WINCHESTER
A CITY IN THE MAKING

Archaeological excavations between 2002 – 2007
on the sites of Northgate House, Staple Gardens and the former Winchester Library, Jewry St

Section 16

Wood Charcoal
by Dana Challinor
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Introduction

The excavations at Northgate House and Winchester Discovery Centre produced a large number of samples, which were assessed by Carruthers and Pelling (OA unpubl. assessment reports). Wood charcoal was abundantly and well preserved from a range of features dating from the Roman to the post-medieval periods. This report presents the results of the analysis of 20 samples, the majority of which were selected from phases 4 and 5; the late Saxon (AD850-1050) of which two phases are represented (phases 4.1 and 4.2) and the Anglo-Norman (AD1050-1225). A couple of medieval (AD1225-1550) samples were included for comparison. The aims of the charcoal analysis were to provide evidence for the type and character of fuelwood used, the exploitation of woodland resources and managed woodland and any temporal changes over the phases represented.

Methodology

Twenty fragments from each sample were selected for identification, ten from the >4 mm fraction and ten from the >2 mm fraction. The charcoal was fractured and sorted into groups based on the anatomical features observed in transverse section at X7 to X45 magnification. Representative fragments from each group were then selected for further examination in longitudinal sections using a Meiji incident-light microscope at up to X400 magnification. Identifications were made with reference to Schweingruber (1990), Hather (2000) and modern reference material. The maturity of the wood was noted where possible. This method of analysis was adopted to provide a general species list for each phase, and non-oak or clearly different fragments were deliberately selected, so it must be noted that it provides neither a complete taxonomic list nor an accurate quantification of each species. However, it was possible to gauge obvious trends in the quantity of a taxon within a sample, for instance when samples were dominated by oak.
Notes on identification

The results by fragment count are given in Tables 1-4. Classification and nomenclature follow Stace (1997). Thirteen taxa were positively identified. The taxonomic level of identification varies according to the anatomical similarity between genera. Most of those given to species level are based upon the likely provenance and period, ie where a genus is represented by a single species.

FAGACEAE: *Fagus sylvatica* L., beech; *Quercus* sp., oak.

BETULACEAE: *Betula* sp., birch; *Alnus glutinosa* Gaertn., alder; *Corylus avellana* L., hazel.

SALICAEAE: *Salix* sp., willow or *Populus* sp., poplar; rarely possible to separate on anatomy.

ROSACEAE: Amygdaloideae, subfamily including *P. spinosa* L., blackthorn, *P. avium* L., wild cherry, *P. padus* L., bird cherry and *P. domestica*, plum. Two species were represented in the Winchester assemblages, *P. spinosa* and *P. avium*, which were distinguished by their variations in ray width.

Maloideae, subfamily including *Pyrus* sp., pear; *Malus* sp., apple; *Sorbus* sp., rowan/service/whitebeam and *Crataegus* sp.(hawthorn); all are anatomically similar and were not distinguished.

CELASTRACEAE: *Euonymus europaeus* L., spindle.

AQUIFOLIACEAE: *Ilex aquifolium* L., holly.

ACERACEAE: *Acer campestre* L., field maple

OLEACEAE: *Fraxinus excelsior* L., ash.

The description of the samples is presented below by phase.
Late Saxon: Phase 4.1

Property BW 2
Two samples from this phase were examined. Context NH4712 came from a pit with metalworking evidence (kiln fragments and hammerscale) and produced an assemblage dominated by oak (*Quercus*), with a fair amount of heartwood present. A few pieces of hazel (*Corylus avellana*), including roundwood fragments were also recorded. Sample NH551, context NH4711, from the same feature was also dominated by oak, but the charcoal was more fragmented. In contrast the burnt layer NH4556, which came from a charcoal spread related to a hearth and from probable domestic waste, produced a more mixed assemblage of oak, alder (*Alnus glutinosa*), hazel, willow/poplar (*Salix/Populus*), hawthorn group (Maloideae) and holly (*Ilex aquifolium*).

Property BW4
An occupation layer (NH3494) with evidence of domestic burning was examined from BW4. This sample produced a mixed assemblage, with lots of oak and hazel, and a few fragments of hawthorn group, field maple (*Acer campestre*) and ash (*Fraxinus excelsior*).

<table>
<thead>
<tr>
<th>Property</th>
<th>Feature type</th>
<th>BW 2</th>
<th>BW 2</th>
<th>BW 4</th>
<th>BW 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feature number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feature type</td>
<td>Pit</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Context number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Quercus sp.</strong></td>
<td>oak</td>
<td>15h</td>
<td>9h</td>
<td>7s</td>
<td>4s</td>
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<tr>
<td><strong>Alnus glutinosa</strong></td>
<td>Gaertn.</td>
<td>alder</td>
<td></td>
<td>2</td>
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<tr>
<td><strong>Corylus avellana</strong></td>
<td>L.</td>
<td>hazel</td>
<td>5r</td>
<td>1r</td>
<td>7r</td>
</tr>
<tr>
<td><strong>Populus/Salix</strong></td>
<td>poplar/willow</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maloideae</strong></td>
<td>hawthorn group</td>
<td>5r</td>
<td>4r</td>
<td>3r</td>
<td></td>
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<tr>
<td><strong>Ilex aquifolium</strong></td>
<td>L.</td>
<td>holly</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acer campestre</strong></td>
<td>L.</td>
<td>field maple</td>
<td>1r</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Fraxinus excelsior</strong></td>
<td>L.</td>
<td>ash</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

r=roundwood; s=sapwood; h=heartwood

*Table 1: Charcoal from phase 4.1*
**Property BW5**

A lens of charcoal in an occupation deposit at the south end of the tenement, NH2424 may represent mixed domestic and metalworking debris, since a large fragment of a smithing hearth was found in an associated deposit. The charcoal comprised mixed taxa, with oak, hazel, hawthorn group, field maple and ash. All of the hazel came from small diameter roundwood. In contrast to the smithing associated deposit in BW 2 (NH4712), oak was not dominant.

**Late Saxon: Phase 4.2**

**Property BW 2**

An assemblage from occupation layer (NH4217) overlying floor surface NH4225 appeared to comprise mostly oak, but several other taxa were identified, including hazel, hawthorn group and ash. Fragments of oak and ash sapwood were noted and the hazel came from small diameter roundwood.

**Property BW 4**

A sample of domestic debris from an occupation layer (NH3186) associated with substantial chalk floors in BW 4 produced a mixed assemblage with beech, oak, hazel, hawthorn group, blackthorn (*Prunus spinosa*) and ash. The blackthorn and hazel came from roundwood. This was the only Saxon sample to contain beech charcoal.

**Property BW 5**

Context NH2377 came from one of the large sub-rectangular ‘cess’ pits in group NH8598. Some of these pits contained fragments of smithing hearths so the origin of the charcoal may have been from metalworking, or mixed with domestic debris. The charcoal assemblage appeared to be mainly oak, including some very large fragments, with heartwood, sapwood and small branchwood represented. Three other species, mostly from roundwood, were noted - hazel, hawthorn group and field maple. The dominance of oak in this sample may relate to metalworking activities, but large oak fragments have
been recovered from other Saxon cess pits, where it has been suggested that the charcoal may have been deliberately deposited to help mask odours (Gale 2005).

<table>
<thead>
<tr>
<th>Property</th>
<th>BW 4</th>
<th>BW 5</th>
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<th>BE 2</th>
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<td>Slumped Floor</td>
<td>Occupation layer</td>
<td>Hearth</td>
<td>Pit</td>
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<td>CC1397</td>
<td>CC2125</td>
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<td>NH3186</td>
<td>NH2377</td>
<td>CC1354</td>
<td>CC1420</td>
<td>CC2360</td>
<td>CC2290</td>
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<td>Sample number</td>
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<td>NH180</td>
<td>CC134</td>
<td>CC138</td>
<td>CC261</td>
<td>CC251</td>
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</tbody>
</table>

**Table 2: Charcoal from phase 4.2**

**Property BE 2**

Two samples from this structure were from slumped floor/occupation deposits. Context CC1354 was thought to belong to layers of slumped floors over the top of pit CC1352. Scorching evidence indicates that the deposits were associated with a hearth and represent domestic activity. The sample from context CC1420 came from a similar deposit slumped over pit CC1397. The taxonomic composition of these samples was extremely similar, although 138 contained more oak. Both produced oak, hazel, alder, hawthorn group field maple and ash, with a significant component of roundwood fragments.

**Property BE 4**

The two samples from BE 4 dating to phase 4.2 derived from domestic activities associated with pits in group CC7018. Context CC2360 was directly associated with hearth debris and the assemblage contained a significant component of oak, whilst...
CC2290 was more mixed. Both samples contained hazel, alder, hawthorn group and ash. CC2360 also produced two small roundwood fragments of spindle tree (*Euonymus europaeus*) and blackthorn.

**Anglo-Norman: Phase 5**

*Property BW 2*

Two samples (contexts NH4186 and NH4189) from group NH8539 were from floor debris of probable hearth rake-outs, and presumably represent domestic waste. The assemblages were similar in composition, dominated by beech (*Fagus*) and containing oak, hazel and hawthorn group, including many roundwood fragments.

*Property SE 1*

Pit NH5192 was part of a group of postholes/small pits (NH8612) which may have been part of a structure associated with metalworking. The sample was notable for its abundance of very large fragments of charcoal, many of which were from hazel stems. Several pieces were 12 years old, as was one of the cherry (*Prunus avium*) stems. A few fragments of oak, alder and hawthorn group were also identified.

*Property SE 3*

The two samples from SE 3 came from large rectangular pits, one of which was a possible cellar (NH8635) and contained dumps of cess and domestic waste. The other (NH8636) also contained backfill layers of cess but was additionally associated with smithing waste. The assemblages were notably contrasting, with NH8635 apparently dominated by beech, and NH8636 dominated by oak. Small quantities of other, but different, species were present in both, including hazel and blackthorn in NH8635 and birch (*Betula sp.*), alder and field maple in NH8636.
### Property BE 5

Contexts CC3034 and CC3083 came from pit CC3010 which contained slumped floors interspersed with domestic occupation deposits, many with a high charcoal content indicating sweepings from hearths. Both assemblages were mixed in character; with significant components of oak and beech and a range of other species, including hazel, alder, hawthorn group and field maple.

### Medieval: Phase 6

<table>
<thead>
<tr>
<th>Property</th>
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<tbody>
<tr>
<td>Feature type</td>
<td>Pit</td>
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<td>Feature number</td>
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<td>NH1007</td>
<td>CC2092</td>
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<tr>
<td>Sample number</td>
<td>NH50</td>
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<tr>
<td>Fagus sylvatica L.</td>
<td>beech</td>
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<tr>
<td>Quercus sp.</td>
<td>oak</td>
<td>7h 8hs</td>
</tr>
<tr>
<td>Alnus glutinosa Gaertn.</td>
<td>alder</td>
<td>6r</td>
</tr>
<tr>
<td>Corylus avellana L.</td>
<td>hazel</td>
<td>1r 3r</td>
</tr>
<tr>
<td>Populus/Salix</td>
<td>poplar/willow</td>
<td>1</td>
</tr>
<tr>
<td>Prunus spinosa L.</td>
<td>blackthorn</td>
<td>1</td>
</tr>
<tr>
<td>Maloideae</td>
<td>hawthorn, pear, apple etc</td>
<td>2r 1r</td>
</tr>
<tr>
<td>Prunus avium L.</td>
<td>cherry</td>
<td>4r</td>
</tr>
<tr>
<td>Fraxinus excelsior L.</td>
<td>ash</td>
<td>1 4s</td>
</tr>
</tbody>
</table>

r=roundwood; s=sapwood; h=heartwood

Table 4: Charcoal from phase 6
Property SE 2
A single sample dating to this phase came from the fills of a rubbish pit (NH1005), with probable mixed domestic and smithing material. The assemblage was primarily composed of oak and beech, with a few fragments of hazel, blackthorn and hawthorn group.

Property BE 4
Context 2092 came from an occupation deposit which was interspersed with several slumped floor layers, representing domestic debris. The assemblage contained a diverse range of taxa, with mixed hazel and alder and oak and single fragments of willow/poplar, hawthorn group and ash.

Discussion
The charcoal assemblages from the Winchester excavations were characterised by their diversity in taxonomic composition. Only one sample contained fewer than four taxa, and many produced six. Given the limited analysis, it is likely that the final count for each sample would have been higher. The obvious assumption from this observation is that a range of firewood was utilised. Whilst this is true to an extent, the issue of context-related variation requires further exploration. The problem with the nature of contexts such as occupation deposits and hearth sweepings, which produce mixed assemblages formed from several events, is that the provenance of the charcoal is not clear. In particular, it was not always possible to determine whether domestic or industrial activities, or both, were represented. To examine the use of fuelwood for different activities requires a clear understanding of the taphonomy of the charcoal and a reasonable quantification of species occurrence. Only one building appears to demonstrate the kind of pattern that might be expected - the samples from the late Saxon phases of BW 2.

The charcoal assemblage from pit NH4713 produced only two taxa - oak and hazel, and was clearly dominated by oak. This pit was associated with metalworking and the charcoal assemblage is appropriate for smithing activities. The processes of iron
smelting and smithing would both have required charcoal as fuel (Edlin 1949, 160; Cleere & Crossley 1985, 37) and oak would have provided good quality charcoal, capable of achieving the high temperatures necessary. In contrast, the evidence from apparent domestic debris in BW 2 (NH4556 and NH4217) shows a range of firewood being used, indicating less focused selection of wood for fuel.

**Changes over time and supplies of firewood**

On first examination, the charcoal assemblages exhibit a reasonable degree of similarity across the areas and throughout the phases represented (Figure 1). This indicates some consistency in the selection of firewood and possibly methods of procuring firewood. However, there are a few significant changes over time. Firstly, and most importantly, there is an apparent rise in the use of beech (*Fagus sylvatica*). No beech charcoal was identified from the phase 4.1 samples, and only one of the seven phase 4.2 samples contained beech. Almost all of the later phase 5 and 6 samples produced beech, which formed a significant component or was dominant in five of the assemblages. Oak continued to be used and was present in all of the later samples, but the rise in the use of beech wood may account for small decreases in the occurrence of taxa such as hawthorn group and hazel, and field maple.

This shift in the charcoal record indicates a change in the source of firewood resources, or a change in the management regime. Supplies of firewood would have been provided from locally managed woodlands (Rackham 2006), and any charcoal fuel (such as required for metalworking or for odour disposal) would certainly not have travelled any great distance. It is interesting that a similar shift in the utilisation of beech is mirrored at other urban sites such as Oxford (Challinor, 2002) and Southampton (Challinor, forthcoming). The evidence from Southampton is particularly interesting given its proximity to Winchester, although the charcoal record is slightly later there - with beech not recorded as significant until the high medieval period, rather than the Anglo-Norman period. Changes in the local woodlands around Winchester may have preceded those around Southampton.
Figure 1: Taxonomic composition of charcoal by phase

One final possibility should be mentioned - that the increase in beech may relate to the use of charcoal as fuel. Beech makes a good charcoal, as does alder, which also appears in greater quantity in the later samples. Whilst the evidence for smithing is not securely linked to specific buildings, there does seem to be a lot of residual evidence for it in the samples and the charcoal may have derived from it. Moreover, charcoal may have been used for other purposes, such as being deliberately deposited into cess pits to absorb odours (Gale 2005). Nonetheless, the comparable evidence from Southampton and Oxford suggests that a more widespread change may be occurring in Anglo-Norman and medieval fuel use.
References


Edlin, H L, 1949. Woodland crafts in Britain: an account of the traditional uses of trees and timbers in the British countryside, London, Batsford


This is one of the 19 specialist reports provided with the above publication

Oxford Archaeology
Monograph