SUPPLEMENTARY DATA

Palaeoenvironmental Results

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INTRODUCTION

Two columns were recovered from sections through a watercourse in the southern half of the site, column <66> was taken through an undisturbed section of the channel and <65> was taken through a medieval dump deposit within the same channel. Pollen analysis was carried out on column samples, at 4 cm interval through <66> and spot samples from <65> 0.67 cm and the colluvium/alluvium (GP53, Context [107]) <42> recorded in GA2. The analysis was undertaken to establish whether sub-fossil spores were preserved, if so, to produce a preliminary idea of the vegetation and environment concurrent with the sediments and to address the problem of possible mixing. Well preserved pollen and spores were recovered and analysed which show an interesting change from woodland dominated by lime, oak and hazel to one in which beech was locally prevalent.

Two samples were submitted for radiocarbon dating to Scottish Universities Environmental Research Centre, East Kilbride (SUERC). A bulk sediment sample from 0.47–0.52 m from the base of the watercourse through which column <66> was taken and a sample of beech (*Fagus*) charcoal was recovered from a 20L bulk sample from WW1.

POLLEN METHOD

Pollen extraction followed standard procedures on sub-samples of 1.0 ml volume.[1] The sub-fossil pollen and spores were identified and counted using an Olympus biological research microscope fitted with Leitz optics at magnifications of x400 and x1000. An assessment total of 100 to 150 pollen grains per sample were identified and counted (the pollen sum) for each level. Spores of ferns and other (misc) microfossils were also identified and counted outside of this sum. A standard pollen diagram has been constructed (Fig B1) using *Tilia* and *Tilia* Graph in which percentages have been calculated as follows:

Pollen =	% of total pollen (TP)
Ferns =	% tdlp + sum of spores
Misc =	% tdlp + sum of misc taxa

Pollen taxonomy, in general, follows that of Moore and Webb[2] modified according to Bennett and others.[3] A substantial pollen comparative collection was available. These procedures were carried out in the Palaeoecology Laboratory of the School of Geography, University of Southampton.

RADIOCARBON METHOD

The samples were processed using the acid-base-acid protocol.[4] All the samples were converted to carbon dioxide in pre-cleaned sealed quartz tubes,[5] graphitised as described by[6] and measured by Accelerator Mass Spectrometry (AMS).[7]

The radiocarbon results are given in Table B3, and are quoted in accordance with the international standard known as the Trondheim convention.[8] They are conventional

radiocarbon ages.[9] The error, which is expressed at the one sigma level of confidence, includes components from the counting statistics on the sample, modern reference standard and blank and the random machine error. The calibrated age ranges are determined from the University of Oxford Radiocarbon Accelerator Unit calibration program (OxCal4).

THE POLLEN DATA

Pollen data obtained from samples <42> and <65> are given in Table B1. The more detailed sequence obtained from the stream <66> has been divided into three distinct local pollen assemblage zones (l.p.a.z.) based on the changing pollen flora. Detail of these zones is given in Table B1 below. Pollen was absent in the uppermost sample examined in the mineral sediment at 0.01 m.

TABLE B1 Pollen data obtained from spot samples <65> and <42>.

	0.67 m	**(107)**
Column	<65>	<42>
Trees and Shrubs		
Betula	5	
Ulmus	1	
Quercus	19	24
Tilia		
Fagus		13
Ilex		
Alnus	65	12
Corylus avellana type	5	27
Calluna	2	4
Herbs		
***Ranunculus* type**	1	1
Brassicaceae indet.		1
Sinapis type	1	
Dianthus type	1	2
Chenopodiaceae		4
Rosaceae undiff.		
Filipendula		
Potentilla type		
Persicaria maculosa type	1	2
Polygonum aviculare type	1	1
Rumex	2	3
Mentha type		
Plantago lanceolata	1	7
Scabiosa	1	
***Bidens* type**	6	1
***Anthemis* type**		22
***Centaurea nigra* type**		4
Artemisia		
Lactucoideae	33	50
Poaceae	326	98

Cereal type	5	13
Large Poaceae	9	10
Typha latifolia	1	
Cyperaceae	3	3
Unidentified/degraded	3	
Ferns		
***Dryopteris* type**	3	62
Pteridium aquilinum	55	47
Polypodium	3	47
Pollen total		
Spore total	61	156

TABLE B2 Local pollen zonation of watercourse (WW1)

Column <66> ***l.p.a.z. 3*** 33 cm to 47 cm *Quercus-Fagus*		This upper zone is characterised by a sharp expansion of *Fagus sylvatica* (to 38%) which along with remaining *Quercus* (40–50%) are the dominant tree taxa. In addition are small numbers of those arboreal taxa noted in l.p.a.z 1 with *Prunus* type, *Sorbus* type and *Calluna* also present. *Tilia* is absent. The zone is also characterised by a much greater diversity of herbs (esp the upper sample) in which Cereal type pollen and *Plantago lanceolata* are present. Wetland/fen taxa comprise only small numbers of Cyperaceae. Spores of ferns remain as for preceding l.p.a.z. 1 but with an increase of *Pteridium* in the upper level (to 22%).
l.p.a.z. 2 47 cm to 51 cm *Quercus-Corylus avellana type*	**DATE** AD 658–725 and AD 738–772	Zone dominated by tree and shrub pollen with relatively few herbs. *Quercus* (to 58%) and *Corylus avellana* type (30% at base and declining) are dominant. There are small numbers of *Betula*, *Fraxinus, Ulmus, Carpinus, Tilia, Ilex* and *Alnus*. Herbs comprise largely Poaceae (8%). Spores of *Pteridium*, *Polypodium* and *Dryopteris* type are more important in the basal sample.
l.p.a.z. 1 51 cm to 53 cm *Tilia*	AD 899–919 and AD 963–1028	This basal level is characterised by higher values of *Tilia* (6%) along with dominant *Quercus* (46%) and *Corylus avellana* type (30%). Herbs are dominated by Poaceae (15%) with sporadic occurrences of other taxa including *Plantago lanceolata*. There are substantial numbers of ferns spores including monolete forms; *Dryopteris* type and *Polypodium* and trilete *Pteridium aquilinum*.

THE PAST VEGETATION

The pollen sequence obtained from the stream <66> is more complete and with which samples from the colluvium/alluvium can be compared.

Watercourse <66>

Three local pollen assemblage zones have been recognised which show a transition from lime (*Tilia*) oak (*Quercus*) and hazel (*Corylus*) woodland to one of oak and hazel and subsequently to beech (*Fagus*) with oak.

Initially (l.p.a.z. 1), oak and hazel are dominant but there is evidence of lime (*Tilia*). The latter is now known to have been the dominant or codominant woodland tree during the middle Holocene (Flandrian chronozone II)[10] and into the Neolithic and early Bronze Age periods.[11] This taxon is poorly represented in pollen assemblages due to insect pollination and flowering during summer months when all trees are in leaf and inhibiting its dispersion. Thus, numbers here suggest some important local growth. In subsequent levels, numbers are small and suggest the 'Lime Decline'. This is due to woodland clearance of this tree which usually occurred during the late Neolithic and middle Bronze Age.[12] The substantial numbers of fern spores attest to a wooded environment, especially the polypody fern (Polypodium).

In l.p.a.z. 2, the lime/linden noted above is almost absent after its possible clearance. Oak and hazel remain locally important and absence of herbs suggests a largely closed woodland habitat. Holly (*Ilex*) is markedly underrepresented in pollen assemblages and the sporadic occurrences show its presence as an understorey element which probably flowered on the woodland fringes or in glades. The base of the local pollen assemblage zone has been dated to 1307+\-26 BP (SUERC-47390 and 1046+\-26 BP (SUERC-47391), the latter being charcoal and probably more accurate than the former from the humic fraction of the sediment. This therefore provides evidence dating to the late-Saxon/medieval transition.

Dating

Radiocarbon dates were recovered from the sediment at the base of the watercourse in lieu of any plant macrofossils and a piece of beech charcoal recovered from the same context. The sediment returned a date of *cal AD 658–725* and *cal AD 738–772* (SUERC 47390, 1370±26 Cal BP) and the charcoal a date of *cal AD 899–919* and *963–1028* (SUERC 47391, 1046±26 Cal BP).

The dating clearly shows that the base of the humic silt context (l.p.a.z. 2 and 3), especially associated with a change to beech woodland, is dated to c 1046+/-26 BP; *cal AD 1012*. The basal pollen zone, however, is enigmatic and may be of an earlier date with a hiatus between the sand unit and the overlying humic sands. This is based on the presence of lime (*Tilia*) pollen (see above) in the lower sand levels. However, it is also possible that the lime pollen, being very resilient, may also have remained in these sediments for a long time-span and/or been reworked from older, middle Holocene or Neolithic and early-mid Bronze Age sediment. However, the importance of beech at

this locality is interesting and unusual providing a valuable dated record for its local dominance in the Weald.

TABLE B3 Radiocarbon dates

Laboratory Code	Sample ID	Material and context	$\delta^{13}C$ (‰)	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-47390	ASE_DS_00185	Bulk sediment 0.47–0.52 m	-29.5	1307 ±26	*AD 658–725 and AD 738–772*
SUERC-47391	ASE_DS_00186	*Fagus* charcoal	-25.0	1046 ±26	*AD 899–919 and AD 963–1028*

Samples <65> and <42>

Both of these spot samples show a different and less wooded flora and environment. Only <65> has any significant numbers of trees and these comprise alder (*Alnus*) with little oak. The former is a tree of wetter habitats and probably grew on this site or as floodplain woodland and/or fringing a local river. This importance is not seen in the stream profile <66>. Herbs are dominant with grasses (Poaceae) and Asteraceae types (daisy/dandelion family) being most important. Cereal pollen is also present and as such, an open mixed agricultural, grassland and cultivated habitat is indicated. Given these differences, it is tempting to suggest that this sample is more recent (?historic) age than <66>.

In <42> herb pollen is similarly dominant although the tree and shrub flora has similarities with <65>. That is, oak, and hazel with some beech is present. However, herbs consist of dominant grasses but with a range of other taxa of grassland, notable Lactucoideae (dandelion types) and some plantago and other pollen types. Cereal pollen is also relatively important as with <65> suggesting a mixed agricultural environment at least local to the site. It is possible that this sample and phase is transitional between the upper levels of <66> and a more open habitat of <42>.

Sub-fossil pollen and spores have been recovered which provide palaeoenvironmental and palaeovegetation data pertaining to the late-Saxon and medieval period. Initially, woodland of oak and hazel with lime is shown. This corresponds with a basal sand unit/context and may represent an earlier woodland phase. Subsequently with a change to humic sand/silt the pollen flora shows the dominance of beech woodland on the site along with oak. Evidence for this increased importance of beech is rarely found and this provides a valuable, radiocarbon dated record for the Weald.

THE FINDS

THE POST-ROMAN POTTERY

By LUKE BARBER

Introduction

The evaluation and subsequent excavation at the site recovered 848 sherds of post-Roman pottery, weighing 6890 g, from 90 individually numbered contexts. This total includes 312 sherds (1076 g) from one of 32 environmental residues. An estimated 311 different vessels are represented in the assemblage. This material has been fully quantified by fabric and form for the archive on an excel database. The assemblage is quite variable in condition. Generally sherds tend to be of small to medium size (up to 50 mm across) and although there are a few larger pieces, the trend is more toward small sherds. Abrasion is often difficult to assess due to the surface weathering of sherds as a result of the acidic subsoil at the site. Although most sherds do not appear very fresh this is usually the result of the subsoil and as such most of the assemblage appears to have undergone only limited reworking. A few sherds are however, clearly heavily abraded and there is some obvious residuality in deposits of Phase 1.3 and later.

The vast majority of the assemblage is of Saxo-Norman date, spanning the 12th to early 13th centuries. However, some sherds appear to be of a slightly earlier date, perhaps late 10th to 11th century, while some more developed types can be identified as mid-13th-century. The precise chronological division of the 16 medieval fabrics is difficult due to the fact that context groups are usually small and characterised by undiagnostic body/base sherds. The lack of a comparable assemblage in the immediate area means much reliance has been placed on dating by comparison with groups from south-east Sussex, in the Ouse valley, and others to the south-west, in the Adur valley. The only other period represented is late post-medieval with seven sherds of mid-/late 19th-century date, most of which were recovered from topsoil during the evaluation. The post-medieval material is not considered further here.

The Medieval Assemblage (Fig B2)

The 16 medieval fabrics identified within the assemblage are briefly described below the Sussex county code is given for each in brackets. There is variability within some of the fabric groups — undoubtedly due both to haphazard quantities of tempering being added at a single workshop at any one time and a chronological progression of fining down of fabrics. As such there is a tendency for some of the fabrics to merge and many are probably only minor variants of the main types. This is most notable for the fabrics tempered with fine flint and sand (F3 to F9). At a more general level the fabrics can be grouped into coarse flint (F1), fine flint (F2), fine flint and sand, or sand and fine flint (depending on the proportions (F3 to F9), shell (F10), sandy (F11 to 13) and chalk and flint (F14).

F1 Coarse flint (Sussex: F/AS1) 2/38 g

A low to medium fired fabric tempered with moderate/abundant sub-angular alluvial flint to 1.5 mm in a silty sand-free matrix. Reduced cores with dull orange/grey patchy surfaces. Only two jars/cooking pots are present, both coming from layer [717] (SG 321, WW1). Probably a later 10th- to 11th-century fabric.

F2 Moderate to abundant fine flint (Sussex: F/M1) 110/749 g

A medium fired fabric tempered with moderate/abundant multicoloured flint grits to 0.75 mm (most to 0.5 mm) but no/virtually no sand. Grey to black cores with dull brown to orange surfaces. Only cooking pots are present, usually with thickened,

simple or beaded flaring rims. Probably a late 11th/early 12th- to late 12th- century fabric. Cat No 15.

F3 Moderate to abundant fine flint with sand (Sussex: F/M2) 233/2080 g

A medium fired fabric tempered with moderate/abundant multicoloured flint grits to 0.5 mm (most to 0.25 mm) and sparse to common sand. Grey to orange cores with dull brown to orange surfaces. Cooking pots dominate but there are also two cresset lamps present. Rims types include out-turned simple, flaring beaded and hollow-topped types. This is almost certainly a slightly later, though overlapping, fabric from the same source as F2. Probably a mid-12th- to early 13th- century fabric. Cat Nos 3 to 8, 11, 13, 16 and 17.

F4 Moderate to abundant fine flint with sand (within Sussex: F/M2) 6/63 g

This is essentially the same as F3, but is a reduced version with slightly less sand and mainly white flint grits. Dark grey/black cores with grey to black surfaces. Only cooking pots are present. Probably a mid-12th- to early 13th- century fabric. Cat No 12.

F5 Moderate fine flint with sand (within Sussex: F/M2) 31/503 g

This is a slightly finer variant of F3, with common/moderate flints mainly to 0.25 mm, and sparse to common sand. The fabric merges with F3. Mid-grey to black cores with grey to dull brown surfaces. Only cooking pots are present, with everted rims, one of which has late pie-crust decoration. Probably a mid-12th- to mid-13th-century fabric.
Cat No 1.

F6 Moderate to abundant fine flint with black sand (Sussex: F+q/M6) 8/198 g

A medium fired fabric tempered with moderate/abundant multicoloured flint grits to 0.5 mm (most to 0.25 mm) and common black sand (glauconitic or iron oxide grains). Mid grey core with dull brown/grey surfaces. A single cooking pot with hollow-topped rim is represented in ditch [269] (GP15, BP1). Probably a later 12th- to mid-13th- century fabric. Cat No 9.

F7a Fine/medium sand with common flint (Sussex: F+q/M7) 115/687 g

A medium fired fabric tempered with moderate fine/medium sand and common multicoloured alluvial flint grits to 0.5 mm (most to 0.25 mm). Mid-grey to black cores with dull brown/orange surfaces. Only cooking pots recognised, either with thickened everted or beaded rims. Probably a late 12th- to mid-13th-century fabric. Cat Nos 14 and 22.

F7b Medium/coarse sand with common flint (Sussex: Q+f/c/M5) 7/60 g

A medium fired fabric tempered with moderate/abundant medium/coarse sand, common multicoloured alluvial flint grits to 0.25 mm and rare calcareous inclusions to 1 mm. Mid-grey cores with brown to dull orange surfaces. Only cooking pots recognised but no rims are present. Probably a late 12th- to mid-13th-century fabric.

F7c Fine sand with sparse/common flint (Sussex: F+q/M8) 27/172 g

A very similar fabric to F7a but with notably finer sand content and less flint. Mid-grey to dull orange cores with dull orange surfaces. Only cooking pots recognised, but no rims are present. Probably a 13th-century fabric.

F8 Medium sand with common flint (Sussex: Q+f/M7) 118/1054 g

A medium fired fabric tempered with moderate medium sand and sparse/common multicoloured alluvial flint grits to 0.25 mm. Mid grey to black cores with dull brown/orange surfaces. Only cooking pots recognised, either with everted or beaded rims. Probably a late 12th- to mid-13th-century fabric. Cat No 2.

F9 Fine/medium sand with rare shell (Sussex: Q+s/M5) 5/38 g

A medium fired fabric tempered with moderate/abundant fine/medium sand with very rare inclusions of shell and occasionally flint to 0.25 mm. Closely related to F8. Mid-grey, black or brown cores with grey to dull brown surfaces. Only cooking pots recognised, though no rims are present. Probably a 13th-century fabric.

F10 Shell tempered (Sussex: S/M1) 38/210 g

A low fired fabric tempered with moderate/abundant shell (voids) to 2 mm, but no/virtually no sand. Grey/black cores with brown or dull orange surfaces usually. Only cooking pots are present, with thickened everted or beaded rims. Probably a late 11th- to 12th-century fabric. Cat no 10.

F11 Medium/coarse sand (Sussex: Q/M14) 110/673 g

A medium fired fabric tempered with moderate/abundant medium/coarse sand, with occasional larger quartz inclusions to 1 mm, though there is some variation in coarseness within this grouping. Grey/black cores with grey, brown or dull orange surfaces usually. Only cooking pots are present, with hollow-topped, or more commonly, rectangular clubbed rims. Probably a late 12th-/early 13th- to mid-13th-century fabric. Cat no 19–21 and 23.

F12 Medium/coarse sand (Sussex: Q/M16) 21/149 g

A finer version of F11 tempered with moderate/abundant medium, occasionally with calcareous and/or larger quartz inclusions to 0.5 mm. Grey/black cores with grey, brown or dull orange surfaces usually. Only cooking pots are present, with hollow-topped or thickened everted rims. Probably a 13th-century fabric. Cat no 18.

F13 Fine sand (Sussex: Q/M1a type) 9/59 g

A medium fired fabric tempered with moderate/abundant fine sand. Grey cores with dull orange surfaces usually. Only jugs are present, usually with thin and patchy green glazing, though a sherd from context [464] (GP45, ENC2) has a white slip beneath the glaze. Probably a 13th-century fabric.

F14 Flint, sand and chalk (Sussex: F+c/M4) 1/5 g

A medium fired fabric tempered with moderate/abundant fine flint sand with common/moderate medium/coarse quartz and common chalk to 0.5 mm (the latter notably on the exterior surface of the vessel). Black core with brown surfaces. Probably a 12th-century fabric.

The earliest sherds consist of generally isolated, or residual, featureless bodysherds in flint tempered fabrics (F1 and F2) with no/negligible sand. The flint tempering of F1 is notably larger and sparser than the later finer F2 fabric but the only two sherds consist of oxidised bodysherds (residual in layer [717]). These are very similar to late-Saxon or early Norman types noted both at Lewes and in the Adur Valley[13] but the oxidised nature of the current sherds suggests an 11th-century date to be more likely. The degree of chronological overlap between the F1 and F2 sherds is uncertain. Although the finer flint fabric could be as early as the late 11th century, the few F2 rims present are more in keeping with a 12th-century date. Both reduced and oxidised vessels are present in F2 and this fabric certainly overlaps with the later flint and sand tempered wares (F3 to F9) that probably start appearing around the middle of the 12th century. Certainly the F2 and F3 sherds frequently appear alongside each other in individual deposits. The shell tempered F10 sherds are more in keeping with a Wealden source as identical vessels have been noted at Crawley[14] and they make up a notable proportion of the late 11th- to 12th-century assemblage from Broadbridge Heath.[15]

The vast majority of the assemblage is composed of quite thin-walled and well-fired oxidised vessels in a range of finer flint and sand tempered fabrics. As noted above there is a fining down of tempering, with sand increasing in quantities at the expense of the flint grits. Comparison to better-dated assemblages at Lewes suggest this transition was occurring between the mid-12th and early/mid 13th centuries.[16] Despite the minor variations these fabrics could have come from a single production centre drawing on alluvial grits for tempering. Some of the fabrics have close parallels with the Clay Hill/Early Ringmer wares to the south-east and indeed the hollow-topped rim forms (eg Cat nos 2, 4, 6 and 9) can be closely paralleled at Ringmer.[17] However, similar wares are also well known in the Adur valley area[18] and both fabric and forms can be exactly paralleled at Woodmancote Place.[19] Although it is quite possible that the Clay Hill/Ringmer industry supplied the Adur valley it is perhaps more likely that a more local industry, drawing on a similar suite of tempering agents, was functioning in the Adur valley. Toward the late 12th century the quantity of flint in the fabrics notably decreases as sand begins to dominate. This pattern is seen both in the Ouse valley (at Ringmer) and the Adur valley. By the early 13th century these wares are essentially sand tempered with some flint inclusions (eg F7). The assemblage from Muddleswood, which appears to be of slightly later date (perhaps mid-/late 13th century), is dominated by these wares.[20]

Cooking pots totally dominate the 12th- to early 13th-century ceramics. These have a range of rim types fairly typical of the period: everted, thickened, squared club and hollow-topped (see catalogue). These vessels are nearly completely devoid of decoration: the sum total comprising two cooking pots with slight thumbing (late pie-crusting) on their rims (F5 Cat no 1 and F7a, probably residual in context [483] GP46, B1). The complete absence of incised line decoration is notable. The only other form recognisable in these coarsewares consists of two different simple lamps in F3 (Cat no 5, context [262] and layer [717/719, SG320, WW1).

Over 100 sherds are in the notably coarse F11 sand tempered fabric and these frequently appear alongside the flint/sand tempered wares. Although the unknown degree of residuality makes close dating of the F11 sherds difficult, it is likely they are of the late 12th to mid-13th century. Where present, rims tend to be slightly more developed (eg a triangular club rim — Cat no 19).

The assemblage also contains a number of medium sand tempered sherds (F12) that, could possibly be late 12th-century in date, but are considered more likely to be 13th century. Again, where present, developed rims are more common and the vessels are better finished. The 21 sherds present all appear to be from undecorated cooking pots. Nine sherds in fine oxidised sandy ware (F13) were also recovered. All of these are from jugs with thin and patchy green glaze (though most could be from a single vessel). Only one has more sophisticated decoration — a tiny bodysherd with an underlying white slip to its green glaze (context [464], GP45, ENC2). All of these jugs would be in keeping with Ringmer types of the first half of the 13th century (Barton 1979).

Unfortunately most contexts produced only very small assemblages of pottery, usually between one and five sherds. This has not helped the refinement of fabric chronologies within the assemblage itself and has made the isolation of residual pieces uncertain. However, the largest three contexts (Tab 4), one from phase 1.2 and two from phase 1.3, provide a fairly accurate picture of changing fabric ratios.

Context/ Fabric	Ditch [269], fill [**270**] (GP15,BP1) **Phase 1.2**	Hearth [223], layer [**176**] (GP35, B2) **Phase 1.3**	Cut [**456**] (GP45, ENC2) **Phase 1.3**
F2	12/165 g (CP x2)	-	-
F3	35/327 g (CP x3)	-	3/29 g (CP x1)
F4	3/25 g (CP x2)	-	1/6 g (CP x1)
F5	4/97 g (CP x1)	-	-
F6	8/198 g (CP x1)	-	-
F7a	16/62 g (CP x3)	-	13/98 g (CP x2)
F7c	-	23/147 g (CP x1)	-
F8	-	11/46 g (CP x2)	2/14 g (CP x1)
F10	10/33 g (CP x2)	-	5/12 g (CP x1)
F11	-	7/94 g (CP x4)	12/162 g (CP x1)
F12	-	-	2/6 g (CP x1)
F13	-	-	1/5 g (J x1)
Totals	**88/907 g (CP x14)**	**41/287 g (CP x7)**	**39/332 g (CP x8; J x1)**

TABLE B4 Quantification of the three largest pottery groups from the site by number of sherds/weight and estimated number of vessels (CP – cooking pot; J – jug).

The assemblage from ditch [269] gives perhaps the best glimpse of a typical phase 1.2 group that does not appear to contain significant residual or intrusive material. The presence of the F2 flinty and F10 shelly fabrics could represent residual sherds from the first half of the 12th century, but the freshness suggests they probably represent contemporaneous vessels in use in the second half of the century, but perhaps not post-dating 1175. The assemblage from layer [176] (Tab 4) is totally dominated by the sand and flint fabrics F7c and F8, along with the coarse sand F11 fabric. The absence of the earlier flint and sand fabrics is notable and together suggests a date between 1175/1200 and 1225. The assemblage from cut [456] is more mixed and there is clearly a low, but significant, residual element in the group (eg F3, F4 and F10 for sure). The sand and flint F7a and F8 may well be an older-style contemporaneous vessels, but the notable quantity of the sandy wares (F11 to F13), including a single sherd of glazed jug, suggests a date in the first half of the 13th century.

Catalogue

Phase 1.2 contexts

1. Cooking pot with slightly thickened everted rim on which is light thumbing. Mid-grey core with grey brown interior and orange brown exterior surfaces. Fabric 5. Ditch [172], fill [173] (SG 272, R2).
2. Cooking pot with everted hollowed rim. Mid-grey core with orange brown surfaces. Sooting on rim. Fabric 8. Sump [133], fill [134] (SG 254, D1).
3. Cooking pot with everted thickened rim. Mid-/dark grey core with orange brown surfaces. Sooting on rim. Fabric 3. Ditch [259], fill [260] (SG 191, BP1).
4. Cooking pot with everted hooked rim. Mid-/dark grey core with orange brown surfaces. Sooting on rim. Fabric 3. Ditch [261], fill [262] (SG 193, BP1).
5. Cresset lamp with simple rim. Black core with dark grey/black to orange brown patchy surfaces. Internal sooting. Fabric 3. Ditch [261], fill [262] (SG 193, BP1). Remains of a virtually identical lamp were recovered from [717]/[719].
6. Cooking pot with everted thickened hollowed rim. Dull orange core with dull orange surfaces with light grey patches. Notably worn. Fabric 3. Ditch [269], fill [270] (SG 194, BP1).
7. Cooking pot with everted slightly beaded rim. Dull orange core with dull brown orange surfaces. Fabric 3. Ditch [269], fill [270] (SG 194, BP1).
8. Cooking pot with everted flat-topped rim. Dark grey/black core with dark grey interior and dull brown orange exterior surfaces. Fabric 3. Ditch [269], fill [270] (SG 194, BP1).
9. Cooking pot with lid-seated rim. Mid-grey core with dull orange brown surfaces. Slight external sooting. Fabric 6. Ditch [269], fill [270] (SG 194, BP1).
10. Cooking pot with squared everted rim. Dark grey/black core with dull orange brown interior and grey brown exterior surfaces. Slight external sooting. Fabric 10. Ditch [281], fill [282] (SG 171, FS2).
11. Cooking pot with squared thickened everted rim. Light grey core with dull brown surfaces. Fabric 3. Ditch [281], fill [282] (SG 171, FS2).
12. Cooking pot with squared, slightly hollowed club rim. Mid-grey core with mid-grey interior and dull orange brown exterior surfaces. Fabric 4. Pit [362], fill [361] (SG 107, FS2).

13. Cooking pot with rounded club rim. Mid-grey brown core with dull orange brown surfaces. External sooting. Fabric 3. Ditch [386], fill [385] (SG 167, FS2).
14. Cooking pot with thickened squared everted rim. Dark grey core with dull orange surfaces. Fabric 7a. Layer [716], feature [739] (SG 320, WW1).
15. Cooking pot with thickened everted rim. Dark grey core with dull orange surfaces. Some sooting on rim. Fabric 2. Layer [716], feature [739] (SG 320, WW1).
16. Cooking pot with hollowed beaded rim. Dark grey core with dull orange surfaces. Some external sooting. Fabric 3. Layer [717], feature [739] (SG 320, WW1).
17. Cooking pot with hollowed hooked rim. Mid-grey core with dull orange surfaces. Exterior notably abraded. Fabric 3. Layer [717], feature [739] (SG 320, WW1).

Phase 1.3 contexts

18. Cooking pot with slightly hollowed everted rim. Light grey core with mid-grey surfaces. Fabric 12. Ditch [459], fill [460] (SG 138, FS2).
19. Cooking pot with tapering club rim. Mid-grey/brown core with dull brown surfaces. Slight external sooting. Fabric 11. Layer [176], hearth [223] (SG 264, B2).
20. Cooking pot or pipkin with up-right lid-seated rim. Dark grey core with dull orange surfaces. Fabric 11. Ditch [206], fill [204] (SG 284, B1).
21. Cooking pot with flat-topped club rim. Dull orange throughout. Fabric 11. Ditch [206], fill [204] (SG 284, B1).
22. Cooking pot with everted beaded rim. Dark grey core with dull orange surfaces. External sooting. Fabric 7a. Ditch [206], fill [205] (SG 284, B1).
23. Cooking pot with rectangular club rim. Mid-grey throughout. Fabric 11. Context [456] (SG 154, ENC2).

Conclusions

Although the pottery hints at some activity on the site between 1050 and 1150 the main onset appears to have occurred around the middle of the 12th century or shortly thereafter. Activity appears to stay at a fairly constant level until decline set in, perhaps from around 1225. The quantities of pottery definitely post-dating this are low, but suggest activity perhaps continued until the middle of the 13th century at which point the site was abandoned. As such a relatively short-lived period is represented. The pottery is all locally sourced from the adjoining valleys and indeed the Weald, much of this probably being transported, at least in part, by the river systems. The lack of regional or imported vessels is not unusual in the Weald and their absence is not necessarily an indicator of low status. However, although the early date of the main occupation is before glazed jugs became common in the area, the limited range of vessels and their generally utilitarian nature would certainly be in keeping with a low-status agricultural context.

ANALYSIS OF CHARRED WOOD REMAINS

By Dawn Elise Mooney

Introduction and Methods

This report summarises the findings of an analysis arising from assessment of environmental samples from excavations at the Bolnore Village Development, Haywards Heath, West Sussex. Following assessment, analytical work was recommended for charcoal remains present in samples from deposits dating to the medieval occupation and land-use at the site. This aimed to clarify the range of woody taxa present in fourteen samples, with a view to characterising environments exploited for fuel wood procurement throughout the occupation of the site, as well as assessing changes in firewood selection and woodland management practices over time. Charred wood remains from the following samples were analysed from the site:

Phase 1.2 – 12th century
<23>, ditch [269]; <28>, post hole [370]; <9>, <74>, ditch [146]; <35> charcoal production feature [598]; <17>, ditch [172]

Phase 1.3 – 13th century
<18>, <19>, ditch [206]; <20>, ditch [211]

Unphased
<56>, pit [713]; <3>, pit [25/004]; <1>, <7>, pit [77/004]

One hundred charcoal fragments (or the total number of fragments >4 mm if less than 100) recovered from the heavy residue of each sample were fractured along three planes (transverse, radial and tangential) according to standardised procedures.[21] Specimens were viewed under a stereozoom microscope for initial grouping, and an incident light microscope at magnifications up to x400 to facilitate identification of the woody taxa present. Taxonomic identifications were assigned by comparing suites of anatomical characteristics visible with those documented in reference atlases,[22] and by comparison with modern reference material held at the Institute of Archaeology, University College London. Identifications have been given to species where possible, however genera, family or group names have been given where anatomical differences between taxa are not significant enough to permit satisfactory identification. Where identifications were uncertain due to poor preservation or limited size of charcoal specimens the identification is preceded by cf., denoting 'compares with'. Nomenclature used follows Stace.[23]

Results

Preservation

In general the charcoal assemblages analysed comprised a moderate to large number of fragments. The preservation of these was poor to fair, with very poor preservation in some samples. The charcoal was often abraded and in some cases also rather friable, and all contexts showed evidence of sediment concretion and infiltration indicative of fluctuations in ground water level. The often poor preservation, along with distortion to the anatomical structure of the wood during charring, led to a proportion of the fragments analysed being unable to be identified. The results of the taxonomic identification of charcoal, along with the quantity of unidentifiable fragments in each sample, are recorded in Appendix 1.

Summary of Recorded Taxa

The charcoal assemblage was entirely dominated by hardwood taxa. The anatomical structure of the charcoal fragments analysed was consistent with the following taxa:

Aquifoliaceae: *Ilex aquifolium* (holly)
Betulaceae: *Alnus* sp. (alder), *Betula* sp. (birch), *Corylus avellana* (hazel)
Caprifoliaceae: *Lonicera* sp. (honeysuckle)
Fagaceae: *Quercus* sp. (oak), *Fagus sylvatica* (beech), *Castanea sativa* (sweet chestnut)
Oleaceae: *Ligustrum vulgare* (wild privet)
Rhamnaceae: *Rhamnus cathartica* (common buckthorn)
Rosaceae: *Rosa* sp. (rose), *Prunus* sp. (cherry/blackthorn), Maloideae subfamily (see below)
Salicaceae: *Salix* sp. (willow), *Populus* sp. (poplar)

In some cases, the anatomical differences between genera are not significant enough to conclusively identify wood to genus level. For this reason, wood of the Salicaceae

family is referred to here as willow/poplar, and privet and honeysuckle are not individually identified. Taxa of the Maloideae subfamily, which includes *Crataegus monogyna* (hawthorn), *Malus* sp. (apple), *Pyrus* sp. (pear), and *Sorbus* sp. (rowan, service and whitebeam), are not distinguished from one another. In some cases, fragments of Betulaceae charcoal were too small or poorly preserved to distinguish between hazel and alder, and in these cases these identifications are noted as hazel/alder. In the following text, taxa are referred to by their English common names, with the exception of Maloideae taxa which are given their subfamily name.

Phase 1.2 (12th century)

Land-use BP1

A single sample was analysed from the fill of ditch [269], defining building plot BP1. The charred wood remains consisted mostly of beech charcoal, with a substantial quantity of oak also present. Rose, cherry/blackthorn, hazel, and birch charcoal fragments were also recorded.

Land-use FS2

Land-use FS2 was represented in the charcoal analysis by four samples. Three samples were analysed from the field system ditches, from the upper and lower fills of ditch [146] and the single fill of ditch [468]. While the fills of ditch [146] were dominated by beech with a smaller component of oak and a few fragments of cherry/blackthorn, approximately even quantities of oak and beech were observed in ditch [468] along with Maloideae, cherry/blackthorn, hazel and possible holly. A further assemblage from the fill of posthole [370] was composed almost entirely of oak, with a very small quantity of hazel/alder charcoal also recorded.

Land-use OA5

A single sample from the possible charcoal production feature in land-use OA5 produced a varied assemblage of charcoal composed primarily of beech but also containing significant quantities of oak and cherry/blackthorn charcoal, along with Maloideae, alder, privet/honeysuckle and willow/poplar fragments.

Land-use R2

The single sample analysed from this land-use originated from the fill of ditch [172], and was dominated by oak charcoal, with beech and cherry/blackthorn also present.

Phase 1.3 (13th century)

Land-use B1

Three samples from ditches [206] and [211] around building B1 produced varied assemblages, although these were again dominated by oak and beech. Fragments of sweet chestnut, Maloideae, cherry/blackthorn, hazel, alder, birch and common buckthorn were also present. A substantial proportion of the remains from these samples consisted of roundwood fragments, especially of hazel and alder, however these were not sufficiently well-preserved or complete to allow for the observation of any patterns in roundwood diameter or number of growth rings present.

Unphased

Four undated samples, from the fills of pits [713], [25/004] and [77/004] produced assemblages consisting almost entirely of mature oak charcoal, with a very small quantity of hazel/alder also recorded.

Discussion

Phase 1.2 (12th century)

The majority of the charcoal assemblages analysed from the 12th-century deposits originate from ditches, as well as a single post hole. As these contexts do not represent primary, in situ burning events, the remains contained therein are likely to represent amalgams of material from multiple burning events related to a variety of domestic and industrial activities. In addition to this, these assemblages are likely to have built up over substantial periods of time, resulting both from dumping events and from accidental inclusion of burnt material from hearths within the deposits. As such, the remains from the ditches and post hole in land-use FS2, and the ditches in land-uses BP1 and R2 can only contribute to a discussion of the wider use of wood as fuel at the site, rather than fuel selection for specific purposes.

As Figure B3 shows, the vast majority of the charcoal remains from the 12th-century deposits were identified as oak and beech, with other taxa comprising less than 10% of the assemblage. Beech, the most frequent taxon in the assemblage, is found on well drained sandy soils and as such would have been present in local woodlands. This seems to correlate with the increase in beech recorded in the pollen sequence which probably occurred post-11th century. Beech, along with oak, is considered a valuable timber tree but also makes an excellent fuel wood, and the predominance of these taxa in the assemblage may represent the specific selection of these woods for use as fuel. The taxa comprising the assemblage indicate the acquisition of firewood from oak- and beech-dominated deciduous woodland, although other habitats are also represented. Maloideae, cherry/blackthorn, hazel and holly may have grown as underwood in oak and beech woodlands, however, they may also represent the utilisation of woodland margin and hedgerow environments for fuel procurement. Wild rose and wild privet/honeysuckle are also likely to derive from hedgerows. Birch wood may originate from more open wooded areas, and the presence of alder and willow/poplar also indicates the exploitation of damp woodland or wetland margins, possibly those growing around the edge of the watercourse. Considering the value of beech and oak as timber trees, their presence in the assemblage in such a large quantity indicates that during the 12th century these taxa are likely to have been abundant in the landscape which is supported by the pollen evidence recovered from the site.

Although most of the charred wood remains from the 12th-century deposits represent secondary deposition of burnt material, the exception to this is the charcoal making mound or clamp in land-use OA5. A wide variety of taxa were represented in this assemblage, although beech and oak were dominant. These woods, along with alder which was also present, are known to be well-suited to charcoal production,[24] and as such are likely to have been specifically selected for this purpose. When burnt, charcoal emits approximately twice the amount of heat as 'fresh' wood, and as such was the preferred fuel for industrial activities such as metalworking and smithing. Ironworking activity on Britain expanded considerably during the 13th to 15th

centuries, and this placed increased pressure on woodlands, resulting in the introduction of charcoal burning under license in the 13th century. By the 16th century, charcoal production in Kent and Sussex was regulated so that wood for charcoal making could only be procured from coppiced woodland.[25] The charcoal clamp at Bolnore predates this regulation, and this can be seen in the assemblage in the presence of mature wood of all taxa rather than roundwood fragments. The range of taxa recovered from the charcoal clamp is comparable with other sites in the region, such as London Road, Crawley,[26] and the combination of oak and beech for charcoal production appears to have been specifically chosen for this purpose.

Phase 1.3 (13th century)

The charcoal assemblage derived from the ditches surrounding building B1 is likely to be representative of the deposition of domestic waste, and as such contains material resulting from a variety of burning events. In contrast with the earlier 12th-century deposits, Figure B4 shows that the dominance of beech and oak is less in this period, with these taxa comprising just under 60% of the assemblage as opposed to over 90% in the earlier deposits. The range of taxa recorded were similar, however the proportions suggest a shift towards greater exploitation of underwood and hedgerow taxa rather than the use of large timber trees. This suggests that by this period the pressure on woodlands for the production of charcoal and timber for construction purposes resulted in wood from taxa other than oak and beech being more widely used as fuel. This fuel is likely to have been used in the form of faggots: roundwood from underwood and/or coppiced trees bound together with smaller branches of taxa more commonly used for timber. By this period, the majority of wood used as domestic fuel would have derived from managed and coppiced woodlands,[27] and the presence of substantial quantities of roundwood fragments in these deposits, which was not observed in the 12th-century assemblage, is likely to be indicative of this practice.

Unphased

The four undated pit fill samples are again likely to derive from amalgams of fuel remains from multiple burning events, however the charcoal assemblage from these pits is starkly different from the other assemblages analysed. The assemblage from the unphased pits was almost entirely composed of oak charcoal, with a very small quantity of hazel/alder also present. Oak was a common tree in the woodlands of this region during the medieval period,[28] and throughout history has been specifically selected both as timber and as fuel both for burning and for charcoal production. The almost complete predominance of oak in these pits suggests that they are linked to an activity for which oak was chosen as a specific fuel, such as ironworking, however no industrial debris was recovered from the samples,[29] and it is therefore not possible to identify the source of the charred wood remains.

Conclusion

The charcoal assemblage from Bolnore indicates that throughout the occupation of the site fuel wood was procured from oak- and beech-dominated deciduous woodland. This is supported by the pollen assemblage recovered from the watercourse, which indicates an increase in beech trees at the site as well as an oak-hazel dominated woodland. In the 13th century, there was a shift towards the use of a

wider variety of woody taxa, suggesting that woodland decline and pressure on beech and oak for timber and charcoal production drove households to procure domestic fuel from underwood taxa in coppiced or otherwise managed woodlands. This hypothesis is supported by the increased frequency of roundwood fragments in the 13th-century deposits, although this may be biased by the derivation of this assemblage from domestic waste rather than from a wider range of burning events. Charcoal production at the site in the 12th century also relied on oak and beech, with other taxa such as alder and cherry/blackthorn utilised in smaller quantities. Large quantities of oak charcoal in undated pits may be indicative of industrial activity; however the uncertainty surrounding these deposits precludes further examination of the derivation of the assemblage.

APPENDIX 1

Results of taxonomic identification of charred wood remains (r = roundwood present).

Phase	**Sample No**	**Context**	**Parent Context**	**Land-use**	**Feature Type**	**Taxonomic Identifications**	*Quercus* sp.	*Fagus sylvatica*	*Castanea sativa*	Rosaceae cf. *Rosa* sp.	cf. Maloideae group	Prunoideae *Prunus* sp.	cf. *Corylus avellana*	*Alnus* sp.	*Betula* sp.	*Ligustrum vulgare/ Lonicera*	*Corylus/Alnus*	cf. *Ilex aquifolium*	cf.*Rhamnus catharticа*	*Salix/Populus*	indet. Distorted
1.2	23	270	269	BP1	Ditch		15	61	-	2	-	3	4	-	6	-	-	-	-	-	9
1.2	28	369	370	FS2	Post hole		95	-	-	-	-	-	-	-	-	-	3	-	-	-	2
1.2	9	140	146	FS2	Ditch		14	81	-	-	-	4	-	-	-	-	-	-	-	-	1
1.2	74	141	146	FS2	Ditch		14	81	-	-	-	-	-	-	-	-	-	-	-	-	4
1.2	35	469	468	FS2	Ditch		41	37	-	-	1	6	2	-	-	-	-	1	-	-	12
1.2	53	598	598	OA5	Charcoal clamp		21	56	-	-	1	18	-	1	-	3	-	-	-	1	5
1.2	17	173	172	R2	Ditch		33	8	-	-	-	12	-	-	-	-	-	-	-	-	7
1.3	18	204	206	B1	Ditch		35r	17	3	-	1	5	13r	7r	2	-	15r	-	-	-	1
1.3	19	205	206	B1	Ditch		47	6	-	-	4	13	10r	-	2	-	8r	-	-	-	10
1.3	20	212	211	B1	Ditch		10	58	-	-	-	13	-	-	6	-	1r	-	1	-	16
U/P	56	703	713	-	Pit		100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U/P	3	25/006	25/004	-	Pit		99	-	-	-	-	-	-	-	-	-	1	-	-	-	-
U/P	1	77/004	77/004	-	Pit		96	-	-	-	-	-	-	-	-	-	2	-	-	-	2

U/P	7	77/005	77/004	-	Pit		100	-	-	-	-	-	-	-	-	-	-	-	-	-

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Abbreviations
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FIGURE CAPTIONS

FIG B1
Pollen diagram. *Drawing by Dr Rob Scaife.*

FIG B2
Medieval Pottery. *Drawing by F Griffin. © Archaeology South-East, UCL.*

FIG B3
Taxa identified in the analysis of charred wood remains from Phase 1.2. *Drawing by Dawn Elise Mooney © Archaeology South-East, UCL.*

FIG B4
Taxa identified in the analysis of charred wood remains from Phase 1.3.
Drawing by Dawn Elise Mooney © Archaeology South-East, UCL

TABLE CAPTIONS

TABLE B1 Pollen data obtained from spot samples <65> and <42>.
TABLE B2 Local pollen zonation of watercourse (WW1)
TABLE 3 Radiocarbon dates
TABLE 4 Quantification of the three largest pottery groups from the site by number of sherds/weight and estimated number of vessels (CP – cooking pot; J – jug).

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[1] Moore and Webb 1978; Moore et al 1991.
[2] 1978.
[3] 1994.
[4] Stenhouse and Baxter 1983.
[5] Vandeputte et al 1996.
[6] Slota et al 1987.
[7] Xu et al 2004.
[8] Stuiver and Kra 1986.
[9] Stuiver and Polach 1977.
[10] Birks et al 1975; Birks 1989.
[11] Moore 1977; Greig 1982; Scaife 1980.
[12] Waller 1993; Scaife 2000; 2003.
[13] Barber forthcoming; Gardiner 1990.
[14] Barber 2008, Fabric 9.
[15] Barber in prep.
[16] Barber 2010; forthcoming.
[17] Hadfield 1981.
[18] Gardiner 1990; 1997; Holden 1980.
[19] Barber 1999.
[20] Butler 1994.
[21] Gale and Cutler 2000.
[22] Hather 2000; Schoch et al 2004.
[23] 1997.
[24] Taylor 1981.
[25] Gale 2001.
[26] Ibid
[27] Rackham 1990.
[28] Gale 2001.
[29] Le Hégarat 2011.