

GLASTONBURY ABBEY (GLSGA)
The Wood and Charcoal
Dana Challinor, MA (Oxon), MSc
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INTRODUCTION

Fragments of wood and charcoal were recovered from twenty-one contexts during the Radford excavations at Glastonbury Abbey in the 1950s and 1960s. This material was submitted for identification to assess suitability for radiocarbon dating and to provide a species list. Several of the contexts were associated with glass furnaces from which the charcoal might be interpreted as spent fuel. Preliminary dating suggests that the samples range from late Saxon to the 12th century AD.

METHODOLOGY

Charcoal which was >2mm in size was considered for identification. Since the material was hand-collected, there tended to be a bias towards larger fragments, but the quantities were poor. 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. Classification and nomenclature follow Stace (1997).

RESULTS

The results of the analysis are presented in Table 1 (wood) and Table 2 (charcoal). Three contexts did not produce identifiable wood or charcoal, but coal or a clinker type material. The full results are recorded in the archive.

Wood

Four contexts produced pieces of wood, three of which were desiccated and one which was mineralised (M327). The condition of both the desiccated and the mineralised wood meant that it was difficult to confirm the identification with certainty, but they all appeared to be *Quercus* sp. (oak). The three large stems from M84 were in significantly better condition, and much larger than the other fragments,, which supports the interpretation that they are modern. It was apparent from the lack of pith that the wood was likely to come from rootwood. The growth rings were very close together, so it was not possible to distinguish the flame-like pattern, but the large pores and rays were characteristic of oak.

Charcoal

The condition of the charcoal was generally good, with clean, reasonably firm pieces. A total of 182 fragments were examined, from which eight taxa were positively identified, all of which were consistent with taxa native to Britain. 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, i.e. where a genus is represented by a single species.

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

BETULACEAE: *Alnus glutinosa* Gaertn., alder; *Corylus avellana* L., hazel. The last two genera have very similar anatomical structures and can be difficult to separate, hence the category *Alnus/Corylus*. Both species were positively identified.

SALICAEAE: *Salix* sp., willow; *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. These species can be difficult to distinguish, but the wide rays were characteristic of *Prunus spinosa*.

Maloideae, subfamily including *Pyrus* sp., pear; *Malus* sp., apple; *Sorbus* sp., rowan/service/whitebeam and *Crataegus* sp.(hawthorn); all are anatomically similar.

ACERACEAE: *Acer campestre* L., field maple.

Accession number	Assigned no.	IADB no.	Identifications	Notes
GLSGA:1991/118/5	M46	BF1126	cf <i>Quercus</i>	Desiccated wood
GLSGA: 1991/272	M84		cf <i>Quercus</i>	Desiccated root wood
GLSGA:1998/3/361	M327	BF5200	cf <i>Quercus</i> , burr wood	Mineralised wood
GLSGA:2008/3/88/2	M545	BF3110	cf <i>Quercus</i>	Desiccated wood, tiny pieces

Table 1: Results of the wood identifications

Record number		1991/ 120/4	1991/ 137	1991/ 146/1	1991/ 280	1993/ 81	1998/ 3/116	1998/ 3/170	1998/ 3/338	1998/ 3/419	1998/ 3/436	2008/ 3/20/1	2008/ 3/23/2	2008/ 3/28/2	2008/ 3/34/1
Assigned number		M49	M71	M72	M86	M117	M307	M311	M320	M332	M334	M482	M491	M493	M497
<i>Fagus sylvatica</i> L.	beech		16												
<i>Quercus</i> sp.	oak				8h	26h				34hb	1r	1	2r		7
<i>Alnus glutinosa</i> Gaertn.	alder					10r	1				8r				
<i>Corylus avellana</i> L.	hazel						2r							1	
<i>Alnus/Corylus</i>	alder/hazel	1		2			3		4r						
<i>Populus/Salix</i>	poplar/willow					4r					9r				4
<i>Prunus spinosa</i> L.	blackthorn						2r								
Maloideae	hawthorn group	2					8r	4r	4r			1			
<i>Acer campestre</i> L.	field maple						1r								
Bark						1					4				
Indeterminate							5			5					
Total		3	16	2	8	41	23	4	8	39	22	2	2	1	11

r=roundwood; b=burrwood; h=heartwood

Table 2: Results of the charcoal analysis

Indeterminate fragments were not identified because of poor preservation or an unusual cellular structure. It is likely that these indeterminate fragments represent additional specimens of taxa positively identified at the site. In one case the charcoal was embedded in clay and could not be easily extracted without destruction.

DISCUSSION

It is not possible to make any interpretation on the wood, as this could have come from structural or natural provenance and, in at least one case, is probably modern. Either way, it is not surprising that oak is represented, since this taxon would have been available and utilised for various activities. The following discussion, therefore, relates to the charcoal examined from the site.

Sampling and taphonomy

Any discussion on material such as this should be preceded by some consideration of its provenance. Three essential issues relate to an understanding of the processes leading to the charcoal record as it occurs from Glastonbury Abbey:

- anthropogenic modification, i.e. selection and use of wood, and combustion processes
- deposition of material, i.e. deliberate dump, wind-blown, and post-depositional processes
- archaeological sampling and recovery

To work backwards, from the known to the unknown, the sampling and recovery of the charcoal from the site is obviously of utmost importance, and presents an intrinsic bias. The excavations by Radford in the 1950s and 1960s pre-dated the establishment of environmental archaeology and the guidelines for sampling which are followed today. Consequently, the charcoal from Glastonbury is hand-collected and does not provide what is now considered a representative sample of the preserved material.

A range of deposition types occur at Glastonbury Abbey, but there is no record associated with the charcoal to suggest burning *in situ*, which is of course the clearest to interpret. Several contexts were recorded as being fills of features (e.g. postholes, fire pits) but the majority were soil layers, either make-up for floors or accumulated over time (e.g. between cobbled surfaces). This means that (notwithstanding any post-depositional processes) the charcoal could have derived from several activities or events and does not represent deliberate dumps of single-event debris. However, the majority of the charcoal represents the spent remains of fuelwood and therefore indicates species preferences and, to a lesser extent, the available resources for fuelwood. Of particular interest are the layers associated with the Saxon glass furnaces which provide a secure provenance for the charcoal.

Furnaces and fuelwood selection

Seven samples were associated with glass furnaces that have been radiocarbon dated to the mid Saxon period (605-780 AD). Unfortunately, the varying amounts of charcoal make it difficult to provide a comparison across different furnaces or activity type (only five fragments from three samples associated with Furnace 1, compared with forty-one from sample M117). However, it is clear from an analysis of fragment count across all seven samples that oak accounts for 47% of the assemblage, with hawthorn group, alder and willow/poplar between 10-17% each (Fig. 1). This suggests that oak was the primary fuelwood, added to which a number of heartwood fragments were recorded, indicating the wood used was of some maturity. In addition, many of the fragments of other non-oak species were from roundwood, consistent with small diameter branchwood that might be used for kindling.

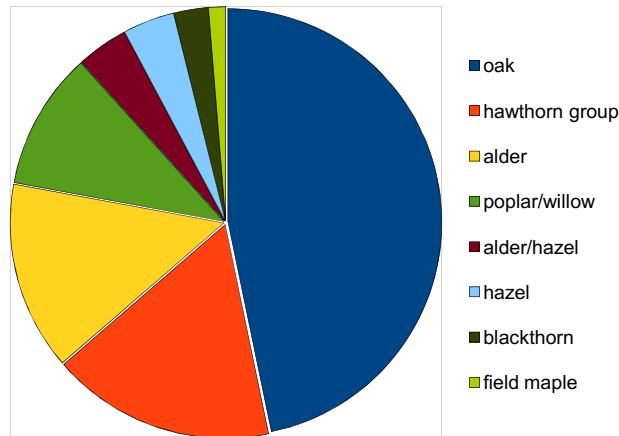


Figure 1: Percentages of charcoal taxa in furnace related assemblages

Woodland resources

Despite the bias of the sample, and the difficulties in extrapolating data from charcoal, some comment can be made on woodland resources. Firstly, oak is the most commonly identified taxon (Fig. 2), whether utilised for fuelwood or other activities, in the late Saxon and early medieval periods. This use of oak was supplemented by a range of other taxa, which is mostly represented by small branchwood and includes hedgerow or woodland margin types (hawthorn, blackthorn), but also by a fairly strong component of damp ground species (alder and willow/poplar).

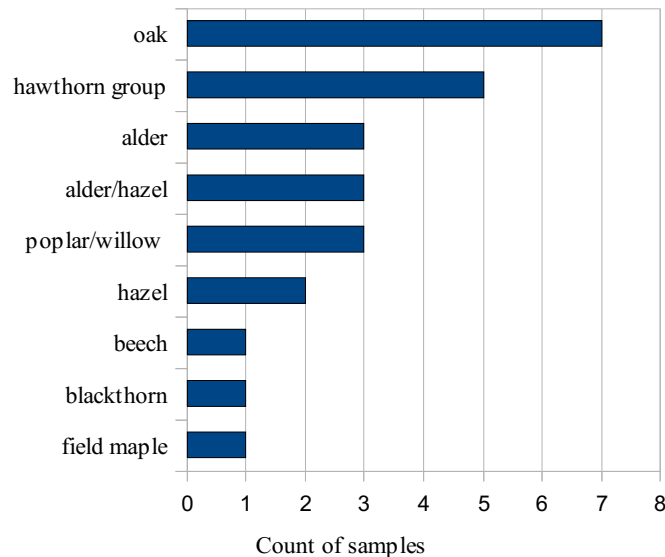


Figure 2: Charcoal taxa by ubiquity analysis

A final note must be made on the presence of beech, which was found uniquely in one sample (M71). This sample came from a layer predating the make-up layer (1206) for a mortar floor (1204) within the west cloister trench, and does not date from earlier than the 12th century AD. This is interesting as charcoal evidence from medieval sites in southern England, such as Oxford (Challinor 2010) and Southampton (Challinor 2009), suggest that beech becomes an important resource for fuel from the early medieval period onwards, and is used alongside or in preference to oak as the main choice for fuelwood.

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