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The charred plant remains from Thurnham Roman Villa, Kent (ARC THM 98)

by Wendy Smith and Ann Davis

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1 INTRODUCTION

The 1998–9 excavations at Thurnham Villa by Oxford Archaeology included sampling for charred plant remains. In total, 249 samples were collected from Late Iron Age and Roman period contexts for archaeobotanical evidence. Assessment of the flots by Pelling (2001) established that 33 samples (all dating to the Roman period) were sufficiently rich to merit full analysis. Unfortunately, none of the Iron Age samples were suitably rich to be of interpretable value (Pelling 2001). For various reasons (see Appendix 1), the number of samples fully analysed was reduced to 17.

The samples derive from contexts dated to the early Roman period (AD c.60 – 120), middle Roman phase I (AD 120 – 150), middle Roman phase II (AD 150 – 250) and the late Roman (AD 250 – 420) occupation and use of the site. This spans the proto-villa construction, the villa construction and remodelling of the complex followed by the late Roman activity centred around the corndrier.

2 METHOD

The samples were processed by Oxford Archaeology by bulk water flotation. The flots were sieved over a 250µm mesh sieve and the heavy residues (the material which does not float) were retained in 1mm sieves (Pelling 2001). The heavy residues were scanned for charred plant remains, as well as other artefacts and environmental evidence, at Oxford Archaeology. Only charcoal was recovered from the heavy residues (*pers. comm.* Mark Robinson) and, therefore, this report is based entirely on the flots.

Sorting of the flots recommended for full analysis was carried out at the Oxford University Natural History Museum under the supervision of Ruth Pelling and Mark Robinson. The primary suggested number of flots for analysis was reduced (Robinson *pers. comm.*) based on the fact that they were repetitive of material already sampled or because they also contained large quantities of charcoal and, therefore, the flots were excessively time consuming to sort. A few of the partially sorted samples were re-sorted by Smith, in order to generate full and reportable archaeobotanical data. As a result, full analysis was limited to 17 fully sorted samples. The results for the incompletely studied and unstudied samples are presented in Appendix 1.

The flots were sorted for plant remains by the authors using a low-powered binocular microscopes at a magnification of x12. Identifications were made at magnifications up to x50 in comparison with the Museum of London's modern seed collection, Smith's personal reference material and/or in consultation with illustrations and photographs. Nomenclature for economic plants follows Zohary and Hopf (2000) and nomenclature for indigenous taxa follows Stace (1997). The traditional binomial system for the cereals has been maintained here, following Zohary and Hopf (2000, 28, Table 3 and 65, Table 5). Quantification is based on the reconstruction of whole plant parts, but in those cases where it was not possible to quantify highly fragmented material (i.e. *Triticum* sp. glume/ lemma fragments or awn) a semi-quantitative system was adopted. Intact spelt wheat spikelet forks are scored as a complete unit; in almost all cases, the rachis internode was not preserved.

3 RESULTS

The results for the fully sorted samples are presented in Table 1 and summarized in Figure 1. Figures 2 – 5 present the distribution for these samples by phase and associated features. The results for the partially sorted samples are presented in Appendix 1/ Table 1 and summarized in Figure 1.

Cereal crop remains dominate all of the samples studied. There is a certain amount of overlap in the gross morphology of free-threshing wheat and glume wheat grains which means precise identification is often not possible, and identifications can only be made to type (G. Jones 1998). On the basis of observed morphology of the cereal grain and the period of the site, it is most likely that spelt wheat (*Triticum spelta*) was in use. Large quantities of spelt spikelet forks and glume bases were recovered from these samples, further supporting the interpretation that the majority of wheat grain recovered is spelt. In addition to spelt wheat, small quantities of barley, emmer (*Triticum dicoccum*), free-threshing type wheat and oat (either cultivated or wild) were also identified. The overall dominance of cereal crops is unlikely to be due to any particular scarcity of non-cereal crops on site but, instead, reflects the pattern of charring events at Thurnham, which appear to frequently involve cereal grain and chaff.

The dominance of hulled wheats, particularly spelt (*Triticum spelta* L.), suggests that this was the primary cereal used and probably cultivated by the site's occupants throughout all periods of occupation. With the exception of the primary deposits sampled within the corndrier, oven and hearth, the majority of the samples studied here represent secondary deposition of charred plant remains. Secondary deposition could have occurred either through intentional dumping or from field manuring. Use of cereal processing waste as fuel is well attested (e.g. Hillman 1984; 1985; G. Jones 1984; Smith 2001; van der Veen 1996, 1999; van der Veen and Hamilton-Dyer 1998) and disposal of spent fuel into open features such as ditches or at surface level within specific locations of the site seems a likely explanation for the presence of this material in some instances.

Aside from cereal crops, a few samples also contain small quantities of cultivated pulses, such as broad bean (*Vicia faba* - sample 10346, Table 1) and large seeded vetch/garden pea (*Vicia* sp./ *Pisum sativum* – partially studied samples 10019 and 10024, Appendix 1, Table 1). In addition to these cultivars, non-edible vetches/clovers (e.g. *Vicia sativa* and *Melilotus* sp./ *Medicago* sp./ *Trifolium* sp.) were also recovered in some samples. These may have been cultivated for animal fodder, possibly as part of a crop rotation system. However, the small quantity of vetches/clovers recovered and the association of these with large quantities of charred cereals suggests that these were primarily weeds of the arable crops.

Hazel (*Corylus* sp.) nutshell fragments were recovered from samples 10335, 10340, 10405, 10411 (Table 1) and partially sorted samples 10038 and 10040 (Appendix 1, Table 1). A single sloe (*Prunus spinosa*) stone was recovered from oven sample 10340. These could be the remains of foodstuffs; however, hazel nutshells and sloe stones could have entered the deposits through the use of hazel or blackthorn wood for fuel.

Most of the samples contained taxa that typically occur as weeds of arable crops in the archaeological record. Some of the taxa provide information about the specific soil conditions in which crops may have been cultivated. Additionally some species, viewed in context of the surrounding topography and associated soils, also provide an insight to the surrounding landscape and its utilisation.

4 DISCUSSION

The distribution of rich samples is frequently concentrated in specific features for a particular phase that could have implications for the interpretation of plant-based agriculture as a whole across the site. Analysis of the plant remains has demonstrated that cereal crop processing activities, especially of spelt, were repeatedly and most likely continuously taking place on or around the from the 1st – 4th centuries AD. Evidence of malt production is suggested by a single sample (10405) and cereal sprouts and detached embryos were noticed in small numbers in almost all other analysed samples. In addition, the recovery of weed/wild taxa associated with cereal remains provides information on the cultivation conditions for these crops. There is also limited evidence for hedgerow or surrounding scrub in the vicinity of the site.

4.1 Concentrations of results

Figures 2 – 5 summarizes the location and proportion of plant remain categories recovered in individual samples by phase and associated feature. Notably, these distributions have demonstrated that for each period generating rich archaeobotanical samples, the remains are frequently centred around a major feature (i.e. Early Roman – ditches, Middle Roman – the aisled building and a pit and Late Roman – the corndrier and the villa building).

All of the rich samples relating to the early Roman period were deposited within the main enclosure ditches (Figure 2). The early to mid 2nd century rich samples derive from hearth debris deposits concentrated within the aisled building (Figure 3). A sequence of successive charred deposits dating from the mid 2nd century were recovered from a votive pit located immediately to the east of the 14-post building and may suggest that this part of the site had a function relating to cereal crop processing activities and/or dumping events prior to the construction of the corndrier here in the late Roman period (Figure 4). The late Roman samples are concentrated within two specific areas of the site (Figure 5). The earlier part of this period saw the accumulation of a silt layer with many charred inclusions across the interior of a main room within the core of the villa building that had been used as a smithy. An oven backfilled in the late 4th century within the villa also produced a rich charred assemblage. To the south east a corndrier either replaced or was built into the modified western end of the 14-post building and produced very rich charred deposits. To the immediate north of this a soil layer sealed a cobbled surface and cart ruts and appears to have been directly related to the use of the corndrier. This produced a similar rich assemblage of charred debris.

Due to the consistent and repeated nature of the cereal crop processing remains and accompanying weed/wild plants (most likely weeds of the cereal crops) across the periods represented the samples are discussed as a whole. Individual phase interpretations can also be gleaned from individual samples to aid the interpretation of the habitats both in the immediate vicinity and those exploited further away from the site.

4.2 Cereal crop processing

Glume wheat chaff, especially from spelt, was recovered from all samples, and in some cases was the most dominant cereal remain identified (see Table 1). In most cases, identification to a definite species of hulled wheat was not possible either due to poor preservation or the fragmentary nature of the remains; however, in those cases where preservation was good, most glume bases were identified as spelt. As a result, it seems likely that spelt was the main crop cultivated throughout all phases of Roman occupation.

Spelt and emmer are hulled wheats that generally have two grains in each spikelet of the cereal ear. Although rarely grown today, hulled wheats do have a number of properties which would have been advantageous to ancient farmers. In particular they can tolerate poor soil conditions and can resist a range of fungal diseases (Nesbitt and Samuel 1996: 42). During threshing, cereal ears of spelt and emmer will break up into individual spikelets, which contain grains surrounded by tough chaff. At this point a farmer could either store or further process the spikelets of hulled wheat. Storage of hulled wheat in spikelet form is well known archaeobotanically and may serve to protect the grain from insect predation (Nesbitt and Samuel 1996: 52).

In order to dehusk hulled wheat, the spikelets must be pounded and the resulting mixture of freed grain and chaff is then winnowed to separate light weed seeds and larger fragments of chaff from the grain, and then sieved to remove remaining weed seeds and smaller fragments of chaff from the grain. The Thurnham samples exhibit traits of the latter stages of this process. Roughly half of the samples (10022, 10314, 10333, 10346, 10375, 10380, 10381, 10383, and 10398) are primarily made up of smaller fragments of glume bases and rachis internodes with small amounts of weed seeds, which strongly suggests that this material is a sieving by-product from the later medium and/or fine sieving stages of cereal processing (Hillman 1981, 1984). Other samples (10097, 10335, 10336, 10340, 10405 and 10411) are primarily comprised of varying amounts of cereal grain and weed seeds, which could be considered as semi-clean grain, and most likely a fine sieving product (*sensu* Hillman 1984: 131). There are also those samples (10014 and 10015) which contain a fairly even mixture of grain, chaff and weed seeds which could either result from mixed deposition of various cereal crop processing events or could be 'chob', which is the 'coarse light waste brought to the surface [of semi-processed hulled wheat grains in a sieve or flat basket] by agitation and simply scooped off the surface (Hillman 1984: 134).

Finds of charred grain are very common on archaeological sites because heating is involved in several stages of crop processing sequence, as well as in food preparation (e.g. Hillman 1981, 1984, 1985; Jones 1984). In addition to accidental charring events, semi-clean grain could be charred through parching or malting activities on site. Malt is produced by allowing the cereal grain to germinate and then arresting this process at the point where the embryo shoot (coleoptile) is approximately the length of the cereal grain, by heating the germinating grain (Corran 1975, 11-12). Malting has two primary results:

- germination converts the starch stored in the grain to sugars (collectively known as diastase), which yeast can feed on during fermentation (Corran 1975; Hagen 1999: 205-209).
- malting results in a partial breakdown of the structure of the barley grain, which makes it easier to crush (Corran 1975, 12) and easier to digest (Corran 1975, 16).

Once made, malt can be stored for up to one year before use (Corran 1975, 12). In order to make beer or ale, the malt is coarsely ground and mixed with hot water at approximately 65°C in a process known as 'mashing' (Corran 1975, 12). Mashing produces a product known as 'wort' (a brown liquid essentially made of malt sugar) and a by-product of husks of cereal grains, with little or no sugar content. The mashing by-product was often used as a fodder in the Anglo-Saxon period (Hagen 1999, 105). In addition, it is clear that malt can be traded and exchanged as a product (e.g. Hagen 1999, 212-213). Unwanted malting residues could also potentially be of use as a fuel in further cereal processing activities.

Parching of either fully processed cereal grain, or grain still encased in spikelets, is another cereal processing activity which could result in the accidental charring of cereal grain and chaff. In addition to parching grain for malt, parching, was typically believed to be a technique to aid dehusking of hulled wheat. In fact, it actually is more likely to be used to dry grain because a crop was harvested slightly unripe or to harden grain for milling, especially in a rotary quern (e.g. Nesbitt and Samuel 1996: 43, Peña-Chocarro 1996).

Cereal chaff and weeds of cereal crops could be charred either as contaminants of semi-clean cereal grain or through use of such crop processing by-products as fuel (e.g. Hillman 1984, 1985; G. Jones 1984).

4.3 Possible evidence for malting

Sample 10405 (context 15283) produced 325 detached embryos, many of which seemed ‘enlarged’ (i.e. appeared to be beginning to germinate). However, large quantities of cereal grain (mostly without the embryos still intact) and only a few sprouts (or coleoptiles) were recovered from this flot and, therefore, it is not certain that this material actually represents malt. This could simply be an artefact of charring conditions.

Cereal/ large POACEAE sprouts (or coleoptiles) were recovered from 10 of the 17 samples fully analysed and this may potentially suggest the possibility of malting on site. Nevertheless, van der Veen (1989, 305) has argued that malt assemblages ‘would consist almost entirely of grains which had germinated prior to charring and large numbers of detached sprouts or coleoptiles’ and this certainly is not the case for sample 10405 or any other sample analysed.

4.4 Cultivation conditions

The weed/wild plants recovered from these samples most likely arrived in these deposits as cereal crop weeds although it is possible that they could represent gardening waste or some other weeding debris (perhaps in field preparation). Modern agricultural practice, especially through the use of pesticides, means that many of these taxa are rarely seen as weeds of cereal crops today; however, the weed/wild flora assemblage from Thurnham Villa contains species that are regularly found in association with ancient crop processing waste (e.g. Greig 1990; M. K. Jones 1988a: 90; 1988b: 46; Moffett and Smith 1996: 169-170).

Several habitat types are indicated by this flora. Corncockle (*Agrostemma githago* L.) was a common cornfield weed in the past, which is only rarely found in such habitats today (Stace 1997: 174), and it is also likely that the oats (*Avena* sp.), if not cultivated, were also cornfield weeds. Stinking mayweed (*Anthemis cotula*) and scentless mayweed (*Tripleurospermum inodorum*) are typical of arable and/or disturbed ground. In addition, remains of stinking mayweed might indicate heavier soil conditions. Black-bindweed (*Fallopia convolvulus* L.) is common in arable land and waste ground. The common long-headed or prickly poppy (either *Papaver rhoeas* L., *P. dubium* L. or *P. argemone* L. are possible) are also typical of arable land or waste places. Grassland species recovered in these samples include meadow-grass (*Poa* sp.) and cat's-tail (*Phleum* sp.). Finds of buttercup (*Ranunculus acris*/ *repens*/ *bulbosus* sp.), common/ slender spike-rush (*Eleocharis palustris*/ *uniglumis*), club-rush (*Bolboschoenus*/ *Schoenoplectus*), and sedge (*Carex* sp.) in many of the samples indicates damp or even relatively wet soil conditions. The presence of pink (*Dianthus* sp.) in several samples across the different periods also indicates that drier soils probably on the chalk were consistently utilised. The varying soil conditions may reflect that a wide area in the vicinity of Thurnham Roman villa was cultivated, but could also indicate that soil conditions and drainage within individual fields were quite variable.

4.5 Limited evidence for hedgerow or scrub

Remains of hazel (*Corylus avellana*) nutshell fragments in samples 10335, 10340, 10405, 10411 and partially sorted samples 10038 and 10040, along with a single sloe (Prunus spinosa) stone recovered from oven sample 10340, may provide slight evidence for the use of hedgerows or scrub in the vicinity. The process by which these items became charred and included into the assemblage is less clear and these may represent food waste (hazel nutshells or sloe stones disposed of in fires) or fuel waste (hazel nutshells or sloe stones inadvertently included in brushwood fuel).

5 CONCLUSIONS

In general the Thurnham archaeobotanical samples are dominated by cereal crop processing waste comprised of spikelets and glume bases of hulled wheat (dominated by spelt), cereal grain (usually wheat and believed also to be dominated by spelt) and accompanying weeds of crop. The weed/wild flora recovered is highly consistent with ancient weed assemblages from elsewhere in Britain. This weed flora may indicate damp conditions and possibly heavier soils but also include some species typical of lighter soil conditions. Many of these weed/wild taxa (most of which are not identified to species level), however, can grow in a wide range of habitats, so it is not possible to put forward any definitive conclusion on soil conditions. There is slight evidence for hedgerow or scrub in the vicinity, but it is also possible that hazel nutshells and/or the sloe stone could have entered deposits as food waste or accidental inclusions within brushwood fuel.

The uniformity of archaeobotanical results across all of the Roman phases suggests consistent and continual cereal processing activities occurred on site, possibly involving the use of crop processing debris as fuel or the accidental charring of cereals during parching/ malting. Germinated grain and the recovery of 'enlarged' detached embryos may suggest that malting was occurring on site; however, the classic indicators for malt – large quantities of cereal grain sprouts and clearly sprouted cereal grains – were not particularly abundant and, therefore, malt production at Thurnham is still fairly speculative. Waste cereal crop processing material was repeatedly disposed of on site, especially within the enclosure ditches of the early Roman period. Some areas of the site – e.g. the oven, hearth and corndrier deposits – suggest that cereal chaff was frequently used as fuel and this material may be one source for the charred cereal remains recovered in secondary deposits, such as ditches, pits and foundations. Although free-threshing bread/ club wheat (*Triticum aestivo-compactum* Schiem) had been adopted as a crop in Britain by the Roman period, these wheats may not have been grown on a wide-scale until Late Roman or Anglo-Saxon times (Hillman 1981; M. K. Jones 1981). The charred remains assemblage establishes that, at least at this site, hulled wheats, in particular spelt, was the preferred crop throughout the Roman period and villa occupation.

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7 ARCHIVE NOTE ON PARTIALLY STUDIED SAMPLES

Sorting of the flots recommended for full analysis was carried out at the Oxford University Natural History Museum under the general supervision of Ruth Pelling and Mark Robinson (pers. comm. Mark Robinson). Some of the Thurnham Roman Villa flots were used as training material for students and the quality of sorting was therefore variable and of uncertain reliability. Robinson (*pers. comm.*) also took the decision to reduce the number of flots originally recommended by Pelling (2001) for full analysis because they were repetitive of material already sampled. This Appendix is included to provide an archive record of the incomplete and definitely biased results from 6 partially sorted samples, since this material is unlikely to receive further study in future.

The results for the partially studied samples are presented in Table 1 and a summary of the Pelling (2001) assessment results for the remaining 10 unstudied samples are presented in Table 2 below. It was not possible to consider these samples in detail in the analysis. However, it is clear that the general trend for these samples is varying mixtures of cereal grain and cereal chaff, with small quantities of accompanying weeds of crop, which is consistent with the fully analysed samples. It is also clear from the partially sorted samples and the Pelling (2001) assessment results, that spelt is the dominant cereal cultivated (as well as wheat) .

Table 1: Results from the partially sorted samples

CONTEXT NUMBER	**10641**	**11208**	**11093**	**10772**	**11044**	**11085**	
SAMPLE NUMBER	**10024**	**10049**	**10038**	**10040**	**10019**	**10026**	
CONTEXT TYPE	**Ditch**	**Layer**	**Postpipe**	**Layer**	**Layer**	**Corndrier**	
PERIOD	**ERo**	**ERo/MRo**	**LRo**	**MRo(2)**	**LRo**	**LRo**	
PROPORTION SORTED	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	
SAMPLE VOLUME (L)	**20**	**20**	**10**	**20**	**10**	**20**	
FLOT VOLUME (ml)	**250**	**20**	**150**	**100**	**50**	**50**	
SEEDS PER LITRE	**307.7**	**60.2**	**114.7**	**22.0**	**28.8**	**34.8**	
LATIN BINOMIAL							**COMMON NAME**
CEREAL GRAIN							
Hordeum sp.	20	1	2	39	15	-	hulled barley
cf. *Hordeum* sp.	5	-	-	19	4	-	possible hulled barley
Hordeum sp.	6	-	-	-	-	-	barley
Hordeum sp./ *Triticum* sp.	-	-	-	-	-	-	barley or wheat
Triticum dicoccum Schübl.	-	-	-	2	-	-	emmer
Triticum cf. *dicoccum* Schübl.	-	-	-	-	-	-	possible emmer
Triticum dicoccum Schübl./ *spelta* L.	5	-	-	10	-	-	emmer/ spelt
Triticum spelta L.	4	-	-	16	1	-	spelt
Triticum cf. *spelta* L.	1	-	4	13	-	1	possible spelt
Triticum aestivum L./ *durum* Desf./ *turgidum* L.	-	-	-	6	-	-	free-threshing wheat
Triticum sp.	335	22	36	14	23	116	wheat
cf. *Triticum* sp.	-	-	-	-	-	-	possible wheat
Cereal/ Large POACEAE	421	104	111	3	59	111	indeterminate cereal/ large grass
CEREAL CHAFF							
Hordeum sp. – rachis node	46	-	1	3	-	-	barley
Hordeum sp. – awn	-	-	-	-	-	-	barley
cf. *Hordeum* sp. – rachis node	-	-	-	-	-	-	possible barley
Hordeum sp./ *Triticum* sp. – rachis node	5	-	-	-	-	-	barley or wheat
Triticum monococcum L./ *dicoccum* Schübl./ *spelta* L. – glume base	746	182	108	19	43	71	einkorn/ emmer/ spelt
Triticum dicoccum Schübl. – spikelet fork	-	-	-	-	-	-	emmer
Triticum dicoccum Schübl. – glume base	-	-	-	-	-	-	emmer
Triticum cf. *dicoccum* Schübl. – spikelet fork	-	-	-	-	-	-	emmer
Triticum cf. *dicoccum* Schübl. – glume base	-	-	-	-	-	-	emmer/ spelt
Triticum dicoccum Schübl./ *spelta* L. – spikelet fork	-	-	-	-	-	-	emmer/ spelt
Triticum dicoccum Schübl./ *spelta* L. – glume base	-	-	-	-	-	-	spelt
Triticum spelta L. – spikelet fork	89	1	3	-	-	-	spelt
Triticum spelta L. – glume base	1300	180	148	-	36	43	spelt
Triticum spelta L. – glume/ lemma fragments	-	-	-	-	-	-	possible spelt

Key to periods:
ERo = Early Roman c. AD 60 – 120
MRo (1) = Middle Roman (phase 1) AD 120 – 150
MRo (2) = Middle Roman (phase 2) AD 150 – 250
LRo = Late Roman AD 250 – 420

CONTEXT NUMBER	**10641**	**11208**	**11093**	**10772**	**11044**	**11085**	
SAMPLE NUMBER	**10024**	**10049**	**10038**	**10040**	**10019**	**10026**	
CONTEXT TYPE	**Ditch**	**Layer**	**Postpipe**	**Layer**	**Layer**	**Corndrier**	
PERIOD	**ERo**	**ERo/MRo**	**LRo**	**MRo(2)**	**LRo**	**LRo**	
Triticum cf. *spelta* L. – spikelet fork	190	-	2	-	1	2	possible spelt
Triticum cf. *spelta* L. – glume base	-	-	-	2	-	-	possible spelt
Triticum cf. *spelta* L. – glume/ lemma fragments	-	-	-	-	-	-	free-threshing wheat
Triticum aestivum L./ *durum* Desf./ *turgidum* L. – rachis internode	1	-	-	-	-	-	possible free-threshing wheat
Triticum cf. *aestivum* L./ *durum* Desf./ *turgidum* L. – rachis internode	-	-	-	-	-	-	wheat
Triticum sp. – spikelet fork	-	-	-	-	-	-	wheat
Triticum sp. – spikelet base	-	-	-	3	-	-	wheat
Triticum sp. – rachis node	1610	445	289	3	36	117	wheat
Triticum sp. – glume/ lemma fragments	-	-	-	-	-	-	wheat
Triticum sp. – awn	-	-	-	-	-	-	wheat
cf. *Triticum* sp. – rachis internode	-	-	-	-	-	-	possible wheat
Cereal/ Large POACEAE – rachis node	439	246	271	-	37	177	indeterminate cereal/ large grass
Cereal/ Large POACEAE – glume/ lemma fragments	-	-	-	-	-	-	indeterminate cereal/ large grass
Cereal/ Large POACEAE – awn	-	-	-	-	-	-	indeterminate cereal/ large grass
Cereal/ Large POACEAE – culm node	1	-	-	-	-	-	indeterminate cereal/ large grass
COLEOPTILE/ DETACHED EMBRYO							
Cereal/ Large POACEAE – coleoptile	91	3	1	-	2	2	indeterminate cereal/ large grass
cf. Cereal/ Large POACEAE – coleoptile	-	-	5	-	-	-	likely indeterminate cereal/ large grass
Cereal/ Large POACEAE – ? small coleoptile	6	1	24	-	-	-	indeterminate cereal/ large grass
Cereal/ Large POACEAE – detached embryo	26	-	3	-	-	2	indeterminate cereal/ large grass
cf. Cereal/ Large POACEAE – detached embryo	-	-	-	-	-	-	likely indeterminate cereal/ large grass
EDIBLE PULSES							
Vicia faba L.	-	-	-	-	-	-	broad bean/ celtic bean/ horse bean
Vicia sp./ *Pisum sativum* L.	1	-	-	-	2	-	large-seeded vetch/ garden pea
WEED/ WILD PLANTS							
Ranunculus acris L./*repens* L./*bulbosus* L.	5	-	-	-	-	-	meadow/ creeping/ bulbous buttercup
Ranunculus flammula L.	-	-	-	-	-	-	lesser spearwort
Ranunculus sp.	-	-	-	-	-	-	buttercup
cf. *Ranunculus* sp.	-	-	-	1	-	-	possible buttercup
Papaver rhoeas L/ *dubium* L./ *argemone* L.	3	-	2	3	-	-	common/ long-headed/ prickly poppy
Corylus avellana L. – nutshell	-	-	1	1	-	-	hazel
Chenopodium sp.	-	-	1	-	1	-	goosefoot etc.

Key to periods:
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CONTEXT NUMBER	**10641**	**11208**	**11093**	**10772**	**11044**	**11085**	
SAMPLE NUMBER	**10024**	**10049**	**10038**	**10040**	**10019**	**10026**	
CONTEXT TYPE	**Ditch**	**Layer**	**Postpipe**	**Layer**	**Layer**	**Corndrier**	
PERIOD	**ERo**	**ERo/MRo**	**LRo**	**MRo(2)**	**LRo**	**LRo**	
Atriplex sp.	-	-	6	32	-	-	orache
Chenopodium sp./ *Atriplex* sp.	-	-	-	14	-	-	goosefoot/ orache
CHENOPODIACEAE – indeterminate	-	-	1	-	-	-	goosefoot family
CHENOPODIACEAE/ CARYOPHYLLACEAE – indeterminate	-	-	-	-	-	-	goosefoot family/ pink family
Cerastium sp.	17	-	-	-	-	-	mouse-ear
cf. *Cerastium* sp.	-	-	3	-	-	-	possible mouse-ear
Agrostemma githago L.	-	-	-	-	-	-	corncockle
cf. *Agrostemma githago* L.	1	-	-	-	-	-	possible corncockle
cf. *Silene* sp.	-	-	-	-	-	-	possible campion/ catchfly
Dianthus sp.	-	-	-	-	-	-	pink
CARYOPHYLLACEAE – indeterminate	-	-	1	-	-	-	pink family
Polygonum aviculare L.	3	-	1	-	-	-	knotgrass
Polygonum cf. *aviculare* L.	-	-	-	-	-	-	likely knotgrass
cf. *Polygonum aviculare* L.	1	1	-	-	-	-	possible knotgrass
Polygonum spp./ *Rumex* spp./ *Carex* spp.- indeterminate	-	-	-	-	-	-	knotgrass/ dock/ sedge
Fallopia convolvulus (L.) Á. Löve	2	-	1	-	-	-	black bindweed
cf. *Fallopia convolvulus* (L.) Á. Löve	-	-	-	-	-	-	possible black bindweed
Rumex acetosella L.	-	-	-	-	-	-	sheep's sorrel
Rumex spp.	-	-	3	144	-	-	dock
Malva sp.	2	-	-	1	-	-	mallow
Brassica sp.	-	-	-	-	-	-	wild cabbage/ turnip/ mustard
Prunus spinosa L.	-	-	-	-	-	-	sloe/ blackthorn
cf. *Prunus spinosa* L.	-	-	-	-	-	-	possible sloe/ blackthorn
Vicia cf. *cracca* L.	3	-	-	-	-	-	likely tufted vetch
cf. *Vicia cracca* L.	21	-	-	-	-	-	possible tufted vetch
Vicia sativa L.	3	-	-	-	-	-	common vetch
Vicia cf. *sativa* L.	5	-	-	-	-	-	possible common vetch
Vicia sp./ *Lathyrus* sp.	134	-	3	2	5	-	vetch/ tare/ vetchling
cf. *Vicia* sp./ *Lathyrus* sp.	1	-	-	-	-	-	possible vetch/ tare/ vetchling
Melilotus sp./ *Medicago* sp./ *Trifolium* sp.	65	1	1	-	-	-	meliliot/ medick/ clover
cf. *Melilotus* sp./ *Medicago* sp./ *Trifolium* sp.	-	-	-	1	-	1	possible meliliot/ medick/ clover
FABIACEAE – indeterminate pod fragment	-	-	-	-	-	-	pea family
Linum catharticum L.	-	-	-	1	-	-	purging flax
cf. *Linum* sp.	-	-	-	-	-	-	possible wild flax
Scandix pecten-veneris L.	1	-	-	-	-	-	shepherd's needle
cf. *Daucus carota* L.	-	1	-	-	-	-	possible wild carrot
APIACEAE - indeterminate	-	-	1	5	-	-	carrot family

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CONTEXT NUMBER	10641	11208	11093	10772	11044	11085	
SAMPLE NUMBER	10024	10049	10038	10040	10019	10026	
CONTEXT TYPE	Ditch	Layer	Postpipe	Layer	Layer	Corndrier	
PERIOD	ERo	ERo/MRo	LRo	MRo(2)	LRo	LRo	
Veronica hederifolia L.	-	-	-	2	-	-	ivy speedwell
Euphrasia sp./ *Odontites* sp.	9	-	-	-	-	-	eyebright/ bartsia
cf. *Odontites vernus* (Bellardi) Dumort.	-	-	-	1	-	-	possible red bartsia
Rhinanthus sp.	-	-	-	4	-	-	yellow rattle
Lamium sp.	-	-	1	-	-	-	dead-nettle
Galeopsis sp.	-	-	-	-	-	-	hemp-nettle
Prunella vulgaris L.	1	-	-	1	1	-	self-heal
cf. *Prunella vulgaris* L.	5	-	-	-	-	-	possible self-heal
LAMIACEAE - indet.	-	-	-	-	-	-	dead-nettle family
Plantago major L.	-	-	-	-	-	-	greater plantain
Plantago lanceolata L.	-	-	2	-	-	-	ribwort plantain
Galium aparine L.	-	-	-	-	-	-	cleaver
Galium sp.	-	-	1	-	-	-	bedstraw
cf. *Galium* sp.	-	-	-	-	-	-	possible bedstraw
Valerianella dentata (L.) Pollich	8	-	-	-	-	-	narrow-fruited cornsalad
cf. *Carduus* sp./ *Cirsium* sp.	-	-	-	2	-	-	possible thistle
Centaurea sp.	-	-	1	-	-	-	knapweed
cf. *Lapsana communis* L.	1	-	-	-	-	-	possible nipplewort
Anthemis cotula L.	-	-	-	-	1	-	stinking chamomile
cf. *Anthemis cotula* L.	-	-	-	-	-	-	possible stinking chamomile
Tripleurospermum inodorum (L.) Sch. Bip.	61	-	3	-	-	-	scentless mayweed
ASTERACEAE – indeterminate	3	-	1	-	-	-	daisy family
Luzula spp.	-	-	-	2	-	-	woodrush
Eleocharis palustris (L.) Roem. & Schult./ *uniglumis* (Link) Schult.	-	-	-	-	-	-	common/ slender spike-rush
cf. *Eleocharis* sp.	-	-	-	-	-	-	possible spike-rush
Bolboschoenus sp./ *Schoenoplectus* spp.	-	-	-	-	-	-	club-rush
Carex spp.	18	1	3	1	-	1	sedge
cf. *Carex* spp.	-	-	-	-	-	-	possible sedge
CYPERACEAE – indeterminate	-	-	1	-	-	-	sedge family
cf. CYPERACEAE – indeterminate	-	-	-	-	-	-	possible sedge family
cf. *Poa* sp.	-	-	7	-	7	13	possible meadow-grass
Avena sp.	1	-	-	36	1	-	oat
Avena sp. – floret	-	-	1	2	-	-	oat
Avena sp. – awn	-	-	-	+	-	-	oat
Avena sp. – rachis	1	-	1	-	1	1	oat
cf. *Avena* sp.	-	-	-	4	-	-	possible oat
Avena sp./ *Bromus* sp.	54	-	-	-	-	11	oat/ brome

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CONTEXT NUMBER	10641	11208	11093	10772	11044	11085	
SAMPLE NUMBER	**10024**	**10049**	**10038**	**10040**	**10019**	**10026**	
CONTEXT TYPE	**Ditch**	**Layer**	**Postpipe**	**Layer**	**Layer**	**Corndrier**	
PERIOD	**ERo**	**ERo/MRo**	**LRo**	**MRo(2)**	**LRo**	**LRo**	
Phleum sp.	-	-	-	-	2	-	cat's-tail
Bromus sp.	32	-	-	2	-	4	brome
cf. *Bromus* sp.	-	-	-	-	-	-	possible brome
cf. *Danthonia decumbens* (L.) DC.	-	-	-	-	-	-	possible heath-grass
POACEAE – indeterminate caryopsis	78	9	18	15	6	3	grass family
POACEAE – indeterminate rachis	-	-	-	-	-	-	grass family
POACEAE – indeterminate culm node	-	-	-	-	-	-	grass family
POACEAE – indeterminate small caryopsis	-	-	-	-	-	-	grass family
Indeterminate	246	5	71	10	2	19	indeterminate
Indeterminate – flower	4	-	-	-	-	-	indeterminate
Indeterminate – calyx	14	-	3	-	1	-	indeterminate
Indeterminate – bud	1	1	-	-	1	-	indeterminate
Indeterminate – fruit	-	-	-	-	-	-	indeterminate
Indeterminate – thorn	1	-	-	-	-	-	indeterminate
Indeterminate – capsule fragment	-	-	-	-	-	-	indeterminate
TOTAL IDENTIFICATIONS	**6153**	**1204**	**1147**	**439**	**288**	**695**	

Table 2: Assessment results for the unstudied Thurnham villa samples originally recommended for full analysis by Pelling (2001)

Sample	Context	Feature	Period	Sample size (L)	Flot size (ml)	Grain	Chaff	Weeds	Other	Charcoal
10287	15148	Pit fill	ERo	12	100	++	+++	++	-	++
10025	10642	Ditch	ERo	10	150	+++	+++	+++	-	++
10452	15386	Layer	?MRo	20	100	+++	++++	+++	-	+
10310	15201	Layer	?MRo	10	50	++	+++	+	-	-
10328	15201	Layer	?MRo	10	20	+	+++	+	-	++
10414	15214	Layer	MRo(2)	10	100	+++	+	++	+	++
10016	11044	Layer	LRo	40	200	++	+++	+	-	+++
10017	10528	Layer	MRo(2)	35	250	++++	++++	++++	+	+
10018	11049	Corndrier	LRo	18	150	++++	+++	+++	-	+
10023	11083	Layer	LRo	20	100	++	+++	++	+	++

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