Channel Tunnel Rail Link

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Wood charcoal from White Horse Stone, Aylesford, Kent

by Diane Alldritt

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

A total of 27 samples were selected from the White Horse Stone excavations for charcoal identification and analysis. The samples were taken from a number of different features within the multi-period landscape, including late Neolithic pits; a late Bronze Age pit; and early-middle Iron Age pits, burials, and metalworking waste pits. Whilst the White Horse Stone area encompasses archaeological landscape and settlement evidence stretching from the late Pleistocene to the Medieval period, the samples chosen for this analysis will concentrate on a more closely defined period of change from small scale late Neolithic activity through to more substantial early Iron Age metalworking and farming activities.

Charcoal was examined with the aid of both a low powered binocular microscope typically at x10 to x20, and a high magnification metallurgical microscope at x200 and x400. The texts of Schweingruber (1990) and Jane (1970) were used as reference material for species identification.

2 RESULTS

A full list of the identification results from this site is provided in the database. This data was used to produce summary Table 1 and Fig. 1, which will be discussed in following sections. The 27 samples produced 4 distinctive genera of wood and 2 subfamily groups. These are considered below:

Fagaceae: *Quercus* (oak) tree heartwood and softwood were distinguished in the larger pieces, with heartwood dominating. Occasional pieces displayed vitrification, possibly resulting from exposure to high temperatures such as those used in industrial processes.

Betulaceae: *Corylus* (hazel) wood from shrubs or small trees. No roundwood pieces were recovered from the samples.

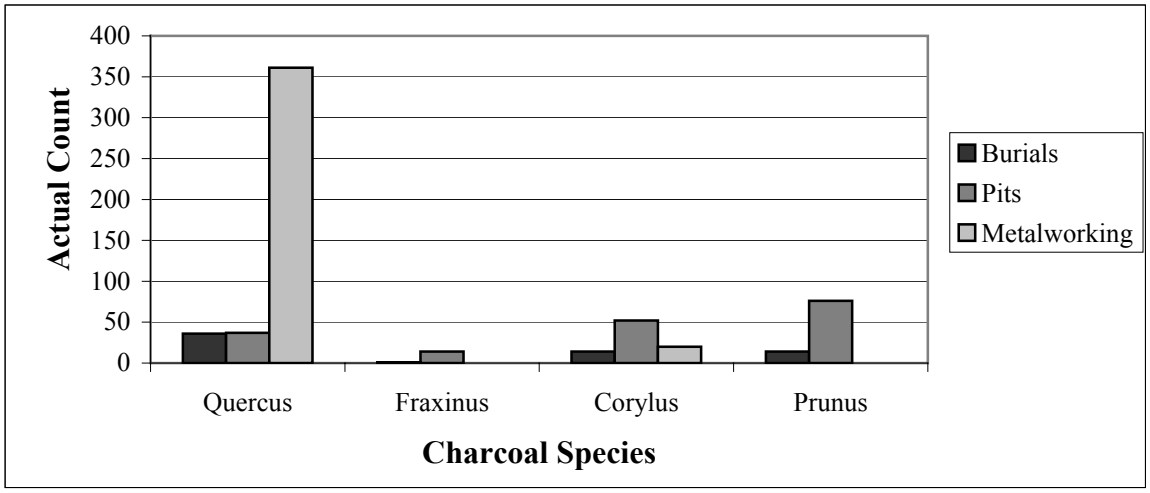
Roseaceae: Two Subfamilies of Roseaceae were present. Subfamily Maloideae shrubs or small trees, including *Pyrus* (pear), *Crataegus* (hawthorn), *Sorbus* (rowan / service / whitebeam) and *Malus* (apple). Species rarely distinguishable based upon wood anatomy. Subfamily Prunoideae shrubs or small trees of *Prunus* spp. (cherries). The presence of thick densely packed spiral thickening in the *Prunus* charcoal strongly indicated that *Prunus spinosa* (blackthorn) was the dominant species recovered.

Oleaceae: Wood charcoal from *Fraxinus* (ash), most likely large trees. This genus was recovered predominantly from the Neolithic house contexts suggesting a structural role for this strong, resilient timber type.

Table 1: Summary of wood charcoal from White Horse Stone

Phase:	**ENA**	**ENA**	**LBA**	**EIA**	**EIA**	**EIA**
Structure:	**House Pits**	**Tree Throw**	**Pit**	**Burials**	**Pits**	**Metalworking**
No. of Samples:	**9**	**1**	**1**	**4**	**2**	**8**
Charcoal Species:						
Quercus	3	0	2	36 (43)	37 (59)	361 (839)
Fraxinus	27	0	0	1	14 (47)	0
Corylus	10	7	19 (30)	14 (18)	52 (66)	20 (42)
Maloideae	0	0	11 (17)	1	7 (13)	2
Prunus spinosa	9	2	0	14 (23)	76 (151)	10 (12)
Indeterminate	16	1	14 (24)	19 (23)	43 (72)	7 (17)

Figure 1: Summary of wood charcoal by type of feature



3 DISCUSSION

The samples have been divided by period and structure type where possible in the following discussion. The exact phasing for sample 53 was uncertain; therefore the charcoal from this cremation is described separately at the end.

3.1 Late Neolithic pits

Samples (GW pits): 60 (905); 562 (7026); 294 (4997); 364 (5095); 97 (959); 634 (4931); 289 (4876); 266 (4969); 649 (5270)

The pits produced very little charcoal, although *Fraxinus* (ash) was the dominant recorded type. It probably derives from the use of the wood as fuel.

3.2 Late Neolithic tree-throw holes

Sample (Tree Throw): 54 (862); 383 (5127)

Possible late Neolithic use of a tree throw was seen in sample 54, where small amounts of oak, hazel, blackthorn and Maloideae types were identified. Sample 383, also a tree throw, produced only a little hazel and blackthorn charcoal, which could be background residual material from any event.

3.3 Late Bronze Age pits

Sample: 915 (5423):

The pit sample charcoal was dominated by hazel, with lesser amounts of oak and Maloideae, although overall recovery was too low to enable firm conclusions to be drawn about the origins of this deposit.

3.4 Late Bronze Age cremation

Sample: 53 (854)

This sample contained a large amount of oak and no other species, suggesting probable pyre material.

3.5 Early Iron Age burials

Samples: 707 (8018); 39 (2297); 40 (2297): 12 (2185 or 6)

The burial samples produced small amounts of oak, hazel and blackthorn. In this context, oak was most likely to have been utilised as fuel which has been incidentally incorporated into the pits, with smaller branches of hazel and blackthorn used as kindling.

3.6 Early Iron Age pits

Samples: 715 (8027); 1 (2104); 246 (4562)

The range of taxa recovered from the pits was distinctly different to that seen in either the EIA metalworking waste pits or the burials. Blackthorn was recovered in the largest amounts in these samples, and ash, oak and hazel were also present. It is probable that these pits were for the disposal of domestic waste, and the charcoal may have been used as fuel in household and farming activities, such as cereal drying. However, it is also possible that the inclusion of blackthorn in these pits had a purpose other than mere rubbish disposal. The spiny branches of this taxon would have formed a highly effective hedging or defensive material when spread in ditches, rendering them extremely difficult for an attacking force to penetrate. It has been

suggested that the Romans used *Prunus spinosa* in this way on the Antonine Wall (Susan Ramsay pers. comm.).

3.7 Early Iron Age metalworking waste pits

Samples: 699 (7152); 927 (7206 and 7202); 703 (7156 and 7157); 710 (7156 and 7157); 735 (7008); 723 (7169); 681 (7080)

Figure 1 clearly illustrates that in the metalworking waste pits, oak was the dominant charcoal type recovered. This is not surprising, as this genus would be ideal for reaching and maintaining the high temperatures required for smelting / smithing processes, and also makes an excellent solid charcoal resilient to crumbling during cartage and in the furnace. Dense oak heartwood has a very high calorific value and makes an excellent fuel (Tylecote 1986). With the correct ventilation, oak can burn evenly at high temperature for many hours (Gale and Cutler 2000). Very small amounts of hazel were also found in the pits, and small branches of this wood type were probably used as kindling to start the furnace.

3.8 Mid-late Saxon horse burial

Sample: 2 (1021)

This sample produced equal quantities of hazel and oak, plus a trace of blackthorn. This combination of charcoal types has no obvious correlation with the burial activities and is more likely to represent background occupation scatter from other events on the site.

4 SUMMARY AND OVERVIEW

The late Neolithic pits at White Horse Stone produced evidence for the use of ash and oak, and evidence for species such as hazel could have been used as hearth fuel. A single late Bronze Age pit sample also demonstrated the use of hazel, although overall recovery was too low to draw definite conclusions.

The early Iron Age contexts produced possibly the most enlightening set of data from White Horse Stone. This is perhaps not surprising, given the large increase in activity seen archaeologically during this period. Close analysis of the data from this period has revealed *Quercus* (oak) to be the main species utilised in these industrial processes. Interestingly the early Iron Age pits strongly suggested the importance of defending this site, or at least providing a physical barrier of separation between activities taking place in the farmstead and the outside world. The deposition of large amounts of blackthorn in ditches and pits around the settlement would have kept both humans and straying animals at bay.

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