Channel Tunnel Rail Link

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Oxford Wessex Archaeology Joint Venture

The wood charcoal from Saltwood Tunnel, Kent

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1 INTRODUCTION

A total of 34 samples were selected for identification and analysis of carbonised wood fragments. The charcoal samples originated from three very different types of archaeological deposit; firstly, the largest group came from cremation features; the second largest from pit deposits; and thirdly two sets of charcoal were from an oven / stoke hole. The Saltwood Tunnel site was set within a multi-period landscape and a contextual analysis of the charcoal may allow patterns of change in woodland use to be discerned over time. In particular the selection of different woodland species for use in funerary rituals as opposed to those used for industrial processes such as metalworking or large scale domestic drying of cereal grain shall be considered.

Charcoal types were identified as specifically as possible with reference to Schweingruber (1990) and Jane (1970), utilising a low magnification binocular microscope at x10 to x20, and a high magnification metallurgical microscope at x 100 and x400. Plant nomenclature used in the text follows Stace (1997) for vascular plant remains, apart from cereals, which conform to the genetic classification of Zohary and Hopf (2000).

2 RESULTS

A full list of results is provided in the specialist database. These results are summarized by phase in table 1. This summary table was used to generate figure 1, which will be considered further in following sections. A small quantity of cereal grain and bone were recovered from two samples and these are listed in table 2. Six clearly distinct genera, two closely related ones and two subfamilies were identified during the analysis. The level of distinction possible between all closely similar genera conforms to recommendations outlined in Schweingruber (1990), and are presented below:

Fagaceae: *Quercus* (oak) [tree]. Heartwood and softwood were present but not regularly distinguishable with confidence due to small fragment size. Numerous oak fragments were highly glassy in appearance, which may be as a result of burning at very high temperatures, such as are required for cremations or metalworking.

Betulaceae: *Corylus* (hazel) [tall shrub / small tree], *Alnus* (alder), *Betula* (birch) [both small trees]. Hazel roundwood was identified from sample 342 (5265) (LBA pit), with pieces of diameter 0.8 – 1.0cm having a minimum of two, maximum three visible growth rings.

Salicaceae: Charcoal from *Salix* / *Populus* (willow / poplar) [shrub / tree] was present in one sample only (ENE pit 238 (3279)). These species are not distinguishable on the basis of anatomical features alone.

Rosaceae: Subfamily Maloideae [shrubs and small trees] including *Pyrus* (pear), *Malus* (apple), *Sorbus* (rowan / service / whitebeam) and *Crataegus* (hawthorn). These genera are hardly distinguishable based upon wood anatomy. Subfamily Prunoideae [shrubs and small trees] comprises the *Prunus* spp. (cherries), including *P. avium* (wild cherry), *P. spinosa* (blackthorn) and *P. padus* (bird cherry), of which only *P.*spinosa (type) is confidently separable

Oleaceae: *Fraxinus* (ash) [tree]. In the Iron Age / Roman cremation samples this species was often the only wood recovered.

Table 1: Summary quantification of charcoal by phase

No. of Samples Analysed:	**3**	**None**	**5**	**16**	**None**	**7**	**2**	**1**
Wood Charcoal Identification:								
Quercus	138	0	23	418	0	22	0	0
Fraxinus	0	0	6	0	0	308	46	0
Corylus	59	0	51	45	0	2	1	0
Alnus	0	0	7	0	0	0	0	42
Betula	0	0	1	0	0	0	0	0
Prunoideae	1	0	78	23	0	70	29	0
Maloideae	12	0	24	173	0	25	0	0
Salix / Populus	1	0	0	0	0	0	0	0
Indeterminate	29	0	23	33	0	47	8	0

Figure 1: Summary quantification of charcoal

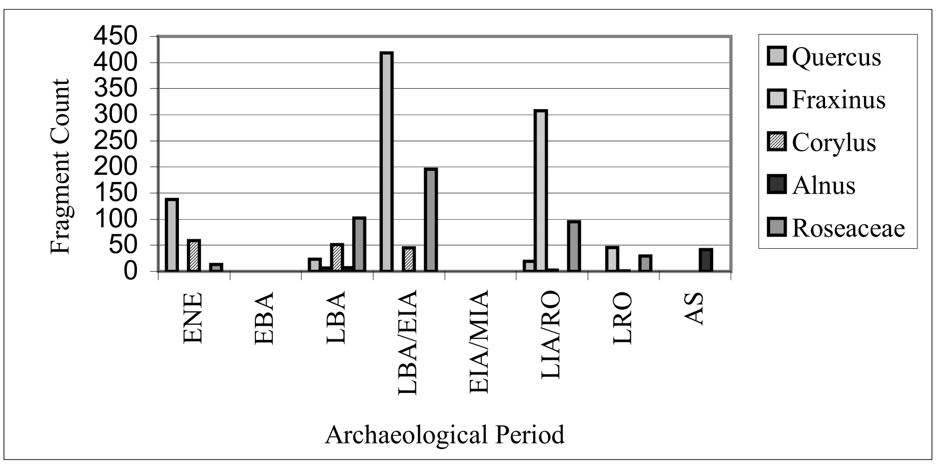

Table 2: Environmental remains from samples 501 and 801

	Sample:	**501**	**801**
Carbonised Cereal Grain:	**Context:**	**3007**	**3704**
Triticum aestivum sl.			4
cf. *Triticum aestivum* sl.		1	
Indeterminate cereal (+embryo)		1	1
Other Environmental Remains:			
Burnt vesicular (peat or other)			12
Burnt bone (white)		15	35

Non-marine mollusc shell		1	
Mineralised (?) seed		1	
Non-Organic Remains:			

3 DISCUSSION

Where data is available the samples shall be discussed by archaeological period / phase.

3.1 Phase 1: Early Neolithic (pits)

Samples: 238 (3279); 241 (3300); 245 (3371):
These deposits were dominated by oak and hazel with lesser amounts of willow or poplar, and Roseaceae family charcoal types. This assemblage is most likely to represent occupation detritus including hearth waste, with possibly also a structural component to the assemblage as well. Hazel and willow have been associated with wattle screens for structural elements since very early Prehistory, but not enough evidence is available from these samples to make this connection with any certainty.

3.2 Phase 2: Early Bronze Age

No samples were available.

3.3 Phase 2 / 3: Late Bronze Age: (pit s)

Samples: 252 (6662); 311 (5030); 318 (5224); 330 (5153); 342 (5265):
This phase produced the greatest range of charcoal types recorded, with small amounts of oak, ash, hazel, alder, birch, and Roseaceae family charcoal types all present. Deposition within pit contexts, together with the variety of taxa recorded probably suggests waste from numerous domestic and industrial hearths.

3.4 Phase 3: Late Bronze Age / Early Iron Age (cremations)

Samples: 109 (1700); 110 (1700); 111 (1701); 112 (1700); 113 (1700); 114 (1701); 115 (1701); 116 (1723); 117 (1725); 118 (1704); 119 (1704); 120 (1727); 121 (1727); 122 (1729); 123 (1729); 280 (3610):
Phase 3 saw a peak in recovery of oak, although hazel continued to have a strong presence, together with Maloideae. Where available, oak was generally the wood of choice on Prehistoric funeral pyres, capable of burning evenly at high temperatures over an extended time period, although good ventilation would be required to maintain an even heat (Gale and Cutler 2000: 205). It is likely that the hazel, possibly also the Maloideae, recovered from the cremation contexts represent small, kindling branches used to start the main oak pyres. Both *Quercus* and Maloideae family types have been associated with magic and religious rituals during Prehistory, often given the mystical attribute of warding off evil spirits (Grigson 1958,

Davidson 1964). The presence of these species may therefore also fulfill social and spiritual needs in addition to the practical necessity of starting a fire.

The properties of oak also render it one of the fuels of choice in metallurgy, producing a 'hard' charcoal resistant to crumbling during transport, and producing less dust contamination whilst in use in the furnace (Tylecote 1986: 225). Iron has a minimum smelting temperature of >1100 C, therefore dense oak heartwood with a high calorific value makes an excellent fuel, although by modern standards ancient metallurgy was extremely inefficient (Tylecote 1986: 129).

3.5 Phase 4: Early Iron Age / Middle Iron Age

No samples were available.

3.6 Phase 5: Late Iron Age / Early Romano-British (pits, cremations and hearth)

Samples: 10 (2152); 18 (2208); 24 (2186); 28 (2232); 216 (2826); 501 (3007); 839 (3985):
During the Late Iron Age and into the Roman period at Saltwood Tunnel, charcoal originating from ash wood was the major type present. Large amounts of Roseaceae and trace quantities of oak, hazel and elm were also seen. Species of the Rosaceae family are characteristic of open, scrub woodland, requiring light to flower and set fruit. This assemblage suggested that by the Late Iron Age, the local landscape now contains less woodland than was present in earlier periods, especially with respect to the larger tree resource.

Given the location of the site, and scarcity of charcoal from other major trees recorded during this phase, it is possible that the ash had been imported for use during the Roman period for particular uses, such as industrial processes or construction. Ash and hazel can also be coppiced, and it is likely that this form of woodland management was in place by this period of site occupation, although the charcoal evidence was insufficient at this site to demonstrate whether this is likely to have been undertaken here.

3.7 Phase 6b: Late Roman (oven and stokehole)

Samples: 51 (629); 81 (637):
The Late Roman oven was dominated by ash charcoal with smaller amounts of Prunoideae and hazel. The abundance of ash in this phase indicated its primary use as a fuel resource in the oven. As in the previous phase it may represent traded raw material or local coppicing of woodland resources. The Prunoideae and hazel charcoal represent the utilization of local, open scrub woodland resources.

3.8 Phase 7: Anglo-Saxon (cremation)

Samples: 801 (3704):

Only alder charcoal was recovered from this cremation, and is most likely to have originated as pyre material. This sample composition differs from those recovered from earlier, Prehistoric cremations, where a much wider range of types was recorded, although with oak clearly dominant at that time. This probably reflects a reduction in availability of oak resources by this later period. Although oak would be the pyre fuel of choice, alder makes a satisfactory substitute in situations where oak is not available. Alder charcoal burns with a high temperature, and is also favoured (with oak) for smelting (Edlin 1973). Alder responds well to coppicing and can tolerate poor soil conditions. It would have been locally available for collection. Ash charcoal was not recorded from this phase, thereby reinforcing the suggestion that ash was subject to some form of management / transportation during the Roman period. Trace evidence for cultivation of bread / club wheat was also recovered from this sample (see table 2) together with burnt vesicular remains that are indicative of peat.

4 SUMMARY AND OVERVIEW:

The multi-phase analysis of charcoal from Saltwood Tunnel has demonstrated changes in both the quantities and range of species in use for a variety of domestic, funerary and perhaps also metalworking purposes over a lengthy period of occupation. It is clear from Fig. 1 that oak dominated the early phases, in particular the Early Neolithic pits and the Late Bronze Age / Early Iron Age cremations, demonstrating a wide range of domestic and funerary uses for this wood. This probably reflected the widespread availability of oak during early prehistory as well as an appreciation of its burning and ritual properties. By the Late Iron Age / Roman and into the Late Roman the range of taxa in use at the site was greatly reduced, but ash was recovered in abundance, possibly indicative of trade / management in woodland resources. In the single Anglo-Saxon cremation the only wood recovered was alder, pointing to the use of it as pyre material, and perhaps suggesting that oak and other major woodland trees had become greatly diminished from the landscape of Southern England relative to earlier periods by this time. Integration of the charcoal database with other specialist reports, in particular with evidence for smithing / smelting processes and cereal crop regimes, will enable a wider economic picture of the site to be realised.

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