Charcoal

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Introduction

Sixteen samples of charcoal were selected for species identification from a range of contexts from Sites 2, 3, 5 and 6, dating from the Peterborough/ Middle Neolithic to Romano-British occupation:

Peterborough/Middle Neolithic: 6 samples (Sites 2 and 3)
Late Neolithic – Early Bronze Age: 2 samples (Site 2)
Middle Bronze Age: 4 samples (Site 3)
Late Bronze Age – Early Iron Age: 2 samples (Sites 3 and 6)
Romano-British: 1 sample (Site 5)

The analysis of the charcoal, was undertaken to obtain economic and environmental data and makes a valuable contribution to current knowledge of local woodland and the exploitation of woodland resources in this region of Wessex. The results are compared with those from charcoal deposits recovered from contemporary sites on Salisbury Plain.

Methodology

Bulk soil samples were processed by flotation and sieving using 1 mm and 0.5 mm meshes. The resulting flots and residues were scanned under low magnification by Sarah Wyles and the charcoal separated from plant macrofossils. Charcoal fragments measuring >2 mm in radial cross-section were considered for species identification. The large volume of charcoal in sample 2 was 50% subsampled.

The charcoal was mostly rather fragmented and friable and evidence of roundwood was sparse. Standard methods were used to prepare the samples (Gale and Cutler 2000). The anatomical structures were examined using incident light on a Nikon Labophot-2 microscope at magnifications up to x400. The taxa identified were matched to prepared reference slides of modern wood. When possible, the maturity of the wood was assessed (i.e. heartwood/ sapwood).

Results

The taxa identified are presented in Table CH1 and discussed below. Classification follows that of *Flora Europaea* (Tutin, Heywood *et al* 1964-80). Group names are given when anatomical differences between related genera are too slight to allow secure identification to genus level, for example, members of the Pomoideae (*Crataegus, Malus, Pyrus* and *Sorbus*). When a genus is represented by a single species in the British flora this is named as the most likely origin of the wood, given the provenance and period, but it should be noted that it is rarely possible to name individual species from wood features and exotic species of trees and

shrubs were introduced to Britain from an early period (Godwin 1956; Mitchell 1974). The anatomical structure of the charcoal was consistent with the following taxa or groups of taxa:

Aceraceae. *Acer campestre* L., field maple
Corylaceae. *Corylus avellana* L., hazel
Fagaceae. *Quercus* sp., oak
Oleaceae. *Fraxinus excelsior* L., ash
Rosaceae. Subfamilies:
Pomoideae - includes *Crataegus* sp., hawthorn; *Malus* sp., apple;
Pyrus sp., pear; *Sorbus* spp., rowan, service tree and whitebeam. These taxa are anatomically similar; one taxon or more may be represented in the charcoal.
Prunoideae - *Prunus spinosa L.,* blackthorn
Ulmaceae. *Ulmus* sp., elm.

Peterborough/Middle Neolithic
Charcoal was examined from three of the 12 pits (3000, 3007 and 3119) located in discrete groups across Site 3. Pits 3000 and 3007 occurred on the eastern margin of the site, whereas pit 3119 was centrally placed. In all instances the pits appeared to have been used as dumps, although signs of burning in pit 3119 could implicate a different function. In addition to charred cereal grain, hazelnut shell and charcoal, pit 3119 also contained pottery sherds and worked flint. The charcoal included oak (*Quercus* sp.), hazel (*Corylus avellana*) and the hawthorn/ *Sorbus* group (Pomoideae). Charred oak (*Quercus* sp.) and hazel (*Corylus avellana*) were also recovered from a rather loose deposit of chalk and flint in the base of pit 3007, together with charred grain and hazel nutshell. Similar taxa (plus charred grain and hazel nutshells) were recorded from pit 3000 (Table CH1); the lower fill of which was particularly rich in organic material.

On Site 5 the pits formed two groups, each with three pits. The pits were unusual in that they appeared to have been dedicated to the disposal of different categories of waste material (e.g., bone and organic material, stone and pottery), which suggests that several were open and used simultaneously. Charred grain and hazel nutshell were frequent although charcoal was sparse; samples were examined from pits 6056 and 6061 (in the westerly group) and pit 6093 (in the eastern group). Oak (*Quercus* sp.) and hazel (*Corylus avellana*) were common to all three pits, whereas pit 6061 also contained the hawthorn/ *Sorbus* group (Pomoideae).

Late Neolithic/ Early Bronze Age
A large volume of charcoal was recovered from pit 1034 on Site 2, one of a group of pits dated to this phase. This pit also contained worked flint, charred grain and hazelnut shells. The charcoal was predominantly oak (*Quercus* sp.) but also included hazel (*Corylus avellana*), elm (*Ulmus* sp.) and the hawthorn/ *Sorbus* group (Pomoideae). Some oak fragments had undergone vitrification (a condition brought about by exposure to temperatures exceeding 800ºC, which reduces organised structure and produces a
a glassy appearance).

Bronze Age
The small quantity of charcoal associated with the remains of an urned cremation 2129 on Site 2, strategically sited on a ridge overlooking the steep dry valley at the western edge of the site, consisted entirely of ash (*Fraxinus excelsior*). Although the charcoal almost certainly represents pyre fuel, the fragments were too small to assess the character of the wood used (i.e., large wood/ roundwood).

Middle Bronze Age features on Site 3 included roundhouse 3240 and associated pits. Charcoal was examined from the fills of post-holes 3091 and 3177, from the east side of the

entrance structure. The level of organic and flinty material filling post-hole 3091 suggested that the post had been removed at some stage prior to the silting up and sealing of the pit by collapse. The lower fill of the pit contained oak (*Quercus* sp.) and hazel (*Corylus avellana*) charcoal; a fragment of twiggy oak, less than a year old, may be indicative of burning brushwood or juvenile branches. Evidence from post-hole 3177 suggested that this post may also have been removed. Charcoal was very sparse in the fill of its void but included a few fragments of oak (*Quercus* sp.). Charred grain was common to both post-holes. It seems likely that the charcoal represents domestic fuel debris which either accumulated accidently in these hollows or was deliberately dumped.

The function of pit 3147, apparently associated with a group of post-holes on Site 3, was not clear, although its contents were consistent with domestic waste: burnt flint, pot sherds and organic material including charred cereal grain, hazel nutshell and charcoal. The charcoal included oak (*Quercus* sp.) and the hawthorn/ *Sorbus* group (Pomoideae).

An ovoid pit 3102, filled by a single dumping event, was also sited on the chalk spur about 20 m or so from roundhouse 3240 and in the close vicinity of a further group of postholes. Charcoal was abundant and consisted of large fragments up to 35 mm in length and about 10 mm thick. These were identified as predominantly ash (*Fraxinus excelsior*), probably all sapwood and with some fast-grown wood, e.g., with a (charred) ring width of 7 mm. Maple (*Acer campestre*) and oak (*Quercus* sp.) were also present. The character of the charcoal, i.e. species content and preservation, differed markedly to that from any other contemporary features, which suggests that this deposit originated from an activity for which these species were specifically selected. There was no evidence to imply ritual significance.

A shallow pit 3328, dated to the Late Bronze Age/ Early Iron Age was sited close to a concentration of other features on Site 3 and included a deposit of animal bone (e.g., pig's jaw), antler and struck flint in the upper fill - attributed to either a ritual deposit or a dump of waste material. A small quantity of charcoal recovered from the primary fill included oak (*Quercus* sp.) and the hawthorn/ *Sorbus* group (Pomoideae). Charred grain and hazel nutshells were also present.

A Late Bronze Age pit 8080 on Site 6 was interpreted as a possible dump of domestic waste material (pot, bone, charred grain and charcoal). The charcoal was mostly oak (*Quercus* sp.) but also included hazel (*Corylus avellana*) and the hawthorn/ *Sorbus* group (Pomoideae).

Romano-British

A small pottery kiln 6163 was sited just to the south of a possible palisade on the steep incline north of Castle Hill on Site 5. The kiln appeared to have been fired only once. Associated charcoal was sparse and fragmented but testified to the use of oak (*Quercus* sp.) and blackthorn (*Prunus spinosa*).

Discussion

The pipeline extended roughly West-East for a distance of approximately 15,500 m, just north of Old Sarum. For the purposes of the excavation the route was divided into six areas (Sites 1-6). Evidence of prehistoric occupation occurred along the entire length of the easement, with features tending to be concentrated in distinct clusters regardless of period. The most densely occupied area was located on the chalk spur just north of Old Sarum (Site 3).

Sixteen samples of charcoal were examined from Sites 2, 3, 5 and 6, from features dating from the Peterborough/ Middle Neolithic to the Romano-British periods (Table CH1). With the exception of a Middle Bronze Age urned cremation burial (Site 2) and a Romano-British kiln 6163 (Site 5), the charcoal related to pits and post-holes.

Neolithic pit groups

Peterborough/ Middle Neolithic pits

These pits tended to be distributed in small discrete groups across Sites 3 and 5. Since there was little evidence of associated structures it was difficult to attribute the charcoal from these pits to a specific function, e.g., domestic or other activities. Given the large quantities of charred cereal grain and hazel nutshell in the same contexts, it is probable that the contents of these pits (including the charcoal) originated from domestic waste. Samples were examined from pits 3000, 3007 and 3119 (Site 3) and 6056, 6051and 6093 (Site 5). The group of pits on Site 5 were particularly interesting since they presented carefully categorised (waste) materials within each pit, the contents of which had been deposited according to fabric type, e.g., organic (including bones), pottery and stone. The disposal of specific types of material into dedicated pits indicates fairly conclusively that these pits were used simultaneously. Charcoal from the pit groups on Sites 3 and 5 was identified as oak (*Quercus* sp.) and hazel (*Corylus avellana*) and, occasionally, the hawthorn/ *Sorbus* group (Pomoideae) (Table CH1).

Late Neolithic/Early Bronze Age

Similar parameters relating to the distribution of the earlier Neolithic pits (see above) also applied to those of the Late Neolithic/ Early Bronze Age on Site 2: the taxa identified from pit 1034 were also comparable to those of the earlier pits, i.e., oak (*Quercus* sp.), hazel (*Corylus avellana*) and the hawthorn/ *Sorbus* group (Pomoideae), although elm (*Ulmus* sp.) was also present

Bronze Age pits and settlement

Several Middle Bronze Age pits and postholes on Site 3 (3102, 3147, 3091 and 3177) occurred in the close vicinity of, or directly associated with, the roundhouse structure 3240. On the assumption that the latter was a dwelling, the contents of these pits and postholes (charcoal, charred cereal grain and hazel nutshells) can be attributed fairly confidently, as domestic refuse, including fuel debris. Although rather sparse, the charcoal indicated the use of oak (*Quercus* sp.), hazel (*Corylus avellana*) and the hawthorn/ *Sorbus* group (Pomoideae) (Table CH1). The similarity of these deposits to those in the Neolithic pits could implicate a domestic origin for those from the earlier period.

Interestingly, charcoal from pit 3102, sited 5 m north of pit 3147 and less than 20 m from the roundhouse 3240, was notable not only for its better preservation and greater abundance, in contrast to the other samples examined, but also because of the difference in species content. A high proportion of the charcoal consisted of ash (*Fraxinus excelsior*), a species recorded elsewhere on the pipeline sites only from the cremation burial on Site 2 (see below). Maple (*Acer campestre*), however, although fairly frequent in this context, was not recorded from elsewhere on the site. A small amount of oak (*Quercus* sp.) was also present, together with charred grain. The pit contained a single deposit derived from a one-off event and there was no evidence of *in situ* burning. Why this deposit should differ so much from those of the other pits is intriguing. Although an origin from domestic fuel cannot be ruled out, the charcoal seems likely to have originated from some other activity for which these species were carefully selected. Some of the ash derived from fast grown trees and appeared to be sapwood, possibly from roundwood at least 60 mm or more in diameter. Ash, maple and oak provide high energy firewood. The economic value of these woods, with potential working properties of strength, resilience and durability, may also be relevant in this instance - it is feasible that these species were initially used for carpentry or other artefactual application and, once redundant, the wood was disposed of by burning or recycled as firewood.

Plant remains from the urned cremation burial 2129 on Site 2 included charred hazel nutshells but scant charcoal (pyre fuel). There was no evidence of grain. The charcoal consisted exclusively of ash (*Fraxinus excelsior*) and, in view of the almost total absence of ash in other contexts and the evident availability of other species, including oak (see Table CH1), it could be argued that ash was specially selected for the pyre construction. The quantity of charcoal available for examination was, however, too small to substantiate this suggestion. It is also worth noting that despite the frequency of nutshells in the deposit, hazel wood does not appear to have been used for the construction of the pyre. The presence of nutshells could infer either that the funeral party was snacking on hazelnuts and tossing the shells into the flames or that they were deliberately placed with the body. It may also be significant that a similar use of ash was recorded from fuel debris from a Middle-Late Bronze Age cremation at Dunch Hill, north-west of Old Sarum, near Tidworth (Gale, unpub), where, in common with Old Sarum, a similar range of other species was available but not utilized. This cremation deposit occurred close to a contemporary settlement from which fuel deposits associated with three roundhouses and other structures were examined. While ash was apparently the sole taxon used for the construction of the pyre, ash did not appear to have been used in domestic hearths, which were fuelled predominantly by oak and, rather less, by the hawthorn group and other shrubs.

Romano-British pottery kiln

On site industrial activity was represented by a Romano-British pottery kiln 6163 and inconsequential quantities of iron-working slag. The pottery kiln was located on Castle Hill (Site 6) below a possible palisade structure. The kiln appeared to have been used only once and although charcoal was infrequent, the deposit indicated the use of oak (*Quercus* sp.) and blackthorn (*Prunus spinosa*). Both species would have provided high calorie fuel and, although the dimensions of the firewood are unknown, the use of both narrow and wide roundwood would have produced an effective combination to fire the kiln, for example, narrow roundwood (?blackthorn) to boost the temperature and wider roundwood/ larger billets (?oak heartwood) to provide a long-lasting heat source.

Environmental evidence

The route of the pipeline passed through a long thin strip of topographically varied countryside, from Camp Hill in the West to Castle Hill in the East, e.g., hillsides, steep valleys, floodplains and water meadows, underscored by the common element of chalk bedrock (Wessex Archaeology 2002). The alkaline soils consisted of clay with flints capping the hilltops and colluvial deposits in the valley bottoms; topsoils elsewhere were generally rather thin. The chalk spur on the northern aspect Old Sarum appears to have formed the focus of settlement from the Neolithic period until the occupation of Old Sarum in the Late Iron Age. The remains of cow, sheep and pig bones in Middle Bronze Age contexts testify to local pastoral farming, which, in association with the cultivation of arable crops, would have determined the character of woodland in the landscape. Proceeding this period, the extent of land clearance is unknown but the transition to agriculture was probably already well advanced.

In the present day there are no established woodlands in the immediate vicinity of the site, although occasional small stands of trees/ scrub dot the landscape. In the prehistoric period, the natural range of eco-zones within the environs of the pipeline would have presented favourable conditions for a wide range of chalk tolerant trees and shrubs. It was anticipated that the charcoal analysis would reflect the topographic influence of each site on the arboreal vegetation. For example, for sites 2 and 3, which were within access of the River Avon, i.e., wetland and floodplain - species such as alder (*Alnus glutinosa*), willow (*Salix*

sp.), poplar (*Populus* sp.) and elm (*Ulmus* sp.). Indeed, elm was identified from Site 2, and also ash (*Fraxinus excelsior*) and maple (*Acer campestre*) from Sites 2 and 3 (perhaps from the valley sides), but these seem to have been the exceptions. The fast growth rates that were observed in some fragments of ash were indicative of optimal growing conditions with minimal vegetative competition, i.e., not in closed woodland.

In general, the fuel debris from contexts across the site indicated a preference or dependence on oak (*Quercus* sp.) and hazel (*Corylus avellana*), with some use made of the hawthorn/ *Sorbus* group (Pomoideae). It is probable that on the drier land and hillsides oak formed the dominant woodland component, possibly with hazel as underwood – although hazelnuts (recovered from Neolithic and Bronze Age contexts) are more likely to have been gathered from trees/ shrubs growing in open woodland or scrub that was sufficiently sunlit for fruiting to occur. Denser woodland may have survived in areas unsuited to agriculture or settlement, on the steeper scarps and hillsides.

Posts and larger timbers needed for the construction and refurbishment of dwellings and other structures during the early settlement of the area would have been obtained from mature trees and other suitable sources in the local environment. Subsequent land clearance would have resulted in a reduction of woodland and it is probable that later settlements in the region were dependent on coppiced woodland for the procurement of fuel and building materials. Unfortunately, the charcoal deposits were too fragmented to assess the use of managed/ coppiced woodland for the periods under discussion. The extensive settlement for the occupation of Old Sarum in the Iron Age and Roman periods would have been predominantly timber-built and the on-going development of the site demonstrates the high productivity of local woodland at this time. Additional resources may have been imported via one of the many Roman roads that served the settlement in the early centuries of the 1st millennium.

Environmental evidence from comparable sites

Over the past few years charcoal analysis has been undertaken on several sites on the southern aspect of Salisbury Plain and, although more work is required to obtain a comprehensive overview of prehistoric woodland in this area, a useful data base is beginning to emerge. For example, comparable taxa were recorded from Neolithic and Bronze Age charcoal deposits from sites at Boscombe Down (oak, hazel, hawthorn group and ash, Gale unpub.), Willis's Field Barn, on a chalk ridge overlooking the Wylye Valley near Heytesbury (oak, hazel, hawthorn group and ash, Gale unpub.) and Breech Hill, near Tilshead (oak, hazel, hawthorn group, ash and pine, *Pinus* sp., Gale unpub.); the latter also verified that remnant stands of pine persisted on the Plain into the later prehistoric period.

Charcoal from prehistoric double linear ditches on Sidbury Hill, near Tidworth, was identified as oak, hazel, ash and elder (*Sambucus* sp.) (Gale 1994) and similar species were recorded from Neolithic and Bronze Age contexts nearby at Dunch Hill, with the addition of maple and probably blackthorn and willow/ poplar (Gale, unpub). From Late Bronze Age – Early Iron Age contexts at Battlesbury Bowl, Warminster, the charcoal indicated an open, rather scrubby environment with hazel, thorn and holly, and pockets of deciduous oak/ ash/ maple woodland, with wetland species (alder and willow) closer to the river (Gale unpub.).

In conclusion, the evidence to date, suggests that by the Mid-Late Bronze Age extant mixed oak woodland may have been confined to dry/ wet valley sides and more sheltered areas unsuited to agriculture. Open woodland or thorny scrub seems to have been fairly common although the range of calcophilic shrubby species identified from these charcoal deposits is fairly limited. Most of the sites described above had reasonable access to rivers, where the damper soils in the valleys would have supported wetland species such as alder, willow, poplar and elm.

Conclusion

The analysis of charcoal deposits from prehistoric contexts on Sites 2, 3, 5 and 6 mainly referred to pits and post holes from Neolithic and Bronze Age features, mostly associated with domestic hearths although the origin of some deposits remained uncertain. The study also included charcoal from a Middle Bronze Age cremation and a Romano-British pottery kiln. The fuel debris commonly consisted of oak (*Quercus* sp.), hazel (*Corylus avellana*) and the hawthorn/ *Sorbus* group (Pomoideae), although residues from two features were of special interest. These included the cremation deposit 2129, which indicated the (apparently) exclusive use of ash (*Fraxinus excelsior*) in the pyre construction (and conformed to similar findings from a Middle-Late Bronze Age cremation at Dunch Hill) and the Middle Bronze Age pit 3102, into which a large amount of charcoal had been dumped in a single event. Since the character of the charcoal in this pit (mostly ash and maple (*Acer campestre*) was in marked contrast to that in other pits, it was suggested that this material derived from a different, although unknown, activity.

The divergent range of environmental conditions that obtained from West to East along the course of the pipeline would have exerted a major influence on species dominance and distribution. Thus the rather conservative range of species identified from the charcoal may have resulted from bias in favour of preferred species, rather than their geographical distribution, but, nonetheless, the dominance of oak suggests that this taxon was strongly represented in the area and probably formed the climax woodland. Open scrub also appears to have been common. There was insufficient evidence to comment on woodland management.

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Table CH1 Charcoal from prehistoric contexts, and Romano-British kiln

Feature	*Context*	*Sample*	*Acer*	*Corylus*	*Fraxinus*	*Pomoideae*	*Prunus*	*Quercus*	*Ulmus*
Peterborough/Middle Neolithic									
Site 3									
Pit 3000	3001	11	-	6	-	-	-	-	-
	3002	10	-	4	-	2	-	1h, 2s	-
Pit 3007	3012	76	-	12	-	-	-	2h/u	-
Pit 3119	3120	58	-	4	-	5	-	7h/u, 1s	-
Site 5									
Pit 6056	6057	84	-	7	-	-	-	5u	-
Pit 6061	6063	88	-	7	-	4	-	2u	-
Pit 6093	6097	104	-	3	-	-	-	1s, 1u	-
Late Neolithic/Early Bronze Age									
Site 2									
Pit 1034	1035	2	-	15	-	9	-	42h/u, 25s	8
Bronze Age									
Site 2									
Crem. grave 2129	2120	6	-	-	14	-	-	-	-
Site 3									
Pit 3102	3133	42	21	-	107s	-	-	5	-
Pit 3147	3173	40	-	-	-	2	-	11h/u,8s	-
Pit 3328	3329	79	-	-	-	1	-	3h/u	-
Roundhouse 3240									
Posthole 3091	3114	24	-	4	-	-	-	1s, 1t	-
Posthole 3177	3178	72	-	-	-	-	-	3h/u	-
Site 6									
Pit 8080	8082	113	-	1	-	1	-	18h, 2s	-
Romano-British									
Site 5									
Kiln 6163	6164	144	-	-	-	-	3	2u	-

Key. h = heartwood; s = sapwood; t = twig; u = unknown maturity (oak only); the number of fragments identified is indicated