratory following completion of the excavations.

In the first instance each flot was assessed as to its contents by scanning part or all of the flot under a binocular-dissecting microscope at magnifications up to x 50. The preservation and the nature of any charred plant remains present were recorded. Notes were made on the amount of charcoal, cereal grain, other seeds, and cereal chaff present in each flot using the following four point scale: 1= present, 2=frequent, 3=common, 4=abundant. The results of this assessment and assessments of previous work at the site were recorded on an Access database which forms part of the research archive.

Identification of all plant remains took place with reference to the modern comparative collection held at Fort Cumberland (English Heritage). Nomenclature follows Stace (1997) for wild plants and Zohary and Hopf (1994, table 3, table 5) for the cereals.

Results

Samples from the tunnel processed for general biological analysis.

The results are presented in Table 1 and described below in phase order.

Phase 2

Old Ground surface (OGS)

Sample 9815 (4041, sub of 9434) from OGS below mini mound: Very strong iron panning was noted in this sample. Organic material represented only about 5% of the total. Charcoal >4mm was frequent with further fragments in the greater than >2mm fraction along with occasional charred hazel nutshell fragments. Monocot stems/ leaves were present along with occasional buttercup (*Ranunculus acris/ repens/ bulbosus*) seeds, fragments of moss, and occasional grass seeds and one fragment of lesser stitchwort (*Stellaria graminea*). Only flint and a possible charred onion couch (*Arrhenatherum elatius var bulbosum*) rhizome were noted in the dried inorganic residue. Root remains were not observed.

Sample 9238 (4041) from OGS below edge of gravel mound: Insects were more numerous than anoxically preserved plant remains this sample. Some charcoal fragments >2mm were noted and two fragments of charred hazel nutshell. The few elder (*Sambucus nigra*) seeds recorded were fragmentary and the Caryophyllaceae seeds had lost their outer surfaces. Mite remains were present.

Sample 9821 (4041, sub of 9435): This sample consisted of around 90% of the sample taken from the ground surface in the vicinity of the pig teeth in the east lateral. A few fragments of moss, some monocot stems/leaves and fragmentary elder seeds were recovered. The other remains recorded were charred: charcoal, sedge (*Carex* sp), buttercup (*Ranunculus acris/ repens/ bulbosus*), hazel (*Corylus avellana*) nutshell fragments and a possible grass rhizome.

Phase 3

Gravel Mound

Sample 9819 (4153, sub of 9251) from the main body of the gravel mound contained very little organic material other than a few elder seeds. Molluscs, however, were numerous.

Sample 9820 (4166, sub of 9252): This sample derived from the possible soil horizon which sealed the gravel mound in places. It was taken from directly above sample 9819. The plant remains recovered are typical of disturbed ground and of soil seed banks. Some moss and a few monocot stems/leaves were also present. Insects were fairly frequent.

Sample 9814 (3069, sub of 9247): This sample came from the top of gravel mound from which pit 3066 was cut. Organic material only accounted for about 1% of the total. There was poor preservation of plant remains. Moss had lost leaves and seeds of elder were only present as fragments. Charred hazel nutshell fragments and some charcoal was present, but the latter were <2mm in diameter. Molluscs are frequent with the assemblage dominated by *Vallonia excentrica*. Few insects were recorded. One earthworm egg was noted.

Phase 4

mini-mound, context 9181

Sample 9808 (4181, sub of 9425): This was a two litre sub-sample taken for general biological analysis. It was very rich in insects and included a tough rachis fragment from a free-threshing wheat (*Triticum* sp.) and other cereal chaff/ straw. There was a considerable woodland element, with well preserved yew (*Taxus baccata*) berries, hawthorn type (*Crateagus* type) thorns, sloe (*Prunus spinos*) stones, hazel nutshell fragments and elder seeds as well as occasional fragments of wood. Bud scales were also noted as well as occasional blackberry/ raspberry (*Rubus* sp). seeds. Presence of grassland is also indicated by the remains of with sedges and other Cyperaceae along with occasional grasses, lesser stitchwort and buttercups, the latter rather poorly preserved. Weeds of disturbed ground included stinging nettle (*Urtica dioica*), blinks (*Montia fontana*) and chickweed (*Stellaria media* gp.).

Sample 9809 (4181, sub of 9425): A three litre sub-sample was taken for recovery of insects. The > 1mm fraction was sorted for any cereal or grass chaff prior to paraffin flotation. This sub-sample contained more wood fragments than sub-sample 9808. The bone recovered included a little burnt bone. Worked flint was present. There were very few molluscs

Both samples contained roughly 30% organic material.

Gully fills

Sample 9812 (4070, sub of 9338): This sample from the lower fill of the gully contained a few bone fragments in the dried residue, a few molluscs and two fragments of charred onion couch tuber. Only about 5% organic material was present.

Sample 9811 (4070, sub of 9338): This sample contained about 5% organic with buttercups, molluscs and moss frequent. Charred remains of elder and onion couch tubers were also noted

Sample 9813 (4173, sub of 9339): This sample from the upper fill contained only about 5% organic material and showed varying preservation especially in relation to *Carex* spp. Lots of iron pan was present in the sample. There were no charcoal fragments greater than 1mm and molluscs were fragmentary and only present as a trace. There were a few tiny fragments of bone.

Lower organic mound

Sample 9200 (4156): This sample contained a mixture of grassland plants with a trace of taxa such as figwort (*Scrophularia* sp.) and sedges (*Carex* spp.) which might be indicative of damp ground, though species preferring drier conditions such as parsley piert (*Aphanes arvensis*) were also recorded. Moss fragments were common and green 'plant' fragments were present.

Sample 9824 (3046, sub of 9267): There were lumps of turf still present, following processing. Green 'plant' material and ant thoraxes were recorded along with a mixture of grassland plants which well preserved, though fragmented. A single, rather decayed fragment of *Rubus* sp. was also present.

Samples 9236 and 9237 (4156): Samples 9236 ad 9237 were recovered from bands of clay rich and gravel rich deposits observed on the edge of the gravel mound. Sample 9237 was taken from a gravel band directly above the OGS,(OGS sampled as 9238) while sample 9236 was taken from a clay rich lens above this gravel band. Both samples contained only about 1% organic material with only a few fragments of elder seeds present and ghosts of other seeds e.g. buttercups. Both samples produced charred hazel nutshell fragments and occasional charcoal fragments >2mm. The clay material is almost certainly sub-soil derived from clay with flints.

Phase 5 Pitting activity

Pit in west lateral sample 9810 (3073, sub of 9340): A 2 litre sub-sample from sample 9340 was processed. Rare elder seeds and a single *Rubus* sp, fragments were recorded. Moss was frequent and buttercups were fairly common. Molluscs were abundant, as were ant remains. 2 fragments of charcoal >2mm in diameter were recovered. There was a tiny amount of bone including burnt bone. Insect remains were common. No seeds were noted in the <500 micron fraction.

Vivianite was noted during sorting of the inorganic dried fraction along with lumps of humified turf. Earthworm granules were also noted in this fraction. The material appears very similar to that retrieved from the organic mounds.

Pit in main tunnel

Sample 9244 (3066, sub of 9244): This sample was derived from the principle fill of this feature. Preservation was excellent in some specimens and was comparable to assemblages from the lower organic mound. Organic material formed about 20% of the sample.

Sample 9823 (3070, sub of 9246): The contents of this sample were similar to sample 9814 taken from the top of the gravel mound from where the pit appeared to be cut, but with fewer molluscs. It is possible that this sample represents subsoil rather than poor preservation.

Phase 6

Upper organic mound

Sample 9825 (3083, sub of 9276): Fragments of turf were present with many roots observed in the wash-over. Earthworm granules, ant thoraxes and mites were noted in the finer fractions. A mixture of poor and good preservation was present in the plant remains recovered.

Sample 9335 (3078): Very little organic was present in the sample, mainly, moss fragments, monocot stem/leaves and roots. Fragments dog's mercury (*Mercurialis perennis*) were recorded along with the usual buttercups, nettles, lesser stitchwort and common chickweed. Earthworm granules were noted in the dried residue.

Sample 9375 (3061): This sample was taken from the upper organic mound above sample 9824 in the main tunnel. Preservation varied but was good overall. Buttercups, nettles, monocot stem/leaf and moss were frequent. Fragments of charcoal >2mm were frequent. Speedwell (*Veronica* sp.) (speedwell) and goosefoot (*Chenopodium rubrum* type) were rare finds.

Phase 7

Further dumping layers

Sample 9822 (3084, sub of 9320) was the only sample processed for general biological analysis. Very few remains were recovered and these were poorly preserved.

Table 1: Results of the general biological analysis of samples, specifically plant remains from the investigations carried out at Silbury Hill in 2007 (OGS = old ground surface, LOM = lower organic mound, UOM, upper organic mound, + = 1-5, ++ 6-25, +++26-100, ++++ = >100. * = presence, () = uncertain identification, c = item preserved through charring. Use of old type for charcoal indicates that fragments >2mm in diameter were present

sample	9815	9238	9821	9819	9820	9814	9808	9809	9811	9812	9813	9200	9237	9236	9824	9817	9823	9810	9335	9825	9375	9822
sub-sample of	9434	N/A	9435	9251	9252	9247	9425	9425	9338	9338	9339	N/A	N/A	N/A	9267	9244	9246	9340	N/A	9276	N/A	9320
Context number	4041	4041	4041	4153	4166	3069	4181	4181	4070	4070	4173	4156	4156	4156	3046	3066	3070	3073	3078	3083	3061	3084
Context	OGS	OGS	OGS	gravel mound	?pos soil	gravel mound	mini-mound	mini-mound	1st gully fill	1st gully fill	2nd gully fill	LOM	LOM?	LOM	LOM	pit	pit	pit	UOM	UOM	UOM	clay cap
Volume in litres	3	2	3.8	2	2	2	2	3	2	3	2	2	1.2	1.4	2	2	2	2	2	2	2	2
Weight in kg	+/-3	1.984	3.579	1.916	1.916	2.187	2.236	3.065	2.078	3.413	2.141	2.089	1.366	1.506	1.966	1926	2.444	2.135	1.91	2.206	2.313	2.093
Phase	2	2	2	3	3	3	4	4	4	4	4	4	4	4	4	5	5	5	6	6	6	7
<i>Taxus baccata</i> L.							+			+								*				
<i>Ranunculus acris/ repens/ bulbosus</i>	+		+(?+c)				(+)		++	++	+	++	(+)		+	++		+++	+	+	++	+
<i>Urtica dioica</i> L.				+		+				+		++			+	+			+	+	++	
<i>Corylia avellana</i> (nutshell fragment)	+c	+c	+c			2c	+				+			+c	+c	+c						
<i>Chenopodium rubrum</i> type																						+
<i>Montia fontana</i> L.				+		+													+		+	
<i>Arenaria serpyllifolia</i> L.																			+			
<i>Stellaria media</i> gp.							+			++	+	+			+	++		++	+	+	+	
<i>S. graminea</i> L.	+			+		+			+			+			++	+		+	+	++	+	
<i>Cerastium</i> sp.																		+			+	
<i>Caryophyllaceae</i> indet.		++												+	+	++						
<i>Polygonum aviculare</i> agg.												+						+		+	+	
<i>Polygonaceae</i> indet.										+					+							

<i>Taraxacum</i> sp.							*																
<i>Carex</i> spp.			+c		+		++		+	+	+	++							+	+			
<i>Cyperaceae</i> <i>indet.</i>							+																
<i>Arrhenatherum</i> <i>elatius</i> var. <i>bulbosum</i> (tuber) (Willd.) St-Amans	1c								1c	2c		+c											
Poaceae <i>indet.</i>	+	+			+					+	+	+			+	+	+		+	+	+		
Poaceae <i>indet.</i> (chaff)							++	*			+							+	+				
Poaceae <i>indet.</i> (rhizome)			+c										+c										
monocot stem/leaves	+		+		++					++	+++	++			++	+			+++	+++	+		
Indeterminate seed					+																		
<i>Triticum</i> sp. tetraploid free- threshing rachis							1																
Cereales <i>indet.</i> (chaff)							+																
bone		+		+	+			++			+		+				+	+					
burnt bone								+		+													
anthers															+								
bud scales					+		+		+		+					+							
<i>Cenococcum</i> sp.						+	++				+		+		++		++			++	+	++	
charcoal	++	+	+++	++	+	++	+		+	+	+	+	+	+	++		+	+		+	++	+	
earthworm egg			+	(+)		+							+	+	+	++	+			+	+		
earthworm granules					*											*		*		*			
green plant					*						*				*		*	*	*	*	*	*	
molluscs		++		+++	+++	+				+	+		++	+	+	++++	++	++			+		
moss	+		+		+++	+	++		++	++		++++			++	+++	+	++	++	++	+	++	+
insects +	+	++			+++	+	++++	++++	++	++	+	+	(+)	+	++	++	+	+++		++	++	+	

