THE WOOD CHARCOAL AND CHARRED PLANT REMAINS FROM PERRY OAKS

by Dana Challinor

Introduction

Over 500 samples were processed for the recovery of charred plant remains and charcoal throughout the excavations at Perry Oaks, Northern Taxiway and Grass Area 21. On the basis of the assessment (unpublished assessment report Gill Campbell and Dana Challinor), 21 samples were chosen for charcoal analysis. The samples were selected from a range of deposits from different features and periods, ranging from the Neolithic to the late Romano-British. The aims of the charcoal analysis were to determine the taxonomic composition of samples from different periods and to investigate the evidence for changes in fuelwood usage and woodland resources over time. Ten samples were selected for the analysis of charred plant remains from ditches, a pit and a waterhole; these were all dated to the Romano-British period. Seven of the samples were from a group of gullies/beamslots thought to be part of a single 'barn' structure (Roman building B1). The aims of the analysis were to investigate the function of the barn structure and to see how this related to other contemporary features. The assessment results have been summarised in the report where relevant.

Methodology

The samples were processed by flotation in a modified Siraf-type machine, with sample sizes mostly 10-30 litres in volume. A number of the charcoal samples had originally been taken as part of a series of spits and the assessment revealed no discernible differences between flots of the same context: in these cases the flots were amalgamated and issued with a new sample number. Some of the charcoal samples were so rich that it was necessary to sub-sample, using a riffle box. The sub-samples were then divided into fractions using a set of sieves and fragments > 2mm were identified. The charcoal was fractured and sorted into groups based on the anatomical features observed in transverse section at X10 and X20 magnification. Representative fragments from each group were then selected for further examination 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. A total of 1708 fragments were examined.

The preservation of the charcoal was generally too poor for the maturity of the wood to be assessed. Combined methods of ubiquity or presence analysis and quantification by fragment count have been used in this report. It is acknowledged that there are differential rates of fragmentation in charcoal and that quantification by fragment count is not always reliable, but this method has been used in this report to demonstrate relationships between individual taxa.

The samples for charred plant analysis were put through a stack of sieves down to 300µm to aid sorting. Any identifiable seeds, chaff or other plant items present were extracted. Identifications were made under a binocular microscope at x10 to x20 magnification and were based on morphological characteristics and by comparison with modern reference material held at the Oxford University Museum of Natural History. Cereal grains were counted on the basis of embryo ends. The plant parts recorded in the table are seeds unless otherwise stated. Classification and nomenclature for the weed seeds and the charcoal follow Stace (1997).

Notes on identification

The full results of the charcoal analysis by fragment count are given in Table 1. Eleven taxa were positively identified. The taxonomic level of identification varied according to the biogeography and anatomy of the taxa:

Pinaceae:

- *Pinus sylvestris* (Scots pine), evergreen tree, native.

Fagaceae:

- *Fagus sylvatica* (beech), tree, early native status debated, but not contentious for the period relevant to this report.
- *Quercus* sp. (oak), tree, two native species not distinguishable anatomically.

Betulaceae:

- *Corylus avellana* (hazel), shrub or small tree, only native species.
- *Alnus glutinosa* (alder), tree preferring damp soils, only native species.

These two species have a very similar anatomical structure and can be difficult to distinguish, hence the category *Alnus/Corylus*. Since both species were positively identified, this category may represent either or both taxa.

Rosaceae:

- *Prunus* spp., includes *P. spinosa* (blackthorn), *P. avium* (wild cherry) and *P. padus* (bird cherry); can be difficult to distinguish anatomically. The distinction between *P. spinosa* and *P. avium/padus* made at this site was on the basis of ray width.
- Maloideae, subfamily of various shrubs/small trees including *Pyrus* sp. (pear), *Malus* sp. (apple), *Sorbus* spp. (rowan/service/whitebeam) and *Crataegus* sp. (hawthorn), rarely distinguishable by anatomical characteristics.

Rhamnaceae:

- *Rhamnus cathartica* (purging buckthorn), shrub, sole native species.

Aceraceae:

- *Acer campestre* (field maple), tree sole native species.

Oleaceae:

- *Fraxinus excelsior* (ash), tree, sole native species.

The preservation of the charcoal was generally poor, and there were fragments in all samples categorised as indeterminate, which were not identifiable because of poor preservation or an unusual cellular structure. In several samples, the charcoal was highly vitrified, having a glassy appearance indicative of high temperatures. It is likely that these indeterminate fragments represent additional specimens of taxa positively identified at the site. For this reason the indeterminate category has not been included in the figures. All samples are from the Perry Oaks area excavation unless otherwise stated.

The full results of the charred plant analysis are given in Table 2. The quantity of material in each sample varied considerably as the calculation of items per litre indicates. Given the difficulties of identifying *Triticum* (wheat) grain to species level (Hillman *et al*. 1996, 206), most of the cereal grains from Perry Oaks are recorded only to generic level. Since there was no indication of any free-threshing wheat, it is likely that the species represented are either *T. spelta* (spelt) or *T. dicoccum* (emmer). Certainly, results from the waterlogged plant macros suggest that both species were being cultivated at Perry Oaks from the Bronze Age to the Late Romano-British period (Carruthers, this vol). Identifications of emmer wheat from the charred remains, however, were tentative. Although the chaff is more diagnostic (see Carruthers for discussion of identification criteria), many of the glume bases were fractured to less than half the full length, making identification to species level difficult. There was no evidence for cultivated oat in the samples, although *Avena fatua/sterilis* was identified from the floret bases in sample 1265. The awn fragments were not counted or included in the calculations, although an estimate of quantity is given on the basis that * = rare, ** = frequent, ***=abundant.

Mesolithic

Samples were taken from every quadrant of the Mesolithic pits. The assessment showed that most of the samples produced little or no charred remains. A couple of the pits (165009, 160021) contained larger quantities of charcoal, which is likely to have entered the deposits as fuelwood as part of the flint-burning process. Provisional identification of the charcoal from Perry Oaks revealed fragments of *Quercus* sp. (oak) and Maloideae (hawthorn type) but the condition of the charcoal was so poor that it was not possible undertake further analysis. The recovery of charcoal from sites of this date in Southern Britain is very rare (Smith 2002) but the provisional results from Perry Oaks are consistent with those from other sites (e.g. Cartwright 1985; Thompson 1999).

Neolithic

A single sample (409) dating to the Late Neolithic was analysed from tree throw 156191. The assemblage was dominated by *Quercus*, with lesser amounts of *Fraxinus excelsior* and Maloideae. Both *Corylus avellana* and *Alnus glutinosa* were positively identified in small quantities. There was a high level of indeterminate fragments as the condition of the charcoal was poor. All of the taxa identified are native British trees and are represented in the pollen record for the earlier Neolithic pit 150011 (Wiltshire, this vol). Other species recorded in the pollen analysis (e.g. *Betula*, birch and *Ulmus*, elm) but not present in the charcoal may be due to fuelwood selection practices but it must be noted that the analysis may be biased by its limitation to a single sample. The range of taxa indicates that the charcoal did not result from the tree burning down, but most likely from a domestic fire built in the shelter of the tree-throw. Most of these species, with the exception of *Alnus*, have good burning properties and would have made a fire suitable for most purposes (Edlin 1949). Similar assemblages have been recovered from Neolithic features at other sites in Southern Britain (e.g. Gale 2004).

Horse-shoe shaped enclosure

A total of 19 samples were taken from the horse-shoe shaped enclosure (HE1; 107042), which appears to be dated to the 3rd millennium BC. The feature was sampled in a spatial pattern but the assessment results showed that much of the charcoal was too comminuted to identify and where larger fragments did survive there were no significant differences in composition. Consequently, a single sample was analysed in full to confirm the range of species present. Three taxa were positively identified; *Quercus* dominated the assemblage with smaller amounts of *Prunus spinosa* and Maloideae. *Prunus* and Maloideae tend to be shrubs rather than large trees and often form part of hedgerows. There is nothing in the assemblage to indicate the function of the fire which produced the charcoal.

Bronze Age

Middle Bronze Age Settlement

Three samples from post-holes forming part of the middle Bronze Age settlements in different areas of the site were analysed; two from Grass Area 21 (GAA00; features 404032, 404035) and one from Northern Taxiway (GAI99; feature 210100). It can be seen from Figure 1 that the assemblages from the Grass Area 21 post-holes are similar - dominated by *Quercus* with some *Fraxinus* and Maloideae. Sample 6004 from feature 404035 also produced some fragments of *Corylus avellana*. The sample from Northern Taxiway differs in that *Fraxinus* is dominant and there are some fragments of *Acer*. The range of species present in all the samples confirms that the deposits are not made up of structural wood from burnt posts but the remains of domestic fires incorporated into the post-hole fills during the final phases of the buildings' use. All of these species would have been locally available in the middle Bronze Age and are suitable as fuelwood. A similar range of species were noted in 11 other MBA post-hole samples during the assessment.

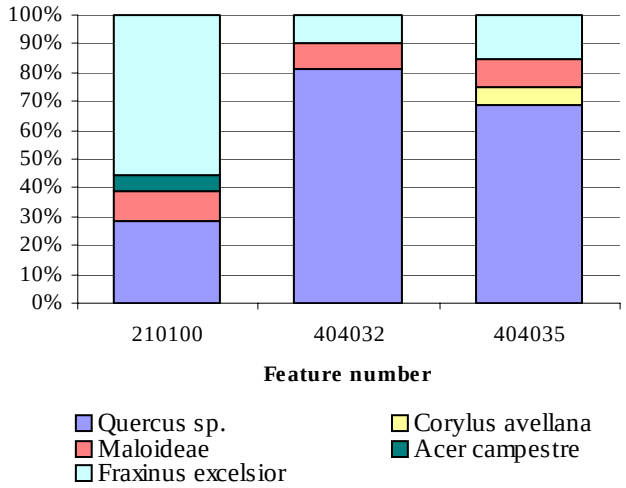

Figure 1: Composition of charcoal assemblages from MBA settlement

The results from the assessment of the non-wood charred plant remains for this period showed that preservation was generally poor. Occasional grains of *Triticum* sp. (wheat) and *Hordeum* sp. (barley) and *T. spelta/dicoccum* (spelt/emmer wheat) glume bases were noted.

Cremations

Three samples from the late Bronze Age cremation deposit 106013 were analysed. Somewhat surprisingly, there were variations in the composition of the deposits (Figure 2). The primary fill 106014 produced only *Alnus/Corylus* charcoal while upper fills were dominated by *Quercus.* None of the charcoal was well-preserved enough to distinguish between the *Alnus/Corylus* although it is likely that it may have been *Corylus*, as *Alnus* does not burn well and would not have been a good choice for human cremation. However, the primary fuel may have been *Quercus*, with the other taxa as supplementary fuel. A second cremation deposit (pit 137027), undated but thought to date to the mid-late Bronze Age, was also analysed. This assemblage was dominated by a single taxon, *Quercus*, with small quantities of Maloideae and *Rhamnus cathartica* Certainly, the small quantities of other taxa in both cremation pits indicate that these species were probably used either as kindling or entered the fire accidentally or not as fuel - potentially as wooden objects laid on the pyre. Certainly, the analysis of the human bone (McKinley, this vol.) revealed the remains of pyre goods (animal bone and copper alloy) in cremation pit 137027.

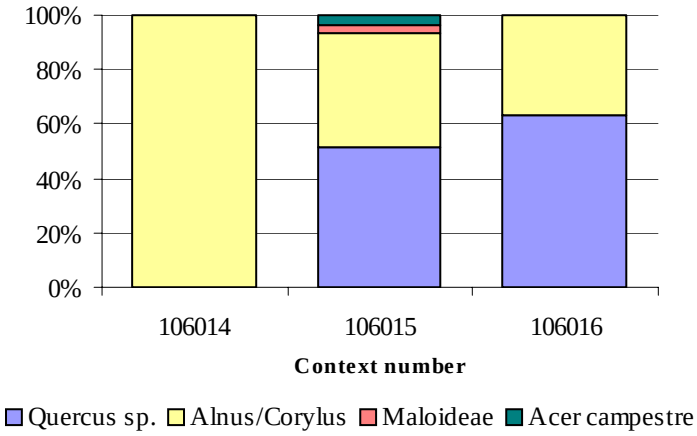

Figure 2: Charcoal from cremation 106013

Ten *Arrhenatherum elatius* (onion couch) tubers were also recovered from the sample from pit 137027. Indeed, the presence of edible tubers, such as *Arrhenatherum elatius*, in cremation deposits are particularly characteristic of Bronze Age cremations (e.g. Jones 1978, 108; Carruthers 1992, 63; Moffett 1999, 245), although their purpose in these assemblages is unclear. These tubers may have entered the funeral pyre as tinder; the root stems being accidentally uprooted while gathering the dry, dead stems for kindling (Robinson 1988, 102). This seems quite a likely provenance for them although it is notable that tubers are not frequently present in other contexts where *Arrhenatherum* would make an appropriate kindling/tinder (e.g. domestic hearths). Another possibility is that the tubers were collected for food although significant preparation would be required to ensure their edibility, and again, they are not frequently found in non-cremation contexts. Of course, the preparation required may have been an important part of the ritual of the cremation or it may not even have been necessary if the tubers were pyre goods.

It is apparent from the human bone report (McKinley, this vol.) that the cremation pit deposits represented the burial of single individuals, in both cases female. The charcoal assemblages, therefore, are single-event depositions of related pyre material.

The predominance of a single taxon in Bronze Age cremation assemblages has been noted recently at a number of sites; such as Radley Barrow Hills (Thompson 1999, 352), Lechlade, Gloucestershire (Robinson 1988, 25) and Rollright Stones (Straker 1988). It is assumed from this fact that one type of wood was deliberately chosen for the funeral pyre (Thompson 1999, 352), which would also appear to be the case at Perry Oaks. Certainly, the predominance for *Quercus* as a fuelwood in cremations was common during the Bronze Age (e.g. Boyer 1992; Cutler 1978; Dimbleby 1965; Dimbleby 1981; Keepax 1976; Levy 1960; Sheldon 1969).

Late Bronze Age

A variety of features including pits and ditches were sampled from the late Bronze Age. The assessment results from 20 samples indicated the use of similar species to earlier periods. Two samples from pits - one from Northern Taxiway (GA199; feature 216063) and the other from WPR98 Bed A (feature 148042) - were analysed. Sample 5069 (feature 216063) produced a greater range of taxa but otherwise the samples were remarkably similar in composition - dominated by *Quercus* with smaller quantities of Maloideae and *Fraxinus* (Figure 3). The recurring occurrence of the same range of species indicates that woodland resources and fuel collection practices remained consistent throughout the Bronze Age.

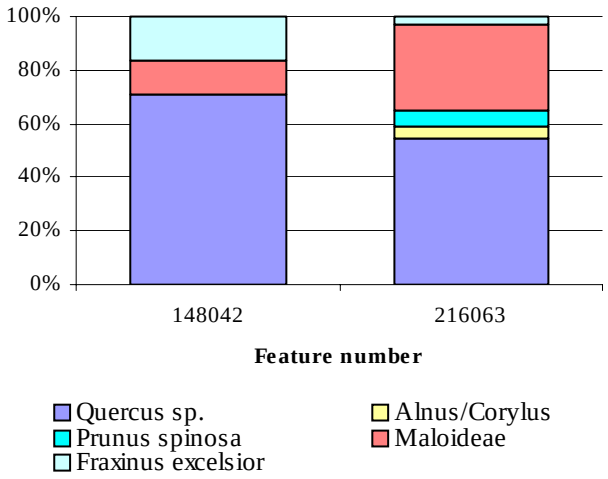

Figure 3: Composition of charcoal assemblage from Late Bronze Age Pits

Iron Age

Early-middle Iron Age

A single sample from post-hole 126173, dating to the early-mid Iron Age was examined. The quantity of charcoal in the sample was low, with only 20 fragments identified. Two taxa were present - *Quercus* (oak) which dominated the assemblage and *Pinus sylvestris* (Scots pine). This is the only sample to have produced *Pinus* charcoal which is quite unusual but the pollen analysis records low levels of *Pinus* from the Neolithic to the late Bronze Age.

Middle Iron Age Settlement

A total of 99 samples, taken from various features including post-holes, gullies and tree throws, were assessed. Many of these produced little charcoal and charred plant remains were sparse. Rare cereal grains were noted, where preservation was good

enough, these appeared to be *Triticum spelta/dicoccum* (spelt/emmer wheat) and *Hordeum* sp. (barley). Chaff fragments confirmed the presence of these taxa with occasional glume bases and rachis fragments. An assemblage from ditch fill 123062 produced a fragment of hazelnut shell and some large seeded wild grasses. A large number of the samples taken from the middle Iron Age period were from the round houses, which were sampled spatially across the ring gullies. The general lack of remains meant that there was no value in spatial analysis and only three samples from different ring gullies (107106, 108011, 108014) were analysed. Samples from two pits (141147 and 163005) were also examined.

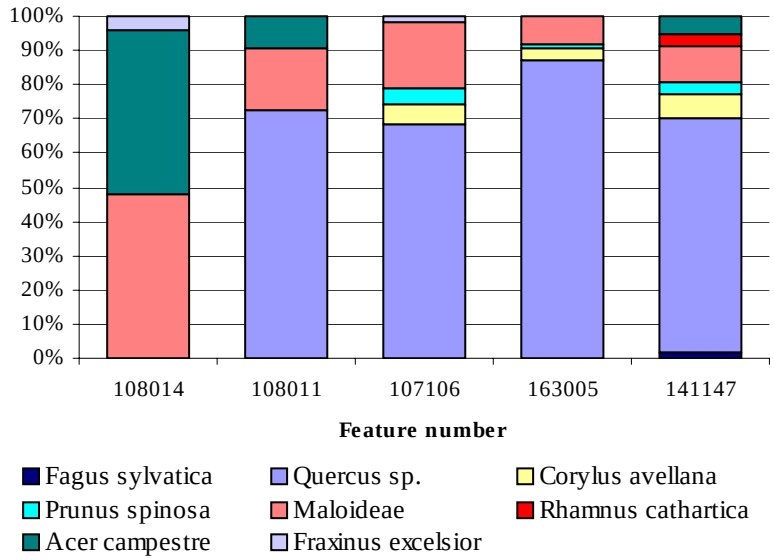

Figure 4: Composition of charcoal assemblages from middle Iron Age Settlement

A reasonably wide range of taxa was identified from all of the samples, although the composition varied a little (Figure 4). Two assemblages are strikingly different; sample 176 (feature 108014) contained no *Quercus* which dominated all of the other assemblages. The composition of this assemblage was dominated by shrubby taxa, Maloideae and *Acer campestre*. The sample from pit 141147 is distinguished by the range of taxa present, including two species rarely represented in the charcoal record from Perry Oaks - *Fagus sylvatica* and *Rhamnus cathartica. Rhamnus* is a shrub often found in hedgerows but favours damp conditions and may have grown on the floodplain.

Romano-British

The assessment of the charcoal from the Romano-British field system indicated that *Quercus* was ubiquitous, with smaller quantities of other taxa. A single sample (77) from ditch 160102 was selected to examine the range of taxa utilised as fuel in this period. The taxa identified were similar to the Iron Age - *Quercus*, with *Corylus*, *Fagus* and *Prunus* (Figure ++). The *Prunus* was of particular interest as it was not thought to be *P. spinosa* which was identified in earlier periods, but *P. avium/padus*. It was not possible to distinguish between these two species but it is worth noting that the native status of *P. avium* is uncertain and it may be a Roman introduction to Britain (see discussion in Moffet *et al.* 1989).

A total of ten samples from Romano-British features were analysed in full for charred plant remains. All of the samples were dominated by *Triticum* sp. (wheat), be it grain or chaff, and where identifications were possible, *Triticum spelta* (spelt wheat) tended to be well represented. *Hordeum* (barley) and *Secale cereale* (rye) were also present in all but two samples (670 & 681) and these were the least rich in charred remains generally. The quantity of rye is of particular interest as there are few sites in Britain to have produced this cereal in quantity for this period. The assemblages of weed seeds are dominated by species of disturbed/cultivated land, such as *Chenopodium album* (fat-hen), *Stellaria media* group (common chickweed), *Rumex* sp. (dock), *Galium aparine* (cleavers) and Poaceae (grasses), including large quantities of *Bromus* cf. *secalinus* (rye brome). Arable species are represented by *Spergula arvensis* (corn spurrey), *Odontities vernus* (red bartsia), *Anthemis cotula* (stinking chamomile) and *Tripleurospermum inodorum* (scentless mayweed). The presence of so much *Anthemis cotula* is of interest as this species is a Roman introduction to Britain (see Carruthers, this vol., for discussion on this species). The occasional seeds of *Montia fontana* (blinks) and *Eleocharis palustris* (common spike-rush) are indicative of wet grassland, perhaps suggesting damp areas or muddy puddles in the middle of the crop fields. The quantity of chaff and weed seeds of arable/disturbed ground indicates that the assemblages represent the dumped remains of crop processing waste.

Romano-British Barn Structure (B1)

Three samples were analysed for charcoal from this structure, which appeared from the quantity of charred material to relate to crop processing activity. It is immediately striking that there is a lesser range of taxa in two of the samples and even the third is composed of more than 80% *Quercus*. Figure 5 compares the three samples from the barn structure (126121, 148155, 126129) and the ditch 160102. This suggests a greater degree of care was taken when selecting the fuelwood for a specific purpose than in the general field system assemblages. It is apparent from the analysis of the charred plant remains from this structure that the charcoal in these deposits was fuelwood used for crop processing.

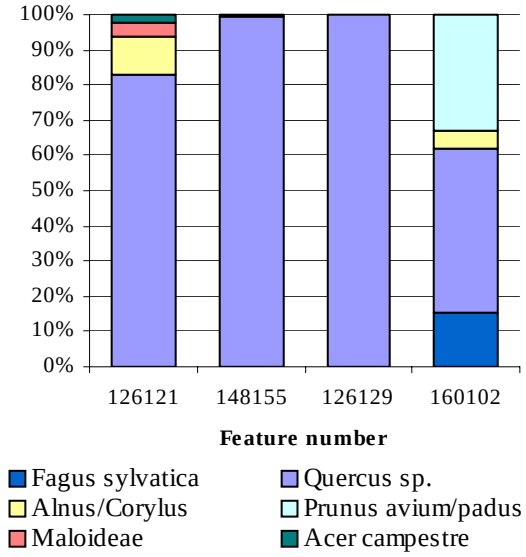

Figure 5: Composition of charcoal assemblages from Romano-British features

Seven samples from the barn (B1) were examined for charred plant remains (samples 655, 659, 661, 667, 669, 670, 681). The assemblages fall into two categories - those which are rich in weeds and chaff and those which are richer in grain. Samples from the termini of the same beamslot tended to be very similar in character and have been grouped together for the pie charts (Figure 6). Figure 6 shows that the assemblages from 148155 and 126121 correspond with grain-richest and smaller quantities of chaff and weeds. The assemblages from 147253 and 113079 differ markedly from the other two, but are similar to each other, dominated by chaff and weeds, with only small amounts of grain. It is thought likely that the material in each sample represents a single deposition, although the assemblage itself may have resulted from several crop processing events, such as a cleaning-out of a corn dryer after several burnings. Nevertheless, the similarity of the samples suggests that they are likely to have been dumps of material resulting from the same activity. Clearly these events have taken place after the barn structure has passed into disuse and the composition of the assemblages suggest that each deposit was a single dumping event into the beamslots of the decayed/dismantled structure. The distribution of these assemblages makes it impossible to differentiate areas of specific activity. Nevertheless, it is reasonable to assume that the samples are the result of crop processing activities which were being carried out in the close vicinity of the barn structure. The grain-dominated assemblages are likely to have resulted from accidental over-burning during crop processing while the chaff-rich assemblages would be the by-product of the process.

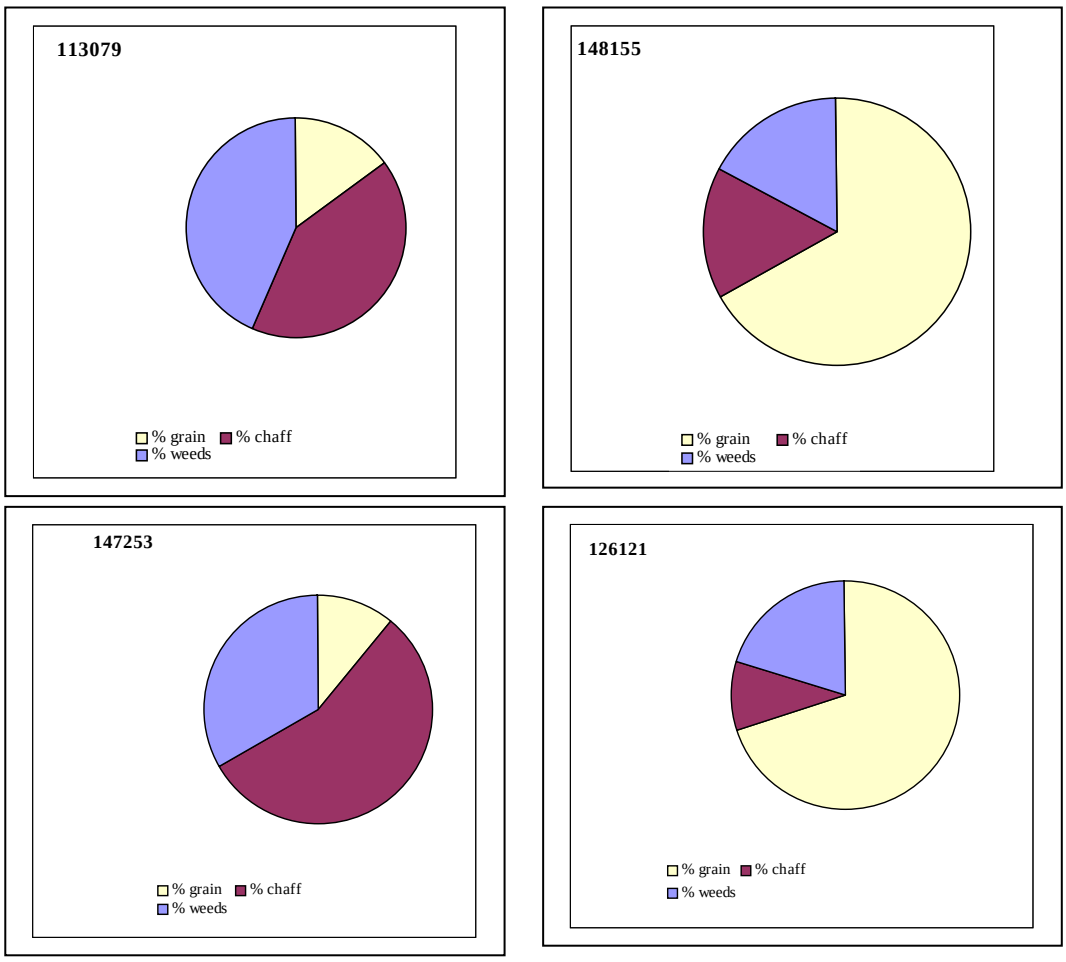

Figure 6: Composition of charred plant remains from Roman building B1

There was no archaeological evidence nearby for a Romano-British settlement but the insects analysed from waterhole 174009 (to the north-east of the barn) strongly suggest the proximity of timber buildings (Robinson, *CD section 12*). The level of truncation in this area of the site may have caused the loss of archaeological evidence; it is possible that there was a corn dryer close to the barn structure which produced the burnt assemblages.

General Romano-British features

Three samples were analysed from general features: two from waterholes/pits (features 174024 and 135087) which were also analysed for plant macros (Carruthers, *CD section 9*) and insects (Mark Robinson, *CD section 12*) and the third from a ditch forming part of the field system (147237). It is apparent from Figure 7 that the assemblages from these three features are very similar and resulted from the by-product of crop processing, since there was little grain recovered. This is consistent with the results from the plant waterlogged plant remains which demonstrates that non-charred processing waste was also present. Carruthers also suggests that the cereal remains recovered from pit 135087 may have represented fodder and/or dung since it was found in compressed, matted layers. It is likely that the pit became the rubbish dump for arable and pastoral waste since there was no evidence to suggest that it was close to a contemporary settlement.

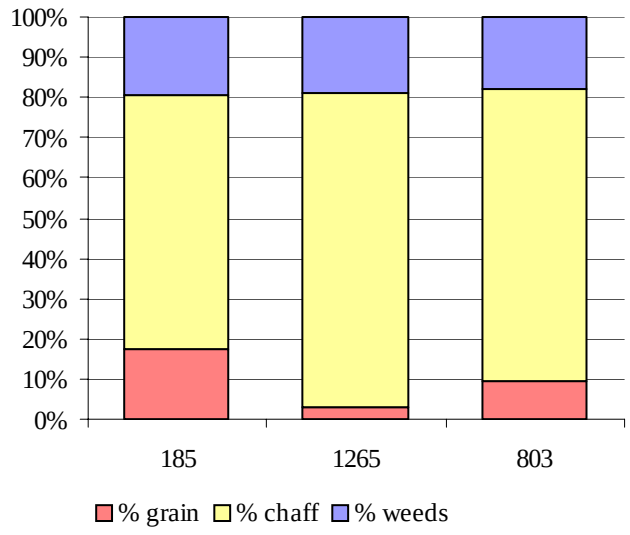

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Figure 7: Composition of charred assemblages from general Romano-British features

General discussion

The woody environment/fuelwood selection: changes over time

The woody species identified from the four periods of occupation indicates overall consistency in the availability of woodland resources (Figure 8). It should be noted that the figure is intended as a guide to trends over time but is limited by such factors as that the Neolithic period is only represented by a single sample. For the purposes of the graph, no distinction has been made between *Alnus* and *Corylus* and *Pinus* and *Rhamnus* have been grouped together since they are small categories. It is quite apparent that *Quercus* is dominant in all phases while the use of supplementary fuels is subject to more change, possibly reflecting species availability. The picture that emerges of the woody environment at Perry Oaks is one of *Quercus/Corylus/Fraxinus* woodland, with marginal woodland/shrubby species such as the Maloideae and *Prunus spinosa* and that this remains more or less constant throughout the period of occupation.

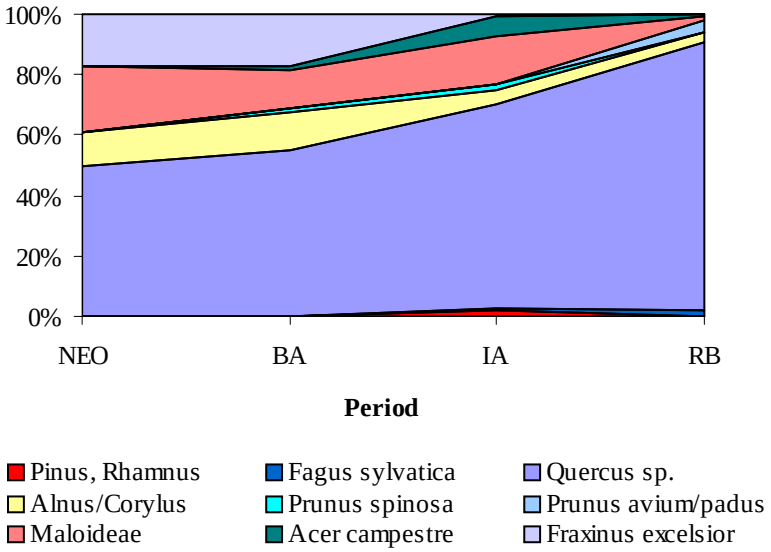

Figure 8: Changes in woodland taxa over time

Clearly, the evidence from the insect, waterlogged plant remains and pollen analyses for clearance and changes in woodland environment over time are lacking from the charcoal record. This demonstrates the limitations and problems of interpreting charcoal assemblages and, in particular, extrapolating the data to the environment. Nevertheless, two trends are apparent; firstly, there was no shortage of large oak trees for fuelwood at any time and secondly that fuelwood practices remained more or less constant from the Neolithic to the late Romano-British period.

Cereal cultivation

While there is little data from the charred plant remains for the prehistoric period at Perry Oaks, the provisional identifications of cereal remains from the samples is consistent with the results from the waterlogged plant macros (Carruthers, *CD section 9*). This demonstrates that *Hordeum*, *Triticum spelta* and *T. dicoccum* were cultivated throughout all phases of occupation at Perry Oaks through to the Romano-British period. The results from the charred plant analysis indicate that *T. spelta* was the dominant crop in the later period, with *T. dicoccum* possibly a contaminant of the

main crop. Indeed, *T. spelta* is the principal wheat recovered across Southern Britain in the Roman period (Greig 1991). The cultivation of *Secale* may be related to soil changes or a change in field locations since this crop grows well in low nutrient and acidic conditions. *Secale* does require well-drained soils which would have been available on the gravel terraces at Perry Oaks. The *Avena* sp. (oat) is likely to have been a contaminant since it was present in very small quantities and cannot, in most cases, be confirmed as wild or cultivated.

Conclusions

Across the excavations at Perry Oaks as a whole, the bulk sampling tended to produce charcoal but few samples with charred seeds and chaff. The condition of the charred remains was generally quite poor, probably due to fluctuations in the water table. Nevertheless, the analysis of the charcoal has demonstrated consistency in fuelwood practices over time and that at no point were woodland resources so depleted to effect change. In addition, the non-woody plant remains have revealed that cereal cultivation at the site was consistent with the pattern across Southern England in the Roman period but that there was potentially a greater emphasis on the cultivation of *Secale* than is commonly found at other sites of this period.

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PERRYOAKS CHARCOAL

Period		Late Neolithic	Middle Bronze Age			Late Bronze Age						Early/Middle Iron Age	Middle Iron Age				Late Iron Age	Romano-British				Unphased
Feature		Tree Throw	Posthole			Cremation			Ditch	Pit	Pit	Posthole	Ring Gully		Ditch	Pit	Pit	Ditch	Gully	Ditch	Ditch	Cremation
Feature		156191	210100	404032	404035	106013			107042	148042	216063	126173	108011	108014	107106	141147	163005	126121	148155	126129	160102	137027
SGDeposit number		156192	210101	404033	404036	106014	106015	106016	107041	148039	216065	126175	108013	108017	107117	141146	163007	126122	148154	126130	160103	137036
Sample number		**409**	**5066**	**6003**	**6004**	**1563**	**1564**	**1565**	**205**	**524**	**5068**	**1257**	**192**	**176**	**568**	**703**	**308**	**660**	**667**	**689**	**77**	**1566**
Volume floated		27	7	15	20	116	22	43	20	20	10	10	20	20	20	20	10	10	10	10	20	59
Percentage identified		50	100	25	100	25	100	25	100	100	100	100	100	100	100	100	25	50	100	12.5	25	12.5
Pinus sylvestris	Scots pine	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
Fagus sylvatica	beech	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	9	-
Quercus sp.	oak	32	31	60	67	-	15	24	17	22	50	13	8	-	45	39	55	106	145	137	27	62
Corylus avellana	hazel	1	-	-	6	-	-	-	-	-	-	-	-	-	4	4	2	8	1	-	1	-
Alnus glutinosa	alder	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Corylus/Alnus	hazel/alder	1	-	-	-	31	12	14	-	-	4	-	-	-	-	-	-	6	-	-	2	-
Prunus spinosa	blackthorn	-	-	-	-	-	-	-	2	-	6	-	-	-	3	2	1	-	-	-	-	-
Prunus avium/padus	wild/bird cherry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	-
Maloideae	apple, pear, hawthorn	14	11	7	9	-	1	-	4	4	29	-	2	11	13	6	5	5	-	-	-	12
Rhamnus cathartica	buckthorn	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	9
Acer campestre	field maple	-	6	-	-	-	1	-	-	-	-	-	1	11	-	3	-	3	-	-	-	-
Fraxinus excelsior	ash	11	60	7	15	-	-	-	-	5	3	-	-	1	1	-	-	-	-	-	-	-
Indeterminate		20	4	19	15	22	23	11	9	32	21	4	1	1	19	29	27	14	6	15	26	15
Total number of fragments		84	112	93	112	53	52	49	32	63	113	20	12	24	85	86	90	142	152	152	84	98

Table 2: Full results of the charred plant analysis by fragment count

Feature Type		Gullies/beamslots of 'Barn' Stucture							Ditch	Water-hole	Pit
Feature no.		113079		126121		148155		147253	147237	174024	135087
SG Deposit no.		113077	113078	126122		148154		147248	147233	174027	135085
Context no.		125132	113078	126116	126120	148148	148150	147165	175028	174027	135077
Sample no.		**659**	**655**	**661**	**669**	**667**	**670**	**681**	**185**	**1265**	**803**
Volume of earth (l)		20	10	10	20	10	10	20	10	20	10
Volume of flot (ml)		54	55	61	26	39	12	29	49	247	116.5
Cereal grain											
Triticum cf. *dicoccum*	cf. Emmer wheat						4				
Triticum spelta	Spelt wheat	7	3	7	6	1			2		6
Triticum spelta	Spelt wheat, germinated						4				
Triticum spelta/dicoccum	Spelt/Emmer wheat	6	4	19	3	9	5		6		11
Triticum sp.	Wheat	12	12	246	17	25	14	1	17	4	12
Avena sp.	Oat		1								14
Hordeum vulgare	Barley, 6-row asymmetric	2	4						1		5
Hordeum sp.	Barley, straight	2	8								10
Hordeum sp.	Barley	11	12	45	3	6			4	2	27
Hordeum sp.	Barley, naked										4
Secale cereale	Rye	5	1								
cf. *Secale cereale*	cf. Rye	7		1	1	2					
Cerealia indet.	Indeterminate grain	31	34	82	17	37	17	1	7		48
Total cereal grain		**83**	**79**	**400**	**47**	**80**	**44**	**2**	**37**	**6**	**137**
Cereal chaff											
Triticum cf. *dicoccum*	cf. Emmer wheat glume base		9							2	
Triticum spelta	Spelt wheat glume base	18	85	24	4	6	9		28	21	128
Triticum spelta	Spelt wheat rachis								2		
Triticum cf. *spelta*	cf. Spelt wheat rachis								2		
Triticum cf. *spelta*	cf. Spelt wheat basal rachis								1		
Triticum spelta/dicoccum	Spelt/Emmer wheat glume base	115	135	16	12	13	1	10	99	107	648
Triticum sp. Hexaploid	Spelt/bread type wheat rachis	20	10						2	13	105
Triticum sp. Hexaploid	Spelt/bread type wheat basal rachis	1									1
Triticum/Secale	Wheat/Rye awn									*	
Avena fatua/sterilis	Wild oat floret base									2	
Avena sp.	Oat floret base									2	
Avena sp.	Oat, awn		**				*		***	***	
Hordeum sp.	Barley rachis	3	9	1						1	44
Hordeum/Secale	Barley/Rye rachis	8	20	1							70
Hordeum/Secale	Barley/Rye basal rachis										1
Secale cereale	Rye rachis		13	2	1	1					13
Cerealia indet	coleoptiles	1	2	2							44
Cerealia indet	Cereal sized culm nodes			2							
Total chaff remains (excl awn)		**166**	**283**	**48**	**17**	**20**	**10**	**10**	**134**	**148**	**1054**
Weeds											
Chenopodium album	Fat-hen	29	10	12		4					17
Chenopodiaceae	Goosefoot family	46	32	1							21
cf. Chenopodiaceae	cf. Goosefoot family			2							
Montia fontana	Blinks			1							
Stellaria media group	Common Chickweed		1		1						
Spergula arvensis	Corn Spurrey			1							
Persicaria maculosa	Redshank									1	1
Persicaria lapathifolia	Pale persicaria										1
Polygonum aviculare agg.	Knotgrass										2
Rumex sp.	Dock	21	35	4	9			1	1	1	14
Rumex sp.	Dock, perianth tubicle										1
Raphanus raphanistrum	Wild radish, pod segments				3						
Brassicaceae	Cabbage family			1							
Vicia/Lathyrus	Vetches/Peas	18	17	13	2	10	6	2		11	5
cf. *Vicia/Lathyrus*	cf. Vetches/Peas								4		
cf. *Trifolium* sp.	cf. Clover		1								
Euphrasia /Odontites vernus	Eyebright/Red Barstia	1									
Odontites vernus	Red Barstia									2	
Galium aparine	Cleavers	2								1	
Anthemis cotula	Stinking Chamomile	21	7	1		1			10		48
Anthemis sp.	Chamomile			2	1						
Tripleurospermum inodorum	Scentless Mayweed	44	28	8	6				24	11	63
Anthemideae	Chamomile tribe	6									
Eleocharis palustris	Common Spike-rush		1					1			
Carex sp.	Sedges	1		1							
Poa sp.	Meadow Grass		1								
cf. *Poa* sp.	cf. Meadow Grass									1	
Bromus cf. *secalinus*	Rye Brome	14	71	17	4	5	6		1	2	51
Poaceae	Grass, small seeded	14	30	33	5					6	30
Indet.	Indeterminate culm nodes		4								
Indet.	Indeterminate weeds	14	2	2				2	1		10
Total weed remains		**231**	**240**	**99**	**31**	**20**	**12**	**6**	**41**	**36**	**264**
TOTAL REMAINS		**480**	**602**	**547**	**95**	**120**	**66**	**18**	**212**	**190**	**1455**
Items per litre		24	60	55	5	12	7	1	21	10	146

* = rare, ** = frequent, ***=abundant

CREMATION (1)

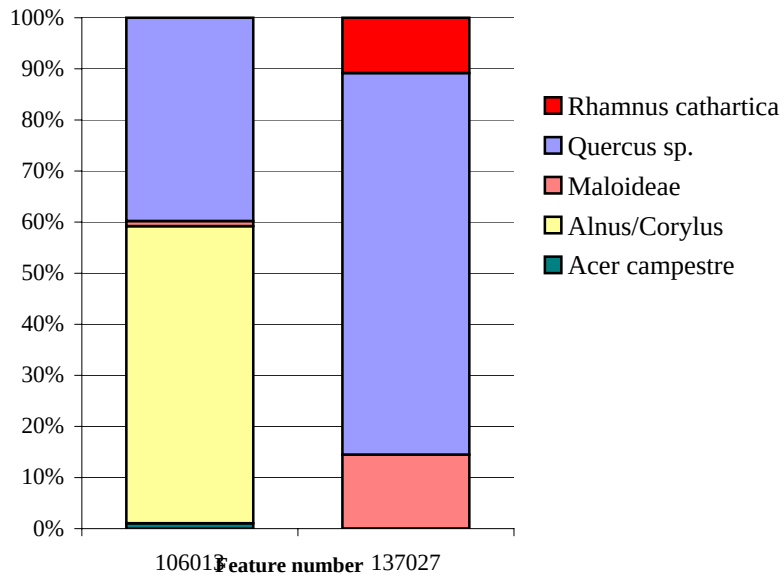
Sample number	Species	Number of fragments
106014	Indet.	22
106014	Alnus/Corylus	31
106015	Maloideae	1
106015	Alnus/Corylus	12
106015	Acer campestre	1
106015	Indet.	23
106015	Quercus sp.	15
106016	Indet.	11
106016	Alnus/Corylus	14
106016	Quercus sp.	24

Sum of Number of fragments	Sample number			
Species	106014	106015	106016	Grand Total
Quercus sp.	0%	52%	63%	39.80%
Alnus/Corylus	100%	41%	37%	58.16%
Maloideae	0%	3%	0%	1.02%
Acer campestre	0%	3%	0%	1.02%
Grand Total	100.00%	100.00%	100.00%	100.00%

CREMATION (2)

Feature	Species	Number of fragments
106013	Quercus sp.	24
106013	Alnus/Corylus	14
106013	Quercus sp.	15
106013	Acer campestre	1
106013	Alnus/Corylus	12
106013	Maloideae	1
106013	Alnus/Corylus	31
137027	Rhamnus cathartica	9
137027	Maloideae	12
137027	Quercus sp.	62

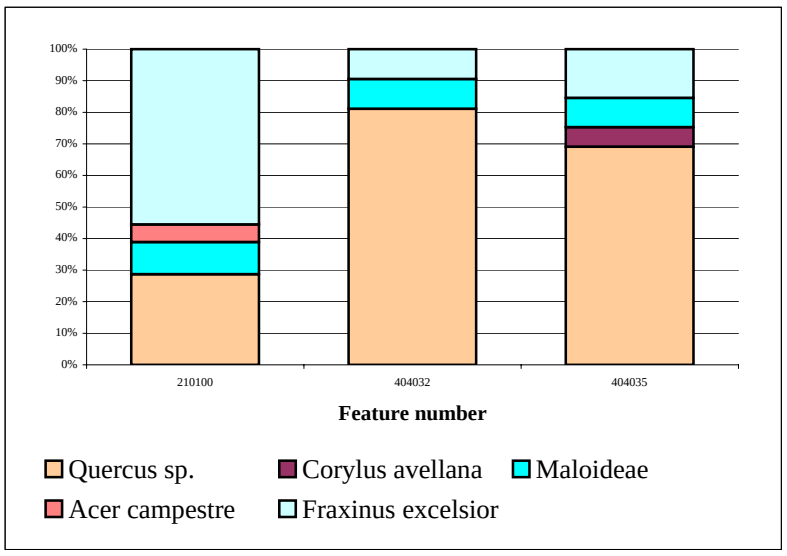
Sum of Number of fragments	Feature		
Species	106013	137027	Grand Total
Acer campestre	1%	0%	0.55%
Alnus/Corylus	58%	0%	31.49%
Maloideae	1%	14%	7.18%
Quercus sp.	40%	75%	55.80%
Rhamnus cathartica	0%	11%	4.97%
Grand Total	100.00%	100.00%	100.00%



MIDDLE BRONZE AGE

Species	Feature	Number of fragments
Acer campestre	210100	6
Fraxinus excelsior	210100	60
Maloideae	210100	11
Quercus sp.	210100	31
Maloideae	404032	7
Quercus sp.	404032	60
Fraxinus excelsior	404032	7
Corylus avellana	404035	6
Quercus sp.	404035	67
Fraxinus excelsior	404035	15
Maloideae	404035	9

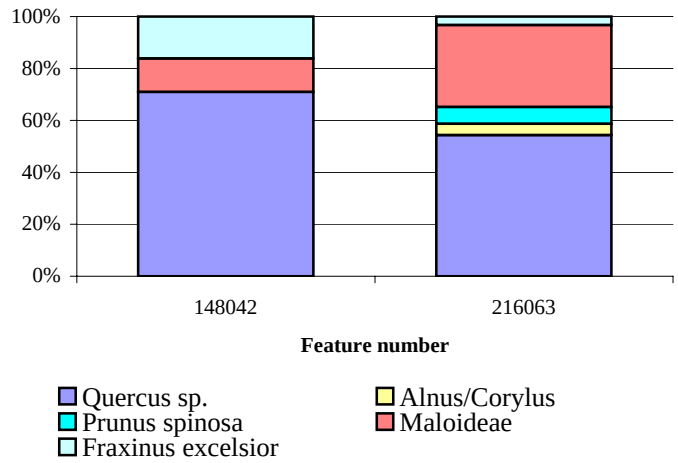
Sum of Number of fragments	Feature			
Species	210100	404032	404035	Grand Total
Quercus sp.	29%	81%	69%	56.63%
Corylus avellana	0%	0%	6%	2.15%
Maloideae	10%	9%	9%	9.68%
Acer campestre	6%	0%	0%	2.15%
Fraxinus excelsior	56%	9%	15%	29.39%
Grand Total	100.00%	100.00%	100.00%	100.00%



LATE BRONZE AGE

Species	Feature	Number of fragments
Fraxinus excelsior	148042	5
Maloideae	148042	4
Quercus sp.	148042	22
Quercus sp.	216063	50
Maloideae	216063	29
Prunus spinosa	216063	6
Alnus/Corylus	216063	4
Fraxinus excelsior	216063	3

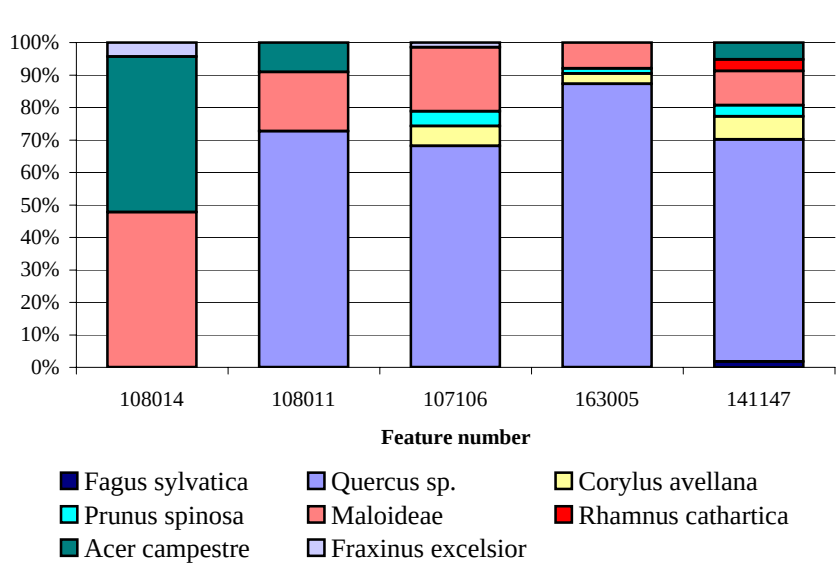
Sum of Number of fragments	Feature		
Species	148042	216063	Grand Total
Quercus sp.	71%	54%	58.54%
Alnus/Corylus	0%	4%	3.25%
Prunus spinosa	0%	7%	4.88%
Maloideae	13%	32%	26.83%
Fraxinus excelsior	16%	3%	6.50%
Grand Total	100.00%	100.00%	100.00%



MIDDLE IRON AGE

Species	Feature	Number of fragments
Prunus spinosa	163005	1
Quercus sp.	163005	55
Corylus avellana	163005	2
Maloideae	163005	5
Corylus avellana	107106	4
Fraxinus excelsior	107106	1
Quercus sp.	107106	45
Maloideae	107106	13
Prunus spinosa	107106	3
Prunus spinosa	141147	2
Maloideae	141147	6
Corylus avellana	141147	4
Rhamnus cathartica	141147	2
Quercus sp.	141147	39
Fagus sylvatica	141147	1
Acer campestre	141147	3
Acer campestre	108014	11
Fraxinus excelsior	108014	1
Maloideae	108014	11
Maloideae	108011	2
Acer campestre	108011	1
Quercus sp.	108011	8

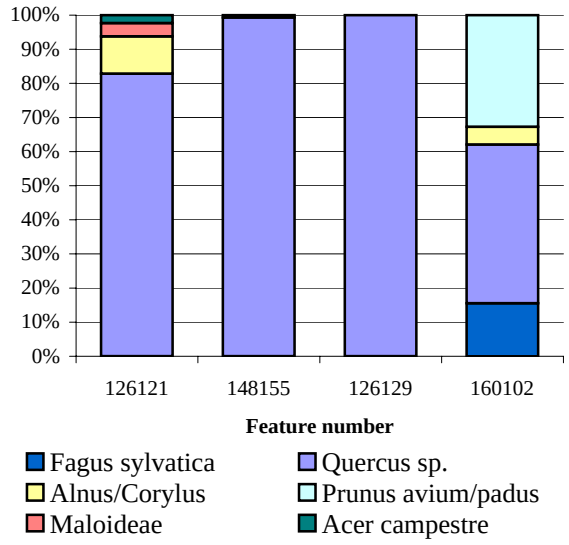
Sum of Number of fragments	Feature					
Species	108014	108011	107106	163005	141147	Grand Total
Fagus sylvatica	0%	0%	0%	0%	2%	0.45%
Quercus sp.	0%	73%	68%	87%	68%	66.82%
Corylus avellana	0%	0%	6%	3%	7%	4.55%
Prunus spinosa	0%	0%	5%	2%	4%	2.73%
Maloideae	48%	18%	20%	8%	11%	16.82%
Rhamnus cathartica	0%	0%	0%	0%	4%	0.91%
Acer campestre	48%	9%	0%	0%	5%	6.82%
Fraxinus excelsior	4%	0%	2%	0%	0%	0.91%
Grand Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%



BUILDING B1

Species	Feature	Number of fragments
Alnus/Corylus	126121	6
Acer campestre	126121	3
Maloideae	126121	5
Quercus sp.	126121	106
Alnus/Corylus	126121	8
Quercus sp.	148155	145
Alnus/Corylus	148155	1
Quercus sp.	126129	137
Fagus sylvatica	160102	9
Alnus/Corylus	160102	2
Alnus/Corylus	160102	1
Prunus avium/padus	160102	19
Quercus sp.	160102	27

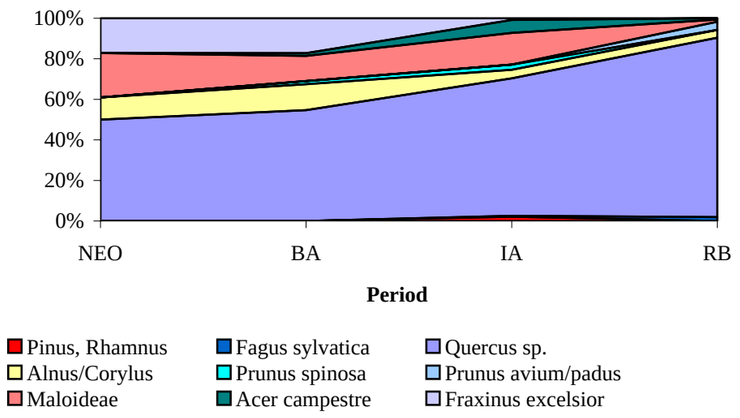
Sum of Number of fragments	Feature				
Species	126121	148155	126129	160102	Grand Total
Quercus sp.	83%	99%	100%	47%	88.49%
Maloideae	4%	0%	0%	0%	1.07%
Acer campestre	2%	0%	0%	0%	0.64%
Alnus/Corylus	11%	1%	0%	5%	3.84%
Fagus sylvatica	0%	0%	0%	16%	1.92%
Prunus avium/padus	0%	0%	0%	33%	4.05%
Grand Total	100.00%	100.00%	100.00%	100.00%	100.00%



FRAGMENTS OF CHARCOAL BY PHASE

Date	Sample number	Species	Number of fragments
RB	77	Alnus/Corylus	1
RB	77	Quercus sp.	27
RB	77	Fagus	9
RB	77	Alnus/Corylus	2
RB	77	Prunus avium/padus	19
IA	176	Acer	11
IA	176	Maloideae	11
IA	176	Fraxinus excelsior	1
IA	192	Acer	1
IA	192	Maloideae	2
IA	192	Quercus sp.	8
BA	205	Quercus sp.	17
BA	205	Maloideae	4
BA	205	Prunus	2
IA	308	Maloideae	5
IA	308	Alnus/Corylus	2
IA	308	Prunus	1
IA	308	Quercus sp.	55
NEO	409	Maloideae	14
NEO	409	Alnus/Corylus	1
NEO	409	Fraxinus excelsior	11
NEO	409	Alnus/Corylus	5
NEO	409	Alnus/Corylus	1
NEO	409	Alnus/Corylus	1
NEO	409	Quercus sp.	32
BA	524	Fraxinus excelsior	5
BA	524	Maloideae	4
BA	524	Quercus sp.	22
IA	568	Alnus/Corylus	4
IA	568	Fraxinus excelsior	1
IA	568	Quercus sp.	45
IA	568	Maloideae	13
IA	568	Prunus	3
RB	660	Alnus/Corylus	8
RB	660	Acer	3
RB	660	Maloideae	5
RB	660	Quercus sp.	106
RB	660	Alnus/Corylus	6
RB	667	Alnus/Corylus	1
RB	667	Quercus sp.	145
RB	689	Quercus sp.	137
IA	703	Acer	3
IA	703	Prunus	2
IA	703	Quercus sp.	39
IA	703	Pinus, Rhamnus	2
IA	703	Alnus/Corylus	4
IA	703	Fagus	1
IA	703	Maloideae	6
IA	1257	Quercus sp.	13
IA	1257	Pinus, Rhamnus	3
BA	1563	Alnus/Corylus	31
BA	1564	Maloideae	1
BA	1564	Alnus/Corylus	12
BA	1564	Acer	1
BA	1564	Quercus sp.	15
BA	1564	Acer	1
BA	1564	Quercus sp.	15
BA	1565	Alnus/Corylus	14
BA	1565	Quercus sp.	24
UN	1566	Pinus, Rhamnus	9
UN	1566	Quercus sp.	62
UN	1566	Maloideae	12
BA	5066	Fraxinus excelsior	60
BA	5066	Maloideae	11
BA	5066	Quercus sp.	31
BA	5066	Acer	6
BA	5068	Alnus/Corylus	4
BA	5068	Fraxinus excelsior	3
BA	5068	Maloideae	29
BA	5068	Quercus sp.	50
BA	5068	Prunus	6
BA	6003	Fraxinus excelsior	7
BA	6003	Quercus sp.	60
BA	6003	Maloideae	7
BA	6004	Maloideae	9
BA	6004	Fraxinus excelsior	15
BA	6004	Quercus sp.	67
BA	6004	Alnus/Corylus	6

Sum of Number	Date				
Species	NEO	BA	IA	RB	Grand Total
Pinus, Rhamnu	0.00%	0.00%	2.12%	0.00%	0.39%
Fagus sylvatica	0.00%	0.00%	0.42%	1.92%	0.77%
Quercus sp.	50.00%	54.68%	67.80%	88.49%	69.12%
Alnus/Corylus	10.94%	12.81%	4.24%	3.84%	7.89%
Prunus spinosa	0.00%	1.53%	2.54%	0.00%	1.08%
Prunus avium/p	0.00%	0.00%	0.00%	4.05%	1.47%
Maloideae	21.88%	12.43%	15.68%	1.07%	9.37%
Acer campestre	0.00%	1.34%	6.36%	0.64%	1.93%
Fraxinus excels	17.19%	17.21%	0.85%	0.00%	7.97%
Grand Total	100.00%	100.00%	100.00%	100.00%	100.00%



PRESENCE OF CHARCOAL BY PHASE

Date	Sample number	Species
RB	77	Corylus avellana
RB	77	Prunus avium/padus
RB	77	Alnus/Corylus
RB	77	Fagus sylvatica
RB	77	Quercus sp.
IA	176	Acer campestre
IA	176	Maloideae
IA	176	Fraxinus excelsior
IA	192	Acer campestre
IA	192	Maloideae
IA	192	Quercus sp.
BA	205	Prunus spinosa
BA	205	Quercus sp.
BA	205	Maloideae
IA	308	Prunus spinosa
IA	308	Quercus sp.
IA	308	Corylus avellana
IA	308	Maloideae
NEO	409	Maloideae
NEO	409	Corylus avellana
NEO	409	Fraxinus excelsior
NEO	409	Alnus glutinosa
NEO	409	Alnus/Corylus
NEO	409	Quercus sp.
BA	524	Quercus sp.
BA	524	Fraxinus excelsior
BA	524	Maloideae
IA	568	Corylus avellana
IA	568	Fraxinus excelsior
IA	568	Quercus sp.
IA	568	Maloideae
IA	568	Prunus spinosa
IA	660	Alnus/Corylus
IA	660	Acer campestre
IA	660	Maloideae
IA	660	Quercus sp.
IA	660	Corylus avellana
IA	667	Quercus sp.
IA	667	Corylus avellana
IA	689	Quercus sp.
IA	703	Acer campestre
IA	703	Quercus sp.
IA	703	Rhamnus cathartica
IA	703	Corylus avellana
IA	703	Prunus spinosa
IA	703	Maloideae
IA	703	Fagus sylvatica
IA	1257	Quercus sp.
IA	1257	Pinus sylvestris
BA	1563	Alnus/Corylus
BA	1564	Maloideae
BA	1564	Alnus/Corylus
BA	1564	Acer campestre
BA	1564	Quercus sp.
BA	1565	Alnus/Corylus
BA	1565	Quercus sp.
BA	5066	Quercus sp.
BA	5066	Maloideae
BA	5066	Fraxinus excelsior
BA	5066	Acer campestre
BA	5068	Alnus/Corylus
BA	5068	Fraxinus excelsior
BA	5068	Maloideae
BA	5068	Quercus sp.
BA	5068	Prunus spinosa
BA	6003	Maloideae
BA	6003	Quercus sp.
BA	6003	Fraxinus excelsior
BA	6004	Corylus avellana
BA	6004	Quercus sp.
BA	6004	Fraxinus excelsior
BA	6004	Maloideae
IA		

Count of Sample number	Date				
Species	NEO	BA	IA	RB	Grand Total
Acer campestre		2	4		6
Alnus glutinosa	1				1
Alnus/Corylus	1	4	1	1	7
Corylus avellana	1	1	5	1	8
Fagus sylvatica			1	1	2
Fraxinus excelsior	1	5	2		8
Maloideae	1	7	6		14
Pinus sylvestris			1		1
Prunus avium/padus				1	1
Prunus spinosa		2	3		5
Quercus sp.	1	8	8	1	18
Rhamnus cathartica			1		1
(blank)					
Grand Total	6	29	32	5	72
	6	7	10	5