

Chapter 5

Environmental evidence and radiocarbon dating

ANIMAL BONE by Lee G Broderick, with a contribution by Lena Strid

Introduction

The excavations recovered a medium-sized faunal assemblage, which was mostly made up of large mammals, that is, domestic cattle and horses. Extensive environmental sampling was carried out, principally targeting pond 3062 and pit 3067. These samples contributed little to the faunal record, however, largely consisting of frog and toad bones. The major point of interest from a zooarchaeological point of view was the large number of horse bones recovered. The possible reasons for this species profile are considered and compared with other sites in the region. It is suggested that the cause may be that Berryfields lay on major routeways from the middle Iron Age to Roman period, facilitating specialisation in horse breeding by way of demand placed by travel infrastructure.

Methods

Recovery of material was principally through hand-collection. Environmental samples were also taken and these were sieved at 10mm, 4mm, 2mm and 0.5mm fractions. This material was recorded in the same way and is considered together below. Taxonomy follows Wilson and Reeder (2005) for mammals and Gill and Donsker (2016) for birds. The word 'caprine' is used when referring to an animal that may be a sheep (*Ovis aries*) or a goat (*Capra hircus*).

All specimens were identified with the aid of the Oxford Archaeology reference collection. Bones were recorded using the diagnostic zones described by Serjeantson (1996, 194-223) for mammal limb bones, Strid (2012) for mammal mandibles and Cohen and Serjeantson (1996) for birds.

The separation between sheep and goat was attempted on the following elements: mandible; dP3; dP4; M1; M2; M3; distal humerus; distal metapodials (both fused and unfused); distal tibia; astragalus and calcaneum, using the criteria described in Boessneck (1969, 331-58), Payne (1985), Kratochvil (1969) and Halstead *et al.* (2002).

Wear stages were recorded for P4, dP4, M1, M2, and M3 of domestic cattle (*Bos taurus taurus*), caprines and pig (*Sus ferus domesticus*), both isolated and within mandibles, following Grant (1982).

Horse (*Equus caballus*) incisor wear stages follow Levine (1982), withers height calculations follow May (1985, 368-82) and separation between the various equid species was attempted on the molars, premolars, metapodials and astragali according to criteria laid out by Davis (1980).

A mammal bone epiphysis is described as 'fusing' once spicules of bone have formed across the epiphyseal plate, joining epiphysis to metaphysis, but while some gaps are still visible between the epiphysis and diaphysis. An epiphysis is described as fused once these gaps along the line of fusion have disappeared. Fusion stages follow Silver (1969, 283-302). Only fused bones were measured, with measurements taken following the criteria laid out by von den Driesch (1976).

Bone condition was recorded following Lyman (1994).

Results

A total of 12,734 animal bones (Number of Identified Specimens, NISP = 4068) were recovered, mostly from Phase 2 (excluding undated material), with Phase 4 and unphased Roman contexts also containing over 1000 specimens each (Table 5.1), much of them from environmental samples. Almost half the assemblage by number of fragments, 43% of the material, was hand-collected, with 56% resulting from environmental sampling (Table 5.2). Environmental sampling particularly increased the number of indeterminate, micro-mammal (mouse-sized mammals) and amphibian bones recovered (Table 5.2). This is typical of such sampling strategies (Payne 1972) and we should expect that the numbers of these groups of species would increase were all the excavated material to be sieved in the same way.

The bones were generally in moderate condition (Fig. 5.1) but varied from this in the Roman pond and pit (see Phase 6 discussion, below), where bone condition varied between stages 1 (excellent) and 5 (extremely poor). Ditch fills produced 3487 hand-collected specimens and a further 1041 fragments derived from pits, together accounting for 82.6% of the assemblage. Context groups of particular interest are highlighted below.

Phase 2: Middle Iron Age

Although a broad base of species might have been

Berryfields

Table 5.1 Total NISP (Number of Identified SPecimens) and NSP (Number of SPecimens) figures per period

	2	3	4	5	6	9	Roman	Undated
Domestic cattle	175	3	22	19	35		19	59
Domestic cattle?	18	1	2		1		1	7
Caprine	135	15	15	3	9	2	7	71
Caprine?	37	7	3				7	11
Caprine/roe deer	1							
Sheep	37	6	6	4	1		4	24
Pig	21	10	2	2	6		2	20
Pig?	3	1						4
Horse	116	48	14	18	21		13	57
Horse?	1						1	
Dog	7	1	2	35	2	1		2
Dog?								1
Red deer							2	1
European hare							2	
Rabbit*	1							1
Small rodent	5				1	1	2	1
Black rat?							1	
Wood mouse/harvest mouse	3							2
House mouse	1						1	1
Water vole	4			1			1	5
Bank vole/field vole/common vole				5				
Field vole	5				2		9	2
Field vole?	1						2	
Common shrew	1						1	
European mole			1				7	
Micro mammal	25	2	33	24	4		49	17
Small mammal	37	1	2				15	9
Medium mammal	259	23	5	227	4	1	5	116
Large mammal	771	80	448	93	164	1	111	611
Total mammal	1664	198	555	431	250	6	262	1023
Bird	1			2				2
Swan	1							
Domestic fowl	1			1				
Total bird	3	0	0	3	0	0	0	2
Amphibian			4		257			3
Common frog/common toad	14		7	6	74		462	1
Common frog	4		2		59		111	1
Common toad					8		79	
Total amphibian	18	0	13	6	398	0	652	5
Total NISP	1685	198	568	440	648	6	914	1030
Total NSP	3584	596	1454	879	817	6	1151	4068

Three most common mammalian species for each phase highlighted in bold italic. *Rabbit is almost certainly intrusive

present in the two phases of settlement (G3 and G4), the assemblage was dominated by just three species – caprines (sheep – *Ovis aries* and/or goats – *Capra hircus*), followed by domestic cattle (*Bos taurus taurus*) and horse (*Equus caballus*) (Fig. 5.2). It was possible to identify 37 of the caprine specimens (mandibles and mandibular teeth) as being specifically sheep. Forty-

five percent of the specimens recovered from this phase were identified only as far as ‘large mammal’, so it may be supposed that cattle and horses may have been the most common domestic animals on the site at the time and, taking into account their relative size, made by far the greatest contribution to the diet of the inhabitants, assuming that the horses were eaten.

Table 5.2 Animal bone specimens recovered from sieved environmental samples and hand-collected (unsieved samples)

	Sieved	Unsieved
Amphibian	1090	0
Bird	5	3
Micro mammal	218	2
Small mammal	48	69
Medium mammal	152	965
Large mammal	84	2848
Indeterminate	5552	1691
Total NISP	1597	3887
Total NSP	7149	5578

Higher proportion highlighted in bold italic

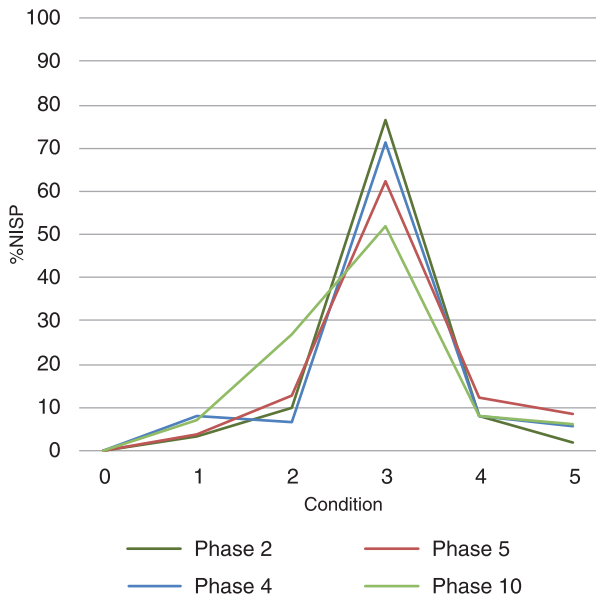


Fig. 5.1 Condition of identified animal bone specimens per phase, as a percentage of NISP

Caprines and cattle are the two most common species found on archaeological sites of this period in Britain but the presence of horse in such high numbers requires more investigation and explanation. The horses from this phase are within the known size range for the animal at this time in Britain (Johnstone 2004, 277), which is very small by modern standards (Fig. 5.3). Domestic cattle and caprines were also small at this time, but it is noticeable that, even by these standards, the animals from Berryfields are on the small side (Figs 5.4 and 5.5).

Domestic fowl (*Gallus gallus*) may also be present on the site at this time, represented by a left proximal coracoid from pit SG8114, with cut-marks on the lateral side (Fig. 5.6). These marks would be consistent with filleting the breast from the bird. Unfortunately, this bone was too small for

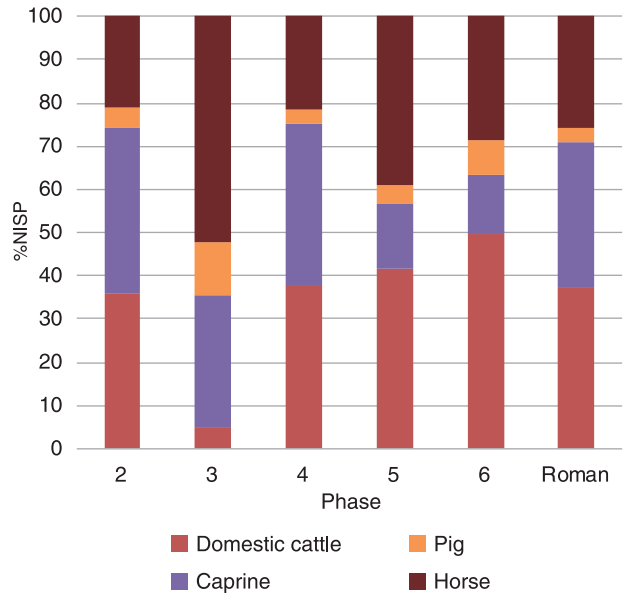


Fig. 5.2 Proportions of livestock mammals (by NISP) for phases with greater than 100 mammal specimens

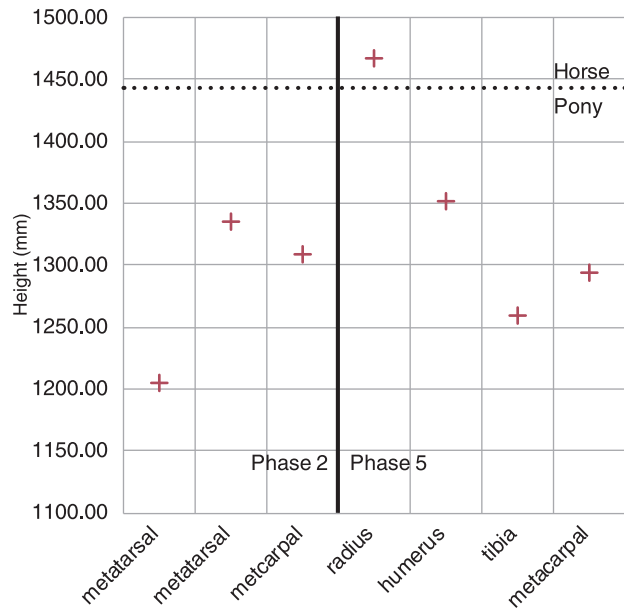


Fig. 5.3 Withers heights of horses (in mm), following May (1985, 368-82)

radiocarbon dating and so a caprine bone from the same context was selected. This produced a date of 410-210 cal BC (95.4%; SUERC-76716). Despite the date, there remains uncertainty about the security of the deposit, and much caution should be applied with regard to the reliability of the middle Iron Age attribution (see Chapter 6 for further discussion).

As might be expected of the phase with the largest number of sieved samples, this phase contained the broadest range of species recorded as present on the site. For the most part this is micro-fauna that might be considered principally

Berryfields

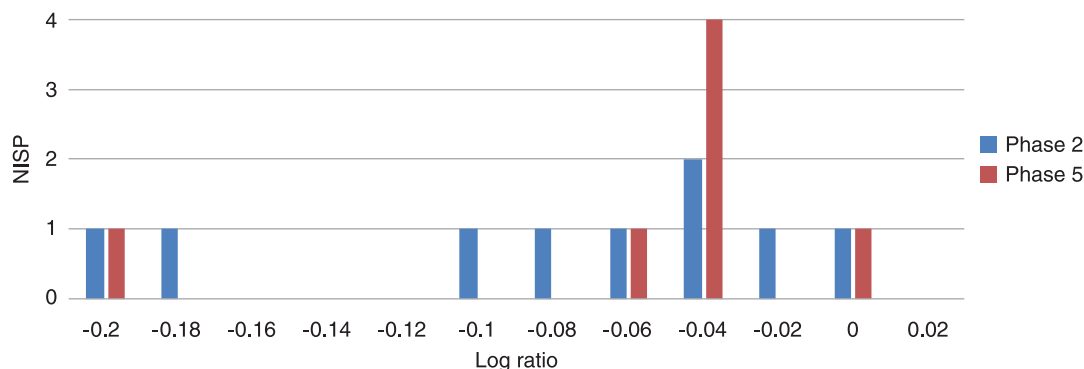


Fig. 5.4 Log ratios of domestic cattle metapodials (NISP), using Gill Mill Phase 4b (Strid 2018) as the standard

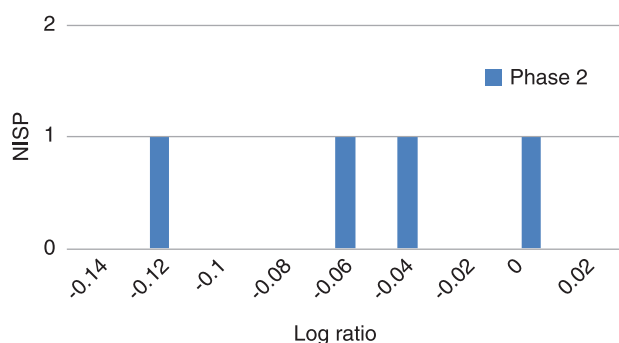


Fig. 5.5 Log ratios of Phase 2 caprine metapodials (NISP), using Gill Mill Phase 4b (Strid 2018) as the standard

as intrusive burrowing species; this interpretation is supported by the generally good condition of the bones and the presence of a rabbit (*Oryctolagus cuniculus*) metacarpal. This species is thought to have been a much later introduction to the British Isles (traditionally associated with the Normans).

Phases 3 and 4: Early Roman

Although smaller assemblages, the finds from Phases 3 and 4 on the site broadly continued the trend observed in Phase 2, but with horse making up an even greater proportion of the total NISP. Phase 3 is the only phase on the site in which pig (*Sus scrofa domesticus*) is among the three most common species present. Given that this still only amounts to a total of ten specimens, little significance can be attached.

Phase 5: Middle Roman (including unphased Roman)

Phase 5 is considered together with material that could not be dated more precisely than the Roman period owing to the similarity of the species profiles. Among the larger fauna, horse and cattle are again the most common species recorded across the two phases and both appear to be more or less the same size as they were in Phase 2 (Figs 5.3 and 5.4). In Phase 5, the second



Fig. 5.6 Coracoid bone of chicken (*Gallus gallus*) from pit SG8114

most common species by NISP is dog (*Canis familiaris*). Most of these specimens come from a single ABG (Associated Bone Group) from ditch SG8017 (3310). This was situated near to a human burial, but there is no direct relationship between the two contexts. Only post-cranial elements were recovered through hand-collection (a right mandibular pre-molar was recovered through environmental sampling), mostly foot elements. It may be assumed that the 209 medium mammal specimens from this deposit, including 65 vertebrae and 47 rib fragments, were also part of this animal. On the basis of a fused proximal left humerus it is possible to state that it must have been at least 15 months old at death (Silver 1969). The fill of Roman grave 3003 contained a caprine pelvis.

The Roman assemblage is dominated by a large number of common frog (*Rana temporaria*) and common toad (*Bufo bufo*) specimens. These result from environmental sampling and it is likely that the large numbers result from mass fatalities during hibernation. The Roman material also features the only wild mammal specimens that could possibly have resulted from food remains – European hare (*Lepus europaeus*) and red deer (*Cervus elaphus*). These are represented by a humerus and radius and two metatarsals, respectively. Several specimens of the European mole (*Talpa europea*) were identified in a sample from ditch SG8053, but were in very good condition and are considered very likely to be intrusive.

Phase 6: Late Roman

All the finds from this phase come from a single pit (3067), which has been suggested to have been a focus for some ritual activity based on the contents of the feature. The only specimens recovered from contexts in the pond into which the pit was cut were three horse bones and two large mammal bones. The proportions of mammal specimens recovered from the pit feature are similar to those for the site as a whole, in each phase. Furthermore, no body-part selection seems to have taken place and the rates of taphonomic indices, such as canid gnawing and butchery marks, are also similar to the site as a whole. In other words, there is nothing in this assemblage which makes it distinct from the rest of the assemblage.

Animal bone from Aylesbury Vale Parkway by Lena Strid

The faunal assemblage from this part of the site comprised 522 re-fitted fragments from securely dated contexts. Of these, 527 fragments (85%) were hand collected and 95 (15%) were recovered from sieved bulk samples.

Phase 4: Early Roman

The early Roman assemblage comprised six bone fragments from ditches 400 and SG660. One cattle mandibular third molar and one horse maxillary molar were the only fragments identified to species. The cattle tooth was in wear stage g, equivalent to the adult age range, according to Halstead (1985).

Phase 6: Late Roman

A total of 519 bones were recovered from five features: a boundary ditch, two quarry pits, a pit and grave 424. The remains from the grave comprised only one amphibian bone and was probably intrusive. The pits and the ditch yielded bones in similar amounts, suggesting that assemblage differentiation between feature types (cf. Rielly 2009, 206) is not likely to be a major reason for the dominance in bones from large mammals.

Livestock

The late Roman assemblage is strongly dominated by cattle (Table 5.3). A species comparison using

Table 5.3 Number of identified animal bone fragments per species from Aylesbury Vale Parkway

Species	Phase 4 Early Roman	Phase 6 Late Roman	Phase 10 Roman	Phase 8 Medieval
Cattle	1 (1)	49 (3)		9 (1)
Sheep/goat		14 (1)	1 (1)	8 (1)
Pig		9 (2)	1 (1)	1 (1)
Horse	1 (1)	13 (2)	2 (1)	4 (1)
Dog		1 (1)	1 (1)	
Field vole		1 (1)		
Domestic fowl		4 (1)		
Bird		1		
Frog		1 (1)		
Amphibian		8		
Pike		3 (1)		
Cyprinid		1 (1)		
Perch		1 (1)		
Fish		2		
Microfauna		4		
Medium mammal	2	23		4
Large mammal	1	48	11	16
Indeterminate	1	339	14	26
Total fragment count	6	522	30	68
Identifiable to taxa	2	95	5	22
Total weight (g)	103	7717	242	1192

Minimum number of individuals (MNI) within parentheses

MNI gives less marked dominance by cattle, which is consistent with that method's promotion of less numerous species in favour of more frequently occurring species (Hambleton 1999, 34-35). The ageing data are limited, but suggest that most cattle were sub-adult or adult at the time of death. The data for sheep and pig were too small for interpretation. Nevertheless, neonatal and juvenile animals were absent. Neonatal mortalities are usually common in extensive animal husbandry, which suggests that the absence of neonatal remains are due to taphonomic factors, to which their fragile bones are particularly sensitive. Measurements could only be taken on one cattle distal radius and two cattle distal tibiae, all of which were found to be within the same size range as cattle bones from contemporary sites (ABMAP 2010). Butchery marks were recorded on one cattle axis and one pig humerus. The axis had been chopped through, indicating a severing between the first and second vertebrae which would have removed the head from the rest of the carcass. The humerus displayed a chop mark on the upper third of the shaft, probably from an attempt to portion the shoulder joint. One cattle metatarsal displayed pathological bone growth and swelling on the posterior/medial and posterior/lateral edges of the distal metaphysis. The aetiology is unknown, but may be due to infection.

Other species

With the exception of horse, most other species in the assemblage are represented very sparingly. The paucity of wild mammals is typical for lower status domestic Roman assemblages (Yalden 1999, 100-102). The horse bones are mostly incomplete, but no chop marks or cut marks could be observed. All horse bones are skeletally mature, with the exception of one unfused distal radius from a horse less than 3.5 years old, one fragmentary horse skull with six unerupted permanent molars, indicating an age-at-death of 2-4 years (Habermehl 1975, 31) and one single mandibular deciduous tooth. All fowl bones were adult, suggesting that their primary use was as providers of eggs and feathers rather than meat. One bird long bone fragment had medullary bone present, indicating that this bird was in an egg-laying stage when it died. The bone was fowl-sized, but could not be identified to species or family.

Overall discussion

The dominance of caprines and domestic cattle on Iron Age and Roman-period sites in Britain is typical, although the proportions of each vary around the country (Hambleton 1999; Allen *et al.* 2017). Buckinghamshire in this context is interesting in that it lies in Hambleton's 'Eastern England and East Anglia' region but close to the 'Upper Thames Valley and Surrounds' region. The former is far more diverse in terms of the relative proportions of the principal domesticates found on sites, while the latter is consistently characterised by high propor-

tions of domestic cattle and caprines (around 40%-60% of each). Although few clayland sites have previously been analysed from this region, there is a noticeable shift towards a greater abundance of cattle on clay sites elsewhere in the country during the Iron Age (Hambleton 1999). Cattle become more common on most sites in Britain through the Roman period (Allen *et al.* 2017). As such, the large proportion of domestic cattle on the site might best be understood as a factor of the local environment, which would favour the more damp-tolerant domestic-cattle over caprines.

George Lambrick (2014, 146) has pointed to the possibility of horse-breeding areas in Oxfordshire and Milton Keynes during the Iron Age, which may be linked to horse-riding and horse-drawn transport. This may be interpreted as the beginning of a trend – horse continues to be a relatively minor component of most assemblages in the Roman period, but there are patterns emerging where horse specimens are more common on certain types of site. These include rural (Stallibrass, pers. comm.) and, particularly, roadside settlements (Wright, pers. comm.). The highest incidence observed so far is from Tort Hill (East and West) in Cambridgeshire. Even at this site, horse remains were less than half that of cattle. The suggestion has been made that the higher numbers recorded at roadside sites might relate to staging posts; at Tort Hill it was proposed that the site might have involved some form of specialised horse ranching (Albarella 1997, 7).

Specialist horse-ranching has also been suggested as an explanation for higher proportions of horse at Copse Farm in Sussex (Bedwin *et al.* 1985, 215-45) and Alchester in Oxfordshire (Broderick 2018, 186), as well as at Feddersen Wierde outside the Roman Empire in Germany (Reichstein 1991). Given this background of sites with high proportions of horse, the Berryfields assemblage stands out for two reasons (in spite of its relatively small total assemblage): first, because the proportion of horse specimens is high even by the standards of these other sites, and, second, because of the apparent continuity, with high proportions of horse present both in the middle Iron Age and Roman phases.

The largest Iron Age assemblage from Buckinghamshire analysed to date is that from Pennyland, where horse was present in much lower, although not insignificant, proportions (8% NISP; Holmes 1993). Pennyland is, coincidentally, another clayland site and is another site with a large proportion of domestic cattle (55% NISP), but the nearby site of Hartigans, with a much smaller assemblage, is on river gravels and is another site with a relatively high proportion of horse (18%; Burnett 1993). The nearest contemporary archaeological site to Berryfields with a medium or large fauna assemblage that has been studied previously is Coldharbour Farm, which is on the same clays. Although much smaller than the Berryfields assemblage, at just 2964 specimens, the proportion of

horse is much lower – lower, in fact, than pig (Johnstone 1997). Thus we might conclude that the inhabitants of Berryfields were specialising in horses to a far greater extent than their immediate neighbours and we can dismiss environmental drivers as an explanation.

With no patterning in the age profiles or skeletal part representation to guide us (partly, no doubt, due to the size of the assemblage) we must look to other explanations, and the proximity of the site to Akeman Street must take on greater significance in light of the roadside nature of many other Roman-period sites with high proportions of horse specimens in their respective assemblages. If this is the cause of the pattern, however, then it would suggest that the origins of this major routeway stretch back into at least the middle Iron Age.

Excavation of pit 3067 resulted in the recovery of domestic fowl eggs, possibly the focus of some ritual activity. Unfortunately, the faunal remains recovered from this feature, consisting primarily of amphibian bones, add little to this line of investigation. Although it has been suggested elsewhere that large numbers of frog/toad bones from a single pit may represent consumption waste (Allen 2019, 15), the context here – in a known wet feature – suggests a far more prosaic interpretation.

Conclusion

The principal area of interest in Berryfields from a zooarchaeological point of view is the horse specimens. These are of a size consistent with other horses found in Britain at this time but are notable for the large proportion of NISP present in the middle Iron Age and Roman phases on the site. This helps to support emerging suggestions of specialist horse ranching along roadside settlements in the Roman period, but comparisons with neighbouring sites suggest that a suggested regional specialisation in the Iron Age may not apply to all sites. The other domestic animals on the site are also of a size consistent with regional and national data, with a domination of domestic cattle consistent with clayland sites elsewhere in the country. Although bird specimens were very scarce on the site, an early domestic fowl bone was recovered, which adds to an increasing body of evidence for a middle Iron Age introduction of this species to the British Isles. The presence of domestic fowl on the site through the Roman period is supported by another bone, as well as the finds of domestic fowl eggs from pit 3067, which may have had a ritual role.

AVIAN EGGS by Rebecca Nicholson

Introduction

During the excavation of waterlogged pit 3067 a cache of three eggs (SFs 2613, 2614 and 2615) was discovered in association with a collection of Roman coins and other finds in pit fill 3073, at the western

end of the pit. Unfortunately, two of the eggs were broken prior to or during discovery, emitting a sulphurous smell, but one (SF 2615) remained intact. An additional, broken, egg (SF 2679) came from pit fill 3074. The eggs were examined and samples of eggshell from SF 2613, as well as eggshell from soil samples 194, 227 and 228 (contexts 3073 and 3074) were sent for analysis to the University of Bournemouth and analysed by microscopy which indicated that the eggs are likely to be chicken (*Gallus gallus domesticus*), although the species identifications from this approach are not definitive (J Best, pers. comm.). The remaining broken eggs (SFs 2614 and 2679) have been retained as samples within the sediment matrix.

Description of the eggs

Intact egg SF 2615 measures 47mm x 39mm and weighs 42g. The surface is smooth, pale brown and grey with occasional black speckles and dark brown patches at both ends, although this colouring is likely to have come from the surrounding matrix (Fig. 5.7). Given the size – slightly larger than a pheasant (*Phasianus colchicus*) and smaller than a mallard (*Anas platyrhynchos*) (Discover Wildlife, nd) – it is likely that the egg is of a small chicken. Broken eggs SF 2613, SF 2614 and SF 2679 are of similar colour to SF 2615.



Fig. 5.7 Chicken egg SF 2615 from pit 3067

Discussion

The location of the three eggs within the pit in association with coins suggests a votive offering. Taken together with the other finds from the feature, which included complete or near-complete pottery vessels, coins, a wooden basket, leather shoes and animal bone, the eggs would seem to be part of a series of structured depositional events that took place in the later 3rd century AD.

Chickens were kept by wealthier households in the later Roman period, but apart from their more

mundane use as egg and meat producers, the birds had special significance, with cockerels associated with the cult of Mithras and the god Mercury, as demonstrated by iconography as well as significant quantities of fowl bones recovered from shrines dedicated to these gods, such as the well-known temple of Mercury at Uley in Gloucestershire (Levitan 1993; Poole 2010, 158). Whether the eggs from Berryfields had been fertilised has not been established, but eggs have clear associations with fertility and birth and eggshell has been found in association with Roman inhumation and cremation burials at several sites, for example at Trentholme Drive, York (Wenham 1968). A complete chicken egg was recovered from under the left hand of an infant at the site of Castellaccio Europarco in Rome, dating to c 50-175 (Killgrove 2010, 85). Recently, Maltby *et al.* (2018) have summarised the evidence for chickens and eggs in Roman Britain. Based on this overview, the Berryfields eggs appear not only to be the only complete examples in Roman Britain, but also the only known examples used as votive offerings.

FISH REMAINS by Rebecca Nicholson

A small number of fish bones and scales were recovered from the residues and flots of processed soil samples from Phase 4 ditch SG8009, Phase 4 ditch SG8019, and Phase 6 ditch SG358, as well as several samples from the bottom fill (3074) of Phase 6 pit 3067. Additionally, a fossil, probably a large fish molar tooth, came the top fill of pit 3067.

The bones and scales all came from small fish likely to have lived in local rivers or ponds. They included three eel (*Anguilla anguilla*) vertebrae, two of which were burnt, from ditch SG8009 and a small pike (*Esox lucius*) vertebra from ditch SG8019. Juvenile pike was also present in the lower fill of ditch 358, comprising five fish vertebrae, three from juvenile pike, one poorly preserved vertebra probably from a cyprinid (Cyprinidae – carp family), and another probably from perch (*Perca fluviatilis*).

A few small fish scales and fish scale fragments were found in the flots of samples from the lower part of fill 3074 at the base of late Roman pit 3067; those which could be identified included pike, perch and cyprinid. A chub (*Squalius cephalus*) opercular came from a fish of estimated total length of 130-150mm, based on visual comparison with

bones from a reference specimen; basipterygia from two samples may be from the same fish. Two vertebrae from tiny pike in sample 220 are very similar in size to those from a reference fish of total length 135mm. A charred, or possibly heavily stained and mineralised vertebral centrum fragment, probably of pike, came from fill 3074. The very small size of most of the fish in these samples, and presence of fish scales throughout the lower fill, may indicate that these fish were living in the feature, possibly having been swept in from the nearby stream during a flood event.

Fish remains are not commonly found on Roman rural sites and are conspicuously absent from Iron Age sites in England (Locker 2007; Dobney and Ervynck 2007). Where present, assemblages typically comprise small numbers of freshwater fish remains, usually dominated by the catadromous eel, but also sometimes with small numbers of flatfish or herring bones (Locker 2007). Similar to the Berryfields assemblage, a small number of fish bones were recovered from Roman contexts at Didcot Great Western Park, Oxfordshire; here eel was the most frequent taxa with perch and cyprinid also present, together with herring, which must have been imported (Nicholson forthcoming). The few fish bones from Iron Age and Roman contexts at Barton Court Farm, Abingdon, included eel and pike as well as perch and cyprinid (Wheeler 1984), again indicating small-scale fishing of local rivers or streams.

MARINE MOLLUSCS by Rebecca Nicholson

A very small number of marine molluscs were recovered, despite fairly comprehensive soil sampling (Table 5.4). The shells from the terminus of middle Iron Age (Phase 2b) ditch SG8106 are probably fossil, but those from late Iron Age/early Roman ditch SG8115 and late Roman pit 3270 and fills 3073 and 3074 in pit 3067 are in good condition and fairly complete, with no evidence of encrustations or infesting organisms.

Although only freshwater fish remains have been recovered from these excavations, the presence of both European flat oyster (*Ostrea edulis*) and mussel (*Mytilus edulis*) demonstrate the importation and presumably the occasional consumption of fresh shellfish which must have been obtained from the coast and transported inland fairly

Table 5.4 Marine molluscs

Context	Feature	Sample	Phase	Weight (g)	Shells
1664	Ditch SG8106	144	2	23	8 fragments of probable oyster shell, extremely worn and probably fossil
2156	Ditch SG8115	n/a	3	3	1 fragment of oyster (<i>Ostrea edulis</i>)
3073	Pit 3067	n/a	6	23	1 oyster (<i>O. edulis</i>) right valve
3074	Pit 3067	n/a	6	23	1 oyster (<i>O. edulis</i>) left valve
3074	Pit 3067	144	6	2	1 mussel (<i>Mytilus edulis</i>) valve
3273	Pit 3270	n/a	6	14	1 oyster (<i>O. edulis</i>) right valve

rapidly, perhaps packed in vats with seaweed or brine. Shellfish are regularly found at Roman sites, even inland, and shells within pit 3067 may represent no more than the incorporation of a small quantity of domestic rubbish.

LAND AND FRESHWATER MOLLUSCS

by Elizabeth Stafford

Introduction

Assessment of a large number of bulk samples, primarily for the recovery of charred plant remains, indicated that the burial conditions at Berryfields were generally not conducive for the preservation of mollusc shell. However, shell was found to be preserved in abundance in the incremental samples recovered from the lower waterlogged fills of Phase 6 pit 3067 (Fig. 2.26). The fossiliferous samples derive from the lower fills, a bluish grey clay (3073 and 3074) and also contained waterlogged plant remains (Meen, below) and insects remains (Allison, below).

The samples were taken at 50mm increments. Initial assessment indicated the mollusc assemblages were of very similar taxonomic composition, dominated by a single freshwater species (*Gyraulus crista*), albeit with a slightly greater diversity of species in the lower levels of context 3074. Consequently, four samples were chosen for detailed analysis in order to provide a comprehensive species list and to identify whether any change in the environment of deposition within the feature could be detected. Based on the results of the first four samples analysed, no further samples were submitted for analysis and the results are presented below.

Methodology

Samples were processed according to Evans (1972). A 1L sediment sub-sample of each of the incremental samples was processed for the recovery of mollusc shell. Two litres of sediment were processed from sample 220, context 3074. The sediment was disaggregated in water and hand floated in a bucket onto a 0.5mm mesh. Both flots and residues were air-dried and were examined under a low power binocular microscope at magnifications of x10-x40. Both flots and residues chosen for detailed analysis were carefully sorted for identifiable shell fragments and whole shells and apical fragments counted according to species. Identifications were made with the aid of a modern reference collection. Nomenclature follows Anderson (2005), while habitat information follows Boycott (1936), Sparks (1961) and Kerney (1999).

Results

The results are presented in Table 5.5. The lowermost sample analysed from context 3074 was

sample 220. Here, diversity was at its greatest with 13 species identified. The majority were freshwater taxa, albeit dominated by a single planorbid, *Gyraulus crista* (Nautilus Ramshorn), at 60% of the total. The lymnaeid, *Radix balthica* (= *Lymnaea peregra*, Wandering Snail), was also present in number, accounting for 21%. The planorbid *Gyraulus albus* (White Ramshorn) at 6% and *Lymnaea stagnalis* (Great Pond Snail) at 2% were present to a lesser extent. Other freshwater species were insignificant, accounting for 1.3% of the total. These include *Galba truncatula* (Dwarf Pond Snail) and *Anisus leucostoma* (White-lipped Ramshorn). The only bivalve identified was the tiny fingernail clam *Musculium lacustre* (capped lake/orb mussel), present in moderate numbers as both adult and juvenile specimens. The terrestrial assemblage accounted for only 1.4% of the total and included *Vallonia pulchella* and *Cochlicopa* sp., with single specimens of *Oxychilus* sp., *Vitrina pellucida*, *Vertigo* sp. and a fragment of *Carychium* sp.

The upper two samples from context 3074 (samples 217 and 211) and the single sample from 3073 (sample 210) also produced abundant shell. However, the assemblages were of very low diversity and almost entirely composed of *Gyraulus crista* and to a lesser extent *Radix balthica*, with no other freshwater component. In sample 217, occasional terrestrial shells were still present, but disappeared

Table 5.5 Land and freshwater molluscs from pit 3067

Context	3073	3074	3074	3074
Sample no.	210	211	217	220
Processed sediment vol. (litres)	1	1	1	2
TAXA				
GASTROPODA				
<i>Carychium minimum</i> (Müller)	1	-	-	-
<i>Carychium</i> sp.	-	-	-	1
<i>Cochlicopa lubrica</i> (Müller)	-	-	-	2
<i>Cochlicopa</i> sp.	-	-	1	2
<i>Galba truncatula</i> (Müller)	-	-	-	5
<i>Lymnaea stagnalis</i> (Linnaeus)	-	-	-	27
<i>Radix balthica</i> (Linnaeus)	457	251	160	237
<i>Oxychilus</i> sp.	-	-	-	1
<i>Anisus leucostoma</i> (Millet)	-	-	-	8
<i>Gyraulus crista</i> (Linnaeus)*	8900	6100	600	750
<i>Gyraulus albus</i> (Müller)	-	-	2	67
cf. <i>Hippeutis complanatus</i> (Linnaeus)	-	-	-	1
<i>Vitrea</i> sp.	-	-	1	-
<i>Vertigo</i> sp.	-	-	-	1
<i>Vallonia pulchella</i> (Müller)	-	-	-	4
<i>Vallonia</i> sp.	1	-	1	3
<i>Vitrina pellucida</i> (Müller)	-	-	1	1
BIVALVIA				
<i>Musculium lacustre</i> (Müller)				6
cf. <i>Musculium lacustre</i> (juvenile)			2	23

* Estimated no.

up-profile in sample 211. Here, the proportion of *G. crista* also increased to 96% of the total, with a reduction in *R. balthica* to 4%. The proportions in sample 210 were similar to 211, with the addition of two terrestrial specimens, *Vallonia* sp. and *Carychium minimum*.

Discussion

Overall, shell was abundant and well-preserved in the four samples analysed. However, the species diversity was generally low, particularly in the upper three samples. This perhaps suggests a niche environment located away from other water bodies, and/or one that was in a state of flux, whereby suitable stable conditions in which a range of species could flourish did not develop. The majority of the freshwater specimens are from aquatic species, suggesting that the feature held water for most, if not all of the year. The assemblages were dominated by species of Sparks' Group 2, generally capable of living in a wide range of freshwater habitats (Sparks 1961). *Gyraulus crista* was super-abundant alongside lesser numbers of *Radix balthica* and *Gyraulus albus*. *G. crista* is often the dominant component in lentic freshwater snail communities (Spyra and Strzelec 2014). This, together with the low numbers of slum species (Sparks Group 1) and the absence of any of ditch (Sparks Group 3) or flowing water species (Sparks Group 4) apart from *Lymnaea stagnalis*, would suggest still or standing water in a closed system that was not subject to significant drying or desiccation, and with no or minimal input from an adjoining watercourse or surface spring. Indeed, Boycott's catalogue of species typically frequenting standing water in closed systems, although more extensive, includes all the aquatic taxa recorded during this study (Boycott 1936, 167). The presence of standing water is also supported by the analysis of insect remains (Allison, below).

The range of adult and juvenile specimens within the aquatic species and good shell preservation with minimal fragmentation would suggest an *in situ* autochthonous community with minimal reworking of sediments. This is supported by the presence of several adult specimens of *Lymnaea stagnalis*, which usually do not survive intact. In addition, the shells of the aquatic species for the most part retained their translucent appearance with proteinaceous outer coating (periostracum) intact, likely to be a consequence of rapid *in situ* burial in anaerobic waterlogged conditions (Evans 1972, 22-23). It is likely that the water levels were maintained by groundwater and precipitation and it is noted that this pit was dug significantly deeper than the infilled pond (3062) that it was cut into (Fig. 2.25). The mudstone bedrock would have afforded poor drainage once the water table had been breached. Indeed, excavation and recording of the base of the feature was extremely challenging, due to rapid groundwater seepage, although the base of the

shallower pond remained relatively dry (Fig. 2.26). It is probable that the feature was dug to greater depth into the water table to maintain standing water, possibly to provide a ready source of water for nearby activities.

Colonisation of the pit may have occurred from remnant faunas, although the shallow pond feature appeared to have largely infilled prior to the pit being excavated and no shell was preserved in the sediments examined. Some species such as the bivalve *Musculium lacustre*, which prefers small impoverished water bodies, has been recorded in the muddy sediments of dried up ponds (Boycott 1936). It is also possible that the higher diversity and aquatic species recorded in the lowermost sample (220) is the result of translocation from another source, allowing species such as *Gyraulus crista*, *Radix balthica*, *Lymnaea stagnalis* and *Gyraulus albus* to colonise for a short time. However, the last two species rapidly disappeared during the initial silting stages, suggesting that conditions within the feature (eg oxygen, nutrient status, competition) may not have been optimal for survival. It is notable that experimental studies suggest *G. crista* in suitable conditions can produce three generations in a year, in spring, summer and autumn. Adults live between about four and twelve months, with those hatched in the autumn overwintering to the spring (Richardot-Coulet and Alfero-Tejera 1985). *G. crista* generally prefers shallow water and becomes sparser in depths greater than 0.5m (ibid.), which may suggest that the standing water was only in the base of the feature and not very deep. The initial colonisation may also have occurred by way of deliberate deposition or dumping of material from an adjacent riverine environment, for example alluvial clay, reeds or river water or accidental transport by mammals, birds or amphibians. The shell characteristics of *G. crista*, its small size and the presence of spines (costae), allows for passive dispersal on bird plumage or fur (ibid.), while small bivalves such as *M. lacustre* can attach themselves to the toes of newts, frogs and toads (Kappes and Haase 2012, 8). *Radix balthica* is often abundant in small isolated water bodies owing to its propensity to colonise across damp terrestrial habitats, being able to survive for short periods out of water (O'Connor 2017, 136).

Terrestrial molluscs were present in very low numbers, mainly in the lowermost sample 220. The low numbers of terrestrial species would perhaps suggest very stable conditions around the feature edges with little erosion. Of the species identified at the base of the feature, most (including the slum species) would be consistent with an environment of damp grassland with a rough sward, although if introduced may not derive from the immediate environs. There was a notable absence of obligate marsh taxa Succinidae, which are frequently found climbing erect vegetation such as reeds and sedges at the margins of water bodies. There was no real evidence for the presence of scrub or woodland.

However, the numbers of terrestrial shells were so low it is not possible to comment in detail and interpretation may be better served by other palaeoenvironmental proxies.

INSECTS FROM PIT 3067 by Enid Allison

Introduction and methodology

The samples examined for insect remains came from Phase 6 pit 3067, which had been cut through the fills of an earlier pond, 3062. Seven samples were initially examined for insect remains (Allison 2017) and two were selected for detailed analysis: sample 193, representing the primary fill (context 3074), and sample 227 from secondary fill 3073. In addition, three smaller incremental samples taken from the top, middle and bottom of the primary fill (Fig. 2.26) were scanned to investigate whether any changes in the depositional environment had occurred over the time that the deposit had accumulated.

The analysed samples had volumes of 5 litres and the three incremental samples volumes of 1 litre. All were received having been wet-sieved to 0.25mm at OA South. Paraffin flotation to extract insect remains was carried out following the methods of Kenward *et al.* (1980), with recovery on 0.3mm mesh.

The paraffin flots from the analysed samples were large and extremely rich in insect remains (estimated 800+ individuals). It was estimated that over half the taxa represented were aquatic and these were recorded by scanning under a low-power stereoscopic zoom microscope (x10). Terrestrial insects were investigated in more detail, since they have the potential to provide information on habitats and vegetation in the vicinity of the feature and local land use. Sclerites of terrestrial beetles (Coleoptera) and bugs (Hemiptera) were removed from the paraffin flots onto moist filter paper for examination (x10 – x45). Identification was by comparison with modern insect material and with reference to standard published works. Minimum numbers of individuals and taxa of beetles and bugs were recorded, and taxa were divided into broad ecological groups for interpretation based on Kenward *et al.* (1986) and Kenward (1997). The paraffin flots from the three incremental samples were scanned in industrial methylated spirits (IMS) at x10 magnification and the principal taxa were noted.

Nomenclature of Coleoptera and Hemiptera follows Duff (2012a) and the systematic lists compiled from various sources on the British Bugs website (Bantock and Botting 2018). Information on host plants of plant-feeding species in the main text and Table 5.6 has been obtained from Cox (2007), Hodkinson and White (1979), Le Quesne (1960), Morris (1990; 1997; 2002; 2008; 2012), Nau (2004) and Southwood and Leston (1959), unless otherwise stated. The extracted insects and the paraffin flots are currently stored in IMS.

The insect assemblages

General comments

The deposits were rich in insect remains with concentrations of beetles and bugs estimated to be in the order of 150-200 individuals per litre. The recovered assemblages are described below, beginning with the earliest. Proportions of various ecological groups among the terrestrial fauna in each of the fully analysed samples are shown in Figure 5.8, hosts of strongly plant-associated taxa in Table 5.5, and lists of taxa recorded from individual samples in Appendix 2.

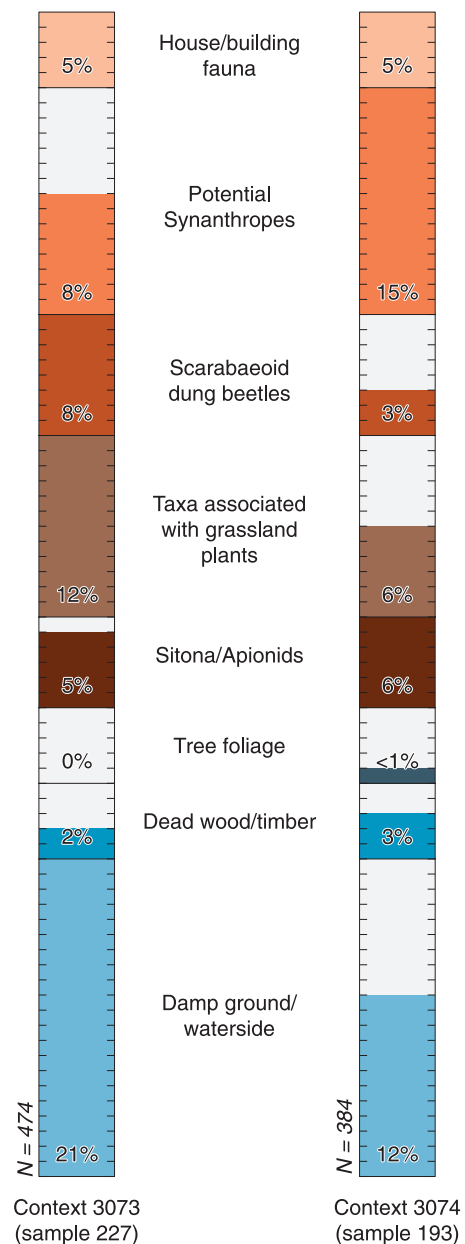


Fig. 5.8 Proportions of terrestrial beetles and bugs representing selected ecological groups

Berryfields

Table 5.6 Habitat and food preferences of strongly plant-associated beetles and bugs

Species	Food and habitat preferences
<i>Coreus marginatus</i> (dock bug)	Hedgerows, margins of cultivated fields, water meadows, wastelands and woodland edges. Nymphs develop mainly on docks (<i>Rumex</i>). Adults on diverse plants in later parts of the year searching for seeds
<i>Podops inuncta</i> (European turtlebug)	Dry litter under shrubs or in grassland
<i>Gampsocoris punctipes</i>	On restharrow (<i>Ononis</i>) in dry grassy habitats
<i>Berytinus</i> sp.	Associated with plants in dry grassy habitats
<i>Heterogaster urticae</i> (nettle ground bug)	Warm, sunny fields and non-acid wastelands, on nettles (<i>Urtica</i>)
<i>Conomelus anceps</i>	On rushes (<i>Juncus</i>)
<i>Livia junci</i>	Wet meadows on rushes (<i>Juncus</i>)
<i>Trioza urticae</i>	On nettles (<i>Urtica</i>)
<i>Phyllopertha horticola</i>	Poor quality permanent grassland on light soils with a diversity of flowering plants and a high proportion of weeds. The larvae feed on turf roots
<i>Agrypnus murinus</i>	Larvae feed at the roots of turf
<i>Agriotes</i> spp.	Larvae feed at plant roots
<i>Athous</i> sp.	Larvae feed at plant roots
<i>Brachypterus</i> sp.	On nettles (<i>Urtica</i>)
<i>Coccidula rufa</i>	On reeds, rushes (<i>Juncus</i>) and reedmace (<i>Typha</i>) in wetlands. Occasionally in grassland
<i>Bruchinae</i> sp.	Associated with leguminous plants (Fabaceae), the larvae developing within the seeds
<i>Hydrothassa</i> sp.	On Ranunculaceae
<i>Prasocuris phellandrii</i>	Adults and larvae feed on marsh marigold (<i>Caltha palustris</i>) and also other wetland Ranunculaceae. Adults can be found on leaves of other marginal plants, often including Apiaceae
<i>Phyllotreta nemorum</i> group	On wild and cultivated Brassicaceae
<i>Phyllotreta</i> spp.	Most species live on various Brassicaceae
<i>Longitarsus</i> spp.	Members of the genus are found on various herbaceous plants, especially Boraginaceae, Scrophulariaceae and Labiatae
<i>Neocrepidodera ferruginea</i>	Adults polyphagous; but common hosts include grasses and cereals. Larvae feed in stems of grasses and cereals
<i>Chaetocnema concinna</i> or <i>picipes</i>	Usually on members of the knotweed family (Polygonaceae) including <i>Polygonum</i> and docks (<i>Rumex</i>)
<i>Sphaeroderma</i> sp.	On Asteraceae, especially thistles (<i>Carduus</i> and <i>Cirsium</i>) and knapweeds (<i>Centaurea</i>)
<i>Psylliodes</i> sp.	Particularly on Brassicaceae
<i>Apion</i> sp.	On docks (<i>Rumex</i>)
<i>Ceratapion carduorum</i>	On thistles (<i>Cirsium</i> and <i>Carduus</i>)
<i>Malvapion malvae</i>	On mallows (Malvaceae), especially common mallow (<i>Malva sylvestris</i>)
<i>Oxystoma</i> sp.	Mainly on vetches (<i>Vicia</i> and <i>Lathyrus</i>)
<i>Apionidae</i> spp.	Most species are associated with herbaceous vegetation
<i>Tanyssphyrus lemnae</i>	On duckweeds (<i>Lemna</i>)
<i>Mecinus labilis</i>	On ribwort plantain (<i>Plantago lanceolata</i>)
<i>Mecinus pascuorum</i>	On ribwort plantain (<i>Plantago lanceolata</i>)
<i>Mecinus pyrae</i>	On ribwort plantain (<i>Plantago lanceolata</i>)
<i>Orchestes</i> sp.	On the foliage of various trees and shrubs
<i>Rhamphus</i> sp.	On the foliage of trees and shrubs
<i>Tychius</i> spp.	Associated with Fabaceae
<i>Ceutorhynchus erysimi</i>	In Britain found exclusively on shepherd's purse (<i>Capsella bursa-pastoris</i>) in waste places and on disturbed ground
<i>Ceutorhynchus</i> spp.	On various wild and cultivated Brassicaceae
<i>Rhinoncus ?pericarpus</i>	In grasslands and waste places, and in open areas generally feeding on docks (<i>Rumex</i>)
<i>Graptus triguttatus</i>	Open and grassy places. Shows a marked preference for ribwort plantain (<i>Plantago lanceolata</i>) in the British Isles
<i>Sitona</i> spp.	On wild and cultivated Fabaceae
<i>Hypera</i> sp.	On herbaceous plants

Main sources: Cox (2007), Harde (1984), Nau (2004), Majerus (1994), Morris (1990; 1997; 2002; 2008; 2012), Southwood and Leston (1959)

Context 3074

The analysis for this deposit focused on sample 193. Deposition was clearly under aquatic conditions. Several hundred aquatic beetles and bugs were represented with *Helophorus* spp. *Limnebius*, and

Ochthebius minimus the most abundant taxa. Fragments of caddis fly larvae (Trichoptera), water flea ephippia (Cladocera: resting eggs) and ostracod carapaces were also recorded. Most of the closely identified water beetles are typical of still to slowly flowing waters, and some species, including

Graptodytes pictus and *Hygrotus inaequalis*, indicate that the water within the feature was permanent and well-vegetated. The occurrence of at least 11 specimens of three species of riffle beetle (Elmidae), however, suggests that there was an input of clean, clear running water from a spring or running water channel. *Ochthebius bicolon* is also suggestive of running water (Duff 2012b, 326). Duckweed (*Lemna*) growing on the water surface was indicated by the tiny aquatic weevil, *Tanysphyrus lemnae*.

Sample 228, also from this context, was scanned as part of the assessment, but no riffle beetles (Elmidae) were observed (Allison 2017). The contrast with sample 193 raised the possibility that depositional conditions may have changed during the accumulation of the primary fill, so the aquatic component of the three incremental samples from the bottom, middle and top were scanned as part of this analysis. The range of water beetles and bugs in all three samples was in most respects very similar to that seen in sample 193, with all assemblages dominated by *Helophorus* spp., *Ochthebius minimus* and *Limnebius*. Additional taxa noted were *Agabus nebulosus* and *Hygrotus impressopunctatus*. In terms of aquatic conditions, the only significant difference between the assemblages from the three samples was that several individuals of the riffle beetle *Oulimnius* were present in the lowermost (sample 219), but none was recorded from the other two samples. This suggests that sample 193 may represent the basal part of context 3074. The possible implications for water conditions are discussed further below.

A large assemblage of terrestrial insects was recorded in sample 193 (a minimum of 382 beetles and bugs of 193 taxa). Damp ground/waterside taxa accounted for 12% of these: *Bembidion lunulatum* found on bare damp soils near water was common (11 individuals) and *Dryops* and *Heteroceris* are found in wet waterside mud. *Conomelus anceps* (a leafhopper) is found on rushes (*Juncus*), and larvae and adults of *Prasocuris phellandrii* feed primarily on marsh marigold (*Caltha palustris*), although the adults can be found on various wetland plants, commonly including various waterside umbellifers (Apiaceae; Harde 1984, 276), for which there was abundant plant evidence (Meen, below). Soldier beetles (Cantharidae) were common and may also have been associated with umbellifers, since they often congregate on the flowerheads for mating. Plants growing close to the feature are likely to have included nettles (*Urtica*), indicated by shed nymphal skins of *Trioza urticae* (a jumping plant louse), *Brachypterus* and, in one of the incremental samples, nettle ground bug (*Heterogaster urticae*). Docks (*Rumex*) were indicated by *Rhinoncus ?pericarpus* and *Coreus marginatus*, and common mallow (*Malva sylvestris*) by *Malvapion malvae*. There may also have been woody vegetation: the weevils *Orchestes* and *Ramphus* are found on the foliage of trees and shrubs, and habitats associated with dead or dying wood were suggested by *Bitoma crenata*, found on

dead bark, and two species of bark beetles (Scolytinae). Scale insects found on the branches of various trees and shrubs were also recorded (Coccoidea, Diaspidinae). Woodworm beetles (*Anobium punctatum*) were quite common and could have infested dry dead wood of deciduous trees or perhaps timber fragments within the deposit or any wooden structures that may have been situated close to the feature.

Various ground beetles (Carabidae) indicated that ground away from the feature was generally rather dry and open (eg *Calathus fuscipes*, *Brachinus crepitans*, *Stomis pumicatus*, *Anchomenus dorsalis*, *Ophonus* spp.) and phytophagous taxa were suggestive of disturbed ground and grassland. *Phyllotreta* and *Ceutorhynchus* species predominantly feed on crucifers (Brassicaceae), with *Ceutorhynchus erysimi* specifically associated with shepherd's purse (*Capsella bursa-pastoris*), while *Chaetocnema concinna/picipes* is usually associated with knotweeds (*Polygonum*). Taxa typical of grassland habitats included *Longitarsus*, numerous apionid weevils, including *Ceratapion carduorum*, found on thistles (*Cirsium* and *Carduus*), *Sitona* spp. found on Fabaceae, and *Mecinus labile* and *M. pascuorum* found on ribwort plantain (*Plantago lanceolata*). The ground beetle *Ophonus ardosiascus* can often be found feeding on the seeds of wild carrot (*Daucus carota*; Duff 2012b, 222). Larvae of *Phyllopertha horticola* (a small chafer) feed on turf roots and the species is characteristic of poor quality permanent grassland on light soils where there is a diversity of flowering plants and a high proportion of weeds (Raw 1951).

Scarabaeid beetles primarily associated with herbivore dung accounted for 3% of the terrestrial fauna; species represented included *Aphodius erraticus*, *A. contaminatus*, *A. prodromus/sphacelatus*, and *A. fimetarius*. Modern studies suggest that such a proportion would indicate low-level or 'naturalistic' grazing (Smith *et al.* 2010; 2014). *Aphodius* larvae develop in fresh dung and a record of an unexpanded *A. contaminatus* elytron (from an unemerged or emerging beetle) suggests that some animals were close enough for their dung to have entered the water.

Beetles that are regarded as synanthropic to some degree accounted for 15% of the terrestrial fauna. Two-thirds of these are categorized as facultative synanthropes, that is, common in natural habitats, although clearly favoured by artificial ones (Kenward 1997), but the rest include a group of beetles (5% of the terrestrial fauna) that are characteristically found together in association with litter from within ancient buildings (*Typhaea stercorea*, *Crataraea suturalis*, *Latridius minutus* group, *Enicmus*, *Cryptophagus* spp., *Ephistemus globulus*; Carrott and Kenward 2001; Hall and Kenward 1990; Kenward and Hall 1995). The building fauna and other synanthropes typically associated with organic occupation waste were not common enough to indicate direct dumping of substantial quantities of such material in the feature; the material may therefore

have arrived in run-off/drainage from occupation or manured land.

Terrestrial beetles and bugs noted during scanning the incremental samples were consistent with the records from the larger analysed sample.

Context 3073

It was estimated that over half of the very large insect assemblage consisted of aquatic beetles and to a lesser extent bugs. Water flea ephippia and ostracods were also common and aquatic deposition was clearly indicated. The range of water beetles was very similar in many respects to those recorded from the primary fill. Taxa not seen in the earlier deposit included *Coelostoma orbiculare*, which occurs at the edges of water bodies and in floating rafts of vegetation, usually in association with mosses, and *Helochaeres lividus*, found in vegetated waters (Foster *et al.* 2014, 72, 63). A single riffle beetle (*Oulimnius*) was recorded, suggesting that there may have been an input of clean, clear running water at least occasionally.

A minimum of 474 individuals of 163 terrestrial taxa was recorded. Ground around the feature might have been marshier than previously, since damp ground/waterside taxa were very well-represented among terrestrial insects (21%). Marsh beetles (*Cyphon*, at least 51 individuals) whose larvae develop in shallow water were particularly well-represented, and *Bembidion lunulatum*, *Dryops* and *Heterocerus* provided evidence for damp bare ground and wet mud. Insects associated with wetland vegetation included *Prasocuris phellandrii* (at least six individuals), particularly associated with marsh marigold (*Caltha palustris*), *Conomelus anceps* and *Livia junci*, found on rushes (*Juncus*), and *Coccidula rufa*, a spotless ladybird usually associated with tall wetland vegetation such as reeds (*Phragmites*), rushes (*Juncus*), and reedmace (*Typha*) (Majerus 1994, 142). Evidence for nettles and docks came from *Brachypterus*, *Trioza urticae* nymphs, *Apion*, and an adult and ?nymph of *Coreus marginatus*. Rotten wood and woody vegetation close to the feature were suggested by *Sinodendron cylindricum* and two species of bark beetles (Scolytinae).

Although there were suggestions of disturbed ground from beetles found on Brassicaceae (*Phyllotreta nemorum* group, *Ceutorhynchus* spp.), drier ground away from the pit was probably predominantly grassland. A striking feature of the assemblage was the abundance of click beetles (Elateridae), including several *Agrypnus murinus* and numerous *Agriotes*; both taxa are common in grassland where their larvae feed on plant roots. Phytophages included *Sphaeroderma* found on thistles or knapweeds, *Graptus triguttatus* on ribwort plantain (*Plantago lanceolata*), *Oxystoma* on vetches (*Vicia* and *Lathyrus*), *Gampsocoris punctipes* on restharrow (*Ononis*), and *Sitona* spp. and *Tychius* on Fabaceae. Tying in with evidence for grassland, scarabaeid dung beetles were proportionally more

common than in the primary fill, suggesting that there was more intensive use of nearby land for grazing by this stage (*Aphodius contaminatus*, *A. prodromus* or *sphacelatus*, *A. erraticus*, *A. ater*, *Onthophagus ?joannae*; 8% of the terrestrial fauna).

Beetles that are regarded as synanthropic to some degree accounted for 8% of the terrestrial fauna, somewhat less than in the primary fill. They did, however, include a group of beetles that are characteristically found together in association with litter from within ancient buildings (*Ptinus fur*, *Latridius minutus* group, *Enicmus*, *Cryptophagus* spp., *Ephistemus globulus*; 5% of the terrestrial fauna), perhaps introduced in run-off/drainage from occupation or manured land.

Discussion

Aquatic conditions

The bulk of the aquatic beetle fauna was indicative of standing water, but the presence of several species of riffle beetle (Elmidae) in the basal parts of the primary fill of the pit (3074) suggests an input of clean, clear, running water into the pit, at least occasionally. Riffle beetles were not observed in the middle and upper incremental samples from context 3074, but a single specimen of one species (*Oulimnius*) was recorded from the later fill (context 3073), suggesting that running water entered the pit at least occasionally at that stage too. While it is quite possible that the water source was intermittent, the apparent decline in number and species of riffle beetles between the earliest and later fills might possibly also reflect a decline in water quality in the source, perhaps in the form of silting or reduced oxygenation as a result of human activity. Riffle beetles have a plastron respiration system which requires a continuous supply of clean, clear, well-oxygenated running water. They do not swim but cling tenaciously to the substrate to avoid being swept away, even during episodes of flooding (Brown 1987; Shotton and Osborne 1986). A modern study has shown that the presence or absence of silt in the water is the single most important factor affecting their distribution (Eyre *et al.* 1993).

Terrestrial conditions and local land use

Terrestrial insects from small water bodies generally reflect ecological conditions in the near vicinity of the feature. A modern study of insect remains from sediments in a well in Kent, for example, found that they provided a good representation of known habitats in its immediate surroundings (Hall *et al.* 1980, 132). Another study of small water bodies has shown that even mobile taxa such as scarabaeid dung beetles will have arrived from within a 100-200m radius (Smith *et al.* 2010).

Ground immediately around pit 3067 appears to have been damp with areas of bare wet mud.

Vegetation growing fairly close to the pit probably included rushes, nettles, docks, members of the buttercup family (Ranunculaceae), and common mallow. Small numbers of beetles associated with dead or rotten wood in both samples, and scale insects found on twigs or branches and weevil that feed on foliage of woody vegetation in the primary fill, provided a hint that trees or shrubs might have grown close to the pit. There was very limited pollen evidence for this, however (Rutherford, below), but it is possible that these insects represent a dead or dying tree or shrub or perhaps even a well-maintained hedgerow that produced few flowers. Woodworm beetles (*Anobium punctatum*), probably present in both samples but only tentatively identified from the secondary fill, could have infested dry dead naturally occurring wood, any timber structures close to the pit, or perhaps some of the pieces of wood that were observed in both fills. In the last case, however, no signs of wood boring were noted during examination of recovered timber fragments (Goodburn, Chapter 3).

Numerous insects indicated that away from the pit, conditions were generally dry and open. The main implication of the terrestrial insects from both deposits was for dry grassland habitats with an abundance of flowering plants, and evidence was particularly strong from the secondary fill (3073). Modern studies of dung beetle remains in insect assemblages from small water bodies have shown that they reflect intensity of grazing in the surrounding area (Smith *et al.* 2010; 2014). Here, scarabaeid dung beetles accounted for 3% of the terrestrial assemblage in the primary fill (3074), a proportion that would indicate low-level or 'naturalistic' grazing in the area around the pit. The proportion in the secondary fill (3073) was 8%, suggesting a more substantial population of grazing animals was present in the vicinity of the pit by this time (Smith *et al.* 2010; 2014). Such proportions of dung beetles do not necessarily indicate permanent pastureland. Traditionally, haymaking would be carried out in the summer with livestock being grazed on the regrown vegetation through the autumn and often into the next year, their dung, and often manuring, adding nutrients to the soil. Animals would be excluded to allow the meadow to regrow in the spring (cf. Crofts and Jefferson 1999, chapter 6). The most numerous dung beetle in the secondary fill (3073) was *Aphodius contaminatus*, which is active from August to November (Jessop 1986, 23).

A further line of evidence that might suggest the presence of meadowland, at least close to the pit, is the abundance of Apionidae and *Sitona* weevils. Both groups were common in the analysed samples, accounting for 6% of the terrestrial fauna in the primary fill and 5% in the secondary fill, levels that have been suggested may be indicative of ungrazed grassland, with levels over 5% possibly suggesting meadowland (Robinson 2002, 26). Many species within these two groups feed on vetches, clovers and grassland trefoils and their life cycles require

their host plants to achieve maturity rather than being constantly eaten to ground level. The figures should be used with caution because isolated apionid sclerites can often not be identified closely, including at the present site.

Waste disposal

Groups of decomposer beetles characteristically found in litter within ancient buildings were recorded in both analysed samples (5% of the terrestrial fauna in both samples) suggesting that limited amounts of occupation litter had regularly entered the pit, perhaps in run-off from manured ground or nearby settlement. Other taxa regarded as synanthropic to some degree mostly consisted of 'facultative synanthropes' (ie favoured by human activity but also common in natural situations; Kenward 1997). The insect evidence was therefore insufficient to suggest direct dumping of significant amounts of organic occupation waste into the feature.

CHARRED PLANT REMAINS AND CHARCOAL by Julia Meen, with a contribution by Wendy Smith

Introduction

A total of 124 bulk samples were recovered, processed and assessed. Following assessment (Meen and Stafford 2017), eight samples were selected for further analysis of the charred plant remains. The only prehistoric sample with any significant quantity of charred plant remains comes from fill 1638 of posthole or pit 1637. A fragment of charred hazelnut shell from this feature was radiocarbon dated to the early Neolithic period (3800-3650 cal BC at 95.4% confidence; SUERC-75472). As well as containing a significant number of charred plant remains, sample 143 contained abundant charcoal and so was further analysed in order to characterise the range of wood taxa present, identify whether there was deliberate selection of certain wood resources by the Neolithic inhabitants, and provide clues as to the nature of the prehistoric woodlands in the area.

Of the other analysed samples, five came from pit 3067 and included three samples from lower fill 3074: two bulk samples 193 and 228 – the latter taken from sediment directly below the preserved wooden basket (SF 2687) – as well as a much smaller incremental sample (220; Fig. 2.26), taken from the very base of the pit where, due to difficult excavation conditions, only a small quantity of sediment could be recovered. The remaining two samples from pit 3067 came from context 3073, a secondary fill overlying 3074, and from context 3072, which appears to be a slumping or tip deposit at the sides of the pit.

In addition to the five samples from pit 3067, a relatively rich sample from fill 2636 of late Roman ditch 2635, was selected for analysis. Context 3005,

despite being the backfill of a grave (3003) and almost certainly containing redeposited material, contained a significant quantity of plant remains related to crop processing. Given the similarity of this material to the charred material from the Roman pit, it is highly likely that the remains from the grave fill are contemporary, and this sample (186) was therefore selected for analysis since it can provide a comparison to other evidence for Roman agricultural activity at the site.

Methodology

All bulk samples from the site were processed using a modified Siraf-style flotation machine, with smaller samples (less than 5 litres in volume) floated by hand using the 'wash-over' technique. Processed volumes are given in Table 5.7 and 5.8. Flots were collected onto 250µm meshes and the heavy residues were sieved to 500µm, after which both flots and residues were dried in a heated room. The residues were sorted by eye for artefacts and ecofactual remains. Identification of extracted items was carried out using a LEICA EZ4D stereo microscope at x10-40 magnification and with reference to published and online reference guides (including Cappers *et al.* 2006) and to the modern reference collection held at OA South. Nomenclature follows Stace (2010). Detached coleoptiles were present in many of the samples and were quantified only where the base was complete in order to avoid over estimating the numerous broken fragments.

Charcoal was selected from sample 143 for species identification, with selection aiming to include fragments in a range of sizes. Each item was fractured on the transverse, radial and tangential sections as required and examined using a Brunel Metallurgical SP-400BD microscope at up to x400 magnification. Items were identified with reference to Schweingruber (1990). Identification was limited to 50 fragments as it was quickly established that the sample was overwhelmingly composed of one taxa (oak), and it was felt that 50 items were therefore sufficient to characterise the assemblage.

Results

Tables 5.7 and 5.8 show the quantification of charred plant remains in each of the eight samples. Three of the samples from pit 3067 were extremely rich in chaff of spelt wheat; to reduce sorting time, the finer fractions of these samples were riffled and a proportion (one sixteenth) was fully sorted. An estimation of the quantity of chaff in the total sample, made by multiplication of the counts from the portion sorted, is given in Table 5.9 in order to more easily compare chaff abundance between samples. Table 5.10 shows the charcoal identifications from sample 143.

Sample 143 contains 270 fragments of charred hazelnut shell greater than 1mm in size, weighing a total of 2.9g. The sample contains very little other

material, although a small number of poorly preserved cereal grains and two glume bases are also present. Although the species of glume wheat these represent could not be further determined, spelt has not been definitely identified from British sites pre-dating the late Bronze Age (Hillman 1981, 124), and the chaff is therefore most likely to be either emmer (*Triticum dicoccum*) or to be intrusive.

The charcoal from sample 143 is almost entirely oak (*Quercus*). In the majority of the oak fragments examined, tyloses were visible within the vessels, indicating that this is heartwood. Heartwood does not usually develop in oak until it is at least 35 years of age (Cowgill 2003, 51), so this suggests that mature oaks were being exploited. Two fragments of hazel (*Corylus avellana*) were also identified.

The seven samples dated to the Roman period are broadly similar in character. All have frequent to abundant glume bases, rather fewer cereal grains, and frequent weed seeds. Notably, all samples also contain detached embryos and coleoptiles, which were sometimes, as in the case of samples 222 and 228, extremely abundant. The samples taken from pit 3067 contain greater quantities of grain than the samples from other features. The glume bases from this feature are often very well preserved, often with much of the glume intact. This is presumably the result of the waterlogged conditions and lack of reworking following deposition.

Sample 186 from grave backfill 3005 is particularly rich in cereal chaff, with a very low ratio of grain to glume bases of over 1:12, and it is also notable in that it contains a similar number of detached embryos and coleoptiles as it does grains. In sample 174, from feature 2635, this contrast is less clear, with a grain: glume ratio of roughly 1:3. However, a very high proportion of the grain is very poorly preserved, generally not identifiable to species, and much is highly fragmented. However, while the proportions of grain and chaff vary, the range and quantity of weed seeds in these two samples is similar to that seen in the samples from pit 3067. The most numerous seeds are those of stinking chamomile (*Anthemis cotula*) and dock (*Rumex* sp.), and other arable weeds, including poppy (*Papaver* sp.), bedstraws (*Galium* sp.) and common chickweed (*Stellaria media*), are also present. Charred caryopses of grasses (Poaceae) are particularly common in sample 222. There is generally an absence of seeds of wet ground taxa, suggesting that land cultivated for arable was some distance from the damp surroundings in which pit 3067 was sited.

Exploitation of woodland resources in the early Neolithic

Deposits of charred hazelnut shell have been found in a number of Neolithic and early Bronze Age pits in England, and wild foods such as hazelnuts are thought to have formed an important part of the prehistoric diet even after the introduction of agriculture (Moffett *et al.* 1989; Robinson 2007).

Large quantities of charred hazelnut shell were recovered from pits and ditches associated with the early Neolithic causewayed enclosure at nearby Thame in Oxfordshire (Wyles in prep). That oak almost exclusively forms the charcoal assemblage

from this sample, and that much is heartwood from mature trees, suggests that mature oak woodland, possibly with a hazel (*Corylus avellana*) understory element which could be exploited for its edible nuts, was available nearby.

Table 5.7 Charred plant remains from early Bronze Age posthole 1637, early Roman grave 3003 and late Roman ditch 2635

	Sample no.	143	174	186
	Context no.	1638	2636	3005
	Feature no.	1637	2635	3003
	Feature Type	Posthole	Ditch	Grave backfill
	Date	Early Bronze Age	Late Roman	Early Roman
	Volume floated (L)	35	30	10
	Flot vol. (ml)	410	50	20
	% sorted	100%	100%	100%
Cereal grain				
<i>Triticum</i> sp.	wheat	grain	24	10
<i>Triticum</i> sp.	wheat	germinated grain	2	
<i>Triticum</i> sp.	wheat	tail grain	2	
cf. <i>Triticum</i> sp.	cf. wheat	grain	10	9
Cereal	indet	grain	3	95
Cereal	indet	grain (est. from fragments)		83
Cereal chaff				
<i>Triticum spelta</i>	spelt	glume base	147	46
<i>Triticum spelta</i>	spelt	spikelet fork	12	
<i>Triticum spelta/dicoccum</i>	spelt/emmer	glume base	2	434
<i>Triticum spelta/dicoccum</i>	spelt/emmer	spikelet fork		5
cf. <i>Triticum aestivum/durum/turgidum</i>	free threshing wheat	rachis	1	1
<i>Hordeum vulgare</i>	barley	rachis	1	
Cereal		detached embryo	14	8
Cereal		detached coleoptile	24	17
Tree/shrub				
<i>Corylus avellana</i> L.	hazel	nutshell fragment	2.884g	
Weed/wild plants				
<i>Papaver</i> sp.	poppy	seed	1	
<i>Trifolium/Melilotus/ Medicago</i> spp.	clover/melilot/ medick	seed	2	
<i>Vicia/Lathyrus</i> spp.	vetch/tare (2-3mm)	seed		1
<i>Vicia/Lathyrus</i> spp.	vetch/tare (1-2mm)	seed	2	9
<i>Brassica</i> sp.	cabbages	seed		20
cf. <i>Brassica</i> sp.	cabbages	seed	1	
<i>Rumex</i> sp.	dock	seed		9
<i>Chenopodium</i> sp.	goosefoot	seed	4	4
Asteraceae	daisies	seed	19	7
<i>Anthemis cotula</i> L.	stinking chamomile	seed	14	32
<i>Tripleurospermum</i> sp.	mayweed	seed	1	
<i>Tripleurospermum inodorum</i> (L.) Sch. Bip.	scentless mayweed	seed	5	1
cf. <i>Juncus</i> sp.	rush	seed	1	1
POACEAE (small)	small grass	seed	1	1
POACEAE (medium)	medium grass	seed	3	3
POACEAE (large)	large grass	seed	14	9
<i>Avena</i> sp.	oat (wild?)	caryopsis	2	
<i>Bromus</i> sp.	brome	caryopsis	3	
<i>Avena/Bromus</i>	oat/brome	caryopsis	9	2

Berryfields

Table 5.8 Charred plant remains from pit 3067

			Sample no.	193	220
			Context no.	3074	3074
				(base of deposit)	
			Volume floated (L)	40	2
			Flot volume (ml)	1960	75
			Fraction	>2mm	<2mm
			% sorted	100%	100%
Cereal grain					
<i>Triticum</i> sp.	wheat	grain	171	1	3
<i>Triticum</i> sp.	wheat	germinated grain	142		4
<i>Triticum</i> sp.	wheat	tail grain			
<i>Triticum</i> sp.	wheat	germinated tail grain			
<i>Triticum</i> sp.	wheat	germinated single grain spikelet			
<i>Triticum</i> sp.	wheat	germinated double grain spikelet			
cf. <i>Triticum</i> sp.	cf. wheat	grain			5
<i>Hordeum vulgare</i>	barley	grain	5		
cf. <i>Hordeum vulgare</i>	cf. barley	grain	3		
Cereal	indet	grain	75	1	1
Cereal chaff					
<i>Triticum spelta</i>	spelt	glume base	445	190	226
<i>Triticum spelta</i>	spelt	spikelet fork	6	8	
<i>Triticum spelta</i>	spelt	basal node			1
<i>Triticum spelta</i>	spelt	rachis internode	6	11	8
<i>Triticum spelta</i> /dicoccum	spelt/emmer	glume base	44	336	148
<i>Triticum spelta</i> /dicoccum	spelt/emmer	spikelet fork	3	2	
<i>Triticum spelta</i> /dicoccum	spelt/emmer	rachis internode	15	17	23
<i>Triticum spelta</i> /dicoccum	spelt/emmer	rachis node			
cf. <i>Triticum dicoccum</i>	emmer	glume base			4
cf. <i>Triticum aestivum</i> /durum/turgidum	free threshing wheat	rachis			3
<i>Hordeum vulgare</i>	barley	rachis			4
Cereal		detached embryo	9	4	
Cereal		detached coleoptile	39	33	21
Cereal		culm node	2	1	
Cereal		basal node			8
Weed/wild plants					
<i>Ranunculus acris</i> /repens/bulbosus	meadow /creeping/ bulbous buttercup				
<i>Trifolium</i> /Melilotus/Medicago spp.	clover /melilot/ medick	seed			1
<i>Vicia</i> sp.	vetch	seed			
<i>Vicia</i> /Lathyrus spp.	vetch /tare (2-3mm)	seed	4		
<i>Vicia</i> /Lathyrus spp.	vetch /tare (1-2mm)	seed			2
cf. <i>Malus sylvestris</i>	apple	seed			
<i>Urtica urens</i> L.	small nettle	seed			
<i>Fallopia convolvulus</i> (L.) A. Love	black-bindweed	seed			
<i>Rumex</i> sp.	dock	seed		5	10
<i>Stellaria media</i> L.	common chickweed	seed	3		1
<i>Stellaria</i> cf. <i>graminea</i> L.	lesser stitchwort	seed			
<i>Montia fontana</i> L.	blinks	seed		2	
<i>Chenopodium</i> sp.	goosefoot	seed			1
<i>Galium</i> sp.	bedstraw	seed	3		
cf. <i>Galeopsis tetrahit</i> L.	common hemp-nettle	seed			1
Asteraceae	daisies	seed			
cf. <i>Lapsana communis</i> L.	nipplewort	seed			
<i>Anthemis cotula</i> L.	stinking chamomile	seed		3	
<i>Tripleurospermum inodorum</i> (L.) Sch. Bip.	scentless mayweed	seed		3	5

Whole	>2mm	<2mm	>4mm	4-2mm	<2mm
100%	100%	6.25%	100%	50%	6.25%
222				228	
3072		227		3074	
		3073			
				(area around basket)	
30		30		30	
55		1560		1350	
68	16		5	60	
27	26		15	81	
			1	1	
				3	
	1			3	
	1				
17	13		4		
				4	
				2	
26	10		1	62	
1597	96	56	22	948	173
50	3	3		99	
8				33	11
2171	75	138	13	102	127
					12
25		10		53	26
4				8	
3					
			1	1	2
47	4		2	11	1
109	12	18	2	91	28
2	2		2		3
			1	26	
1					
5				1	
1					
11		1			
1					
1					
1					
80		2		6	4
				7	
					1
20				2	2
5					
					1
44					
1					
166		5		4	11
18				1	12

Evidence for malting and brewing

Glumes are the main waste product from the processing of hulled wheats, emmer (*Triticum dicoccum*) and spelt (*T. spelta*). Unlike free-threshing wheats, ears of emmer and spelt break up during threshing into spikelets formed of grains held tightly within woody glumes that need to be removed through labour-intensive parching and pounding. For this reason, large quantities of wheat glumes, or 'chaff', are recovered from sites pre-dating the adoption of free-threshing wheats. By the Roman period, spelt wheat had largely displaced emmer as the predominant wheat crop in Britain (Jones 1981, 106; Greig 1991, 309), and where material is well enough preserved to identify, the chaff from Berryfields is overwhelmingly of spelt. A small number of glumes from the very base of pit 3067 (sample 222) have been tentatively identified as emmer (*T. dicoccum*). There is also an unusually high number of rachis internodes of spelt wheat in many of the samples. These are particularly common in the samples from context 3074 and especially from sample 228, which shows exceptional charred preservation in general. Many of the rachis internodes are linked together in chains; where these survive archaeologically they tend to be rachis from towards the base of the wheat ear, as this part of the rachis is denser (R Pelling, pers. comm.).

A high proportion of the grains in all of the Roman samples show signs of having germinated. The most obvious sign of this is the presence of an attached sprout, or coleoptile, on the dorsal face of the grain where the development of a new plant has begun. Other characteristic signs include a collapsed profile to the grain, a leathery texture, a missing or enlarged embryo, and the presence of a dorsal groove where the sprout has carved into the surface of the grain before becoming detached. There were also frequent detached coleoptiles in the analysed samples and these were also present in low levels in a number of other samples at the site. These three types of remains – glumes, germinated grain and detached coleoptile – have been increasingly interpreted as the residue of malting activities. Evidence from an increasing number of sites (eg Whitelands Farm, Oxfordshire (Stevens 2011a), Eton Rowing Lake, Buckinghamshire (Robinson pers. comm.), and Springhead and Northfleet villa in Kent (W Smith 2011; Stevens 2011b)) suggests that spelt wheat was the favoured grain for the production of ale in the Roman period in Britain, and that grains were malted still encased within their spikelets. The spikelets would be soaked in water in order to initiate germination and start the process of converting the grains' starch reserves into fermentable sugars. The grains would then be dried in a low heat in order to halt germination and arrest further growth of the shoots. The malt that was thereby produced would then be carefully rubbed to remove the glumes and coleoptiles, and this waste may have been burnt as

Table 5.8 (continued)

		Sample no.	193	220
		Context no.	3074	3074
			(base of deposit)	
		Volume floated (L)	40	2
		Flot volume (ml)	1960	75
		Fraction	>2mm	<2mm
		% sorted	100%	6.25%
				Whole
Apiaceae	carrot family	seed		
cf. <i>Juncus</i> sp.	rush	seed		
<i>Carex</i> sp.	sedge	seed		
<i>Eleocharis</i> sp.	spike-rush	seed		
Poaceae (small)	small grass	seed		
Poaceae (medium)	medium grass	seed	3	7
Poaceae (large)	large grass	seed		2
Poaceae (large)	large grass	germinated seed		
<i>Avena</i> sp.	oat	caryopsis	18	3
<i>Bromus</i> sp.	brome	caryopsis	8	
<i>Avena/Bromus</i>	oat/brome	caryopsis	77	8
<i>Avena/Bromus</i>	oat/brome	germinated caryopsis	6	
Indet.		seed		1

fuel alongside any sprouted grains still caught up in the material.

The Roman-period site of Weedon Hill, a little over 2km from Berryfields, has strong parallels both in the structures present and the composition of the charred plant assemblages. Structures at this site have been described as a malting house, with abundant germinated spelt grains recovered from an oven believed to have been used for the drying of malt, while waste from the dehusking of malted spelt was recovered from several contexts (Stevens 2013). The presence of several complete spikelets from Berryfields, in which the grain was still held within the glumes, supports the suggestion that the grain was malted as whole spikelets. It is notable that, while spelt spikelets normally each contain two grains, the spikelets at Berryfields included single-grain spikelets as well as the more normal double-grained (Figs 5.9 and 5.10). Single-grain spikelets have been observed at several other sites where malting activity has been identified, including at Over in Cambridgeshire (Fosberry and Moan 2018). Experimental work by Fosberry (*ibid.*) has provided evidence for a link between the formation of single-grain spikelets to physiological stress in the growing plant, and furthermore, has suggested that the presence of numerous rachis internodes in the Over material may be because single-grained spikelets are more likely to occur on the lower part of the ear.

Charred plant remains from Aylesbury Vale Parkway by Wendy Smith

In total, 21 samples from cremations, ditches, inhumations, pits and a tree-throw holes were assessed for the preservation of plant remains. Only

one of these samples was considered suitably rich to merit further analysis. Sample 19 (context 457) was collected from tree-throw hole 459. Seeds from the sample were radiocarbon dated to cal AD 80-230 (95%; NZA-33906). A small quantity of cereal grain was recovered, but in general this sample is dominated by weed seeds, especially vetch/vetchling (*Vicia* spp./*Lathyrus* spp.). Two possibilities for the abundance of vetch/vetchling are immediately obvious: that vetch/vetchling was intentionally grown as a fodder crop, or that vetch/vetchling was a weed of a cereal crop which was subsequently removed (possibly in coarse sieving or hand-cleaning grain) into feature 459. Some have viewed the increased recovery of vetch/vetchling as a potential indicator for the depletion of nutrients in the soil and potentially the expansion of cultivation onto less favourable soils (Jones 1984, 121-2). Certainly, the low-level recovery of vetch/vetchling seeds is quite typical in the Milton Keynes area in the Iron Age and Roman periods (M Jones 1986; 1993). However, the recovery of a large concentration of vetch/vetchling seeds is unusual. Only Bancroft (Nye and Jones 1994, 563) has produced an assemblage with large concentrations of vetch/vetchling (equivalent to 34% of all identifications).

WATERLOGGED PLANT REMAINS FROM PIT 3067 by Julia Meen

Introduction

Owing to the high potential for preservation of organic material within pit 3067 (Phase 6), bulk samples from several of its fills were sub-sampled for waterlogged remains. In addition, a sequence of 25 incremental samples was taken at 5cm intervals

222	227	228			
3072	3073	3074			
		(area around basket)			
30	30	30			
55	1560	1350			
Whole	>2mm	<2mm	>4mm	4-2mm	<2mm
100%	100%	6.25%	100%	50%	6.25%
1					1
2					
1					
1					
14		1			2
23		2	1	3	2
14	1				
					1
8	3	1		14	
2					
23	14	5		82	10
20				1	

vertically through the fills for the recovery of waterlogged plant remains, insects and molluscs in order to understand changing environmental conditions within and surrounding the feature throughout the life of the pit (Fig. 2.26). Such exceptional preservation through waterlogging is unusual for a rural site dating to the Roman period (van der Veen *et al.* 2007, 193). Waterlogged preservation has the potential to preserve food items, such as leafy vegetables, herbs and spices, and elements of the Roman diet that are less well understood than staples such as cereals due to the relatively low number of waterlogged samples that have been excavated compared to those that are charred (van der Veen *et al.* 2008, 15-16). The presence of these foodstuffs also has the potential to inform about patterns of trade and social access associated with these foods, and, particularly relevant for the Berryfields pit, potential for the recovery of plant remains which have been ritually placed into the pit. The presence of the placed eggs, the abundance of coins and the woven basket all suggest that the pit held a deeper significance to the people who lived nearby; many plants are known to have ritual connotations in the Roman

Table 5.9 Estimates of total chaff in each sample from pit 3067, based on fractions quantified

	Sample no.	193	220	222	227	228	
	Context no.	3074	3074	3072	3073	3074	
<i>Triticum spelta</i>	spelt	glume base	3485	226	1597	992	4686
<i>Triticum spelta</i>	spelt	spikelet fork	134		50	51	198
<i>Triticum spelta</i>	spelt	basal node		1			
<i>Triticum spelta</i>	spelt	rachis internode	182	8	8		242
<i>Triticum spelta/dicoccum</i>	spelt/emmer	glume base	5420	148	2171	2283	2249
<i>Triticum spelta/dicoccum</i>	spelt/emmer	spikelet fork	35				192
<i>Triticum spelta/dicoccum</i>	spelt/emmer	rachis internode	287	23	25	160	522
<i>Triticum spelta/dicoccum</i>	spelt/emmer	rachis node			4		16
cf. <i>Triticum dicoccum</i>	emmer	glume base		4			0
cf. <i>Triticum aestivum/durum/turgidum</i>	free threshing wheat	rachis		3	3		0
<i>Hordeum vulgare</i>	barley	rachis		4			35
Cereal		detached embryo	73		47	4	40
Cereal		detached coleoptile	567	21	109	300	632
Cereal		culm node	18		2	2	50
Cereal		basal node		8			53

Table 5.10 Charcoal from early Neolithic pit/posthole 1637

Sample no.	143
Context no.	1636
<i>Quercus</i>	33 (h)
<i>Corylus</i>	2
Indeterminate	1
Total	50

h = heartwood

period and deliberately deposited plant remains are known from similar contexts in Britain (eg Lodwick 2015).

Methodology

A one-litre sub-sample of each of the 25 incremental samples, plus two additional sub-samples from two contexts not covered by the incremental sequence, were processed for the recovery of waterlogged plant remains using the 'wash-over' technique. The flot and residue from each sample were collected separately onto 250µm meshes and retained wet to prevent desiccation.

Berryfields

Table 5.11 Charred plant remains from Roman tree-throw hole 459, Aylesbury Vale Parkway

Sample no.	19	
Context no.	457	
Feature no.	459	
Sample volume (L)	40L	
Flot volume (ml)	62ml	
Proportion of flot sorted	100%	
Seeds per litre of sediment	16.58	
Cereal grain		
cf. <i>Hordeum</i> spp. - tail grain	1	possible barley
<i>Triticum</i> spp. - indeterminate	16	wheat
Cereal - indeterminate	39e	cereal
Cereal/poaceae - indeterminate	30e	cereal/large grass
Cereal Chaff		
<i>Triticum</i> spp. - indeterminate rachis node	2	wheat
<i>Triticum</i> spp. - indeterminate glume fragment	4	wheat
Cereal/Poaceae - culm base	4e	cereal/grass family
Cereal/Poaceae - culm node	4e	cereal/grass family
Tree/shrub		
<i>Corylus avellana</i> L. - nutshell fragment	1	hazel
Weed/wild plants		
<i>Ranunculus</i> subgenus <i>Ranunculus</i>	1	buttercup
<i>Chenopodium</i> spp.	23e	goosefoot
<i>Chenopodium</i> spp. - small-seeded	17	goosefoot
<i>Montia fontana</i> L.	1	blinks
<i>Cerastium</i> spp.	7	mouse-ear
cf. <i>Agrostemma githago</i> L. - calyx tip	1	corncockle
<i>Polygonum</i> cf. <i>aviculare</i> L.	3	possible knotgrass
<i>Rumex</i> spp.	17	dock
<i>Vicia/Lathyrus</i> spp.	336e	vetch/vetchling
<i>Vicia/Lathyrus</i> spp. - favulariate seed coat	40e	vetch/vetchling (irregular ridged surface)
cf. <i>Vicia/Lathyrus</i> spp. - fragments (est whole seeds)	20e	possible vetch/vetcling
<i>Medicago</i> sp./ <i>Melilotus</i> sp./ <i>Trifolium</i> sp.	2	medick/melilot/clover
Fabaceae - unidentified pod fragments	4	pea family
? <i>Myosotis</i> sp.	1	forget-me-not
<i>Euphrasia/Odontites</i> spp.	3	eyebright/bartsia
<i>Galium</i> spp.	6e	bedstraw
<i>Valerianella dentata</i> (L.) Pollich	1	narrow-fruited cornsalad
<i>Tripleurospermum inodorum</i> (L.) Sch. Bip.	22e	scentless mayweed
<i>Eleocharis palustris</i> (L.) Roem. & Schult./ <i>uniglumis</i> (Link) Schult.	2	common/slender spike-rush
<i>Avena</i> spp. - awn fragments	+	oat
cf. <i>Avena</i> - glume fragment	1	possible oat
<i>Avena/Bromus</i> spp.	6e	oat/brome
<i>Bromus</i> spp.	3	brome
Poaceae - small-sized caryopsis	20	grass family
Poaceae - medium-sized caryopsis	17e	grass family
Poaceae - culm node	1	grass family
Unidentified	3	-
Unidentified - stalk	3	-
Unidentified - twig fragment	1	-

Key: e = estimated count of whole seeds (in broadest sense) based of fragments, += <5 items



Fig. 5.9 Single-grained spikelet of spelt, dorsal view (left) and side view (right)

Results

Context 3074

The lowermost five increments, representing primary fill 3074, show significant fluctuations in the size of the open ground/cultivated and grass seed component, and this variation with depth is emphasised by the changes in species composition seen in individual incremental samples (Figs 2.26 and 5.11; Table 5.12). Plant remains from the base of the pit, representing vegetation growing within and in the vicinity of the pit when it was first opened, seem to have a fairly distinct species assemblage



Fig. 5.10 Double-grained spikelet of spelt, side view (left) and dorsal view (right), in which the attached coleoptile and the germinating grain can be clearly seen

composition when contrasted with samples from the later levels of the primary fill. The basal sample is dominated by duckweed (*Lemna* sp.), spiked water-milfoil (*Myriophyllum spicatum*), horned pondweed (*Zannichellia palustris*) and, in particular, water crowfoot (*Ranunculus* subgenus *Batrachium*). There are few grass seeds, although seeds of cultivated or open-ground form a significant part of the assemblage.

Both water- and celery-leaved-crowfoot decline dramatically over time in the upper levels of the primary fill. Horned pondweed and duckweed also declined by the time samples 217 and 219 were laid down, while pondweed (*Potamogeton* sp.) is much more common, particularly in sample 217. Samples

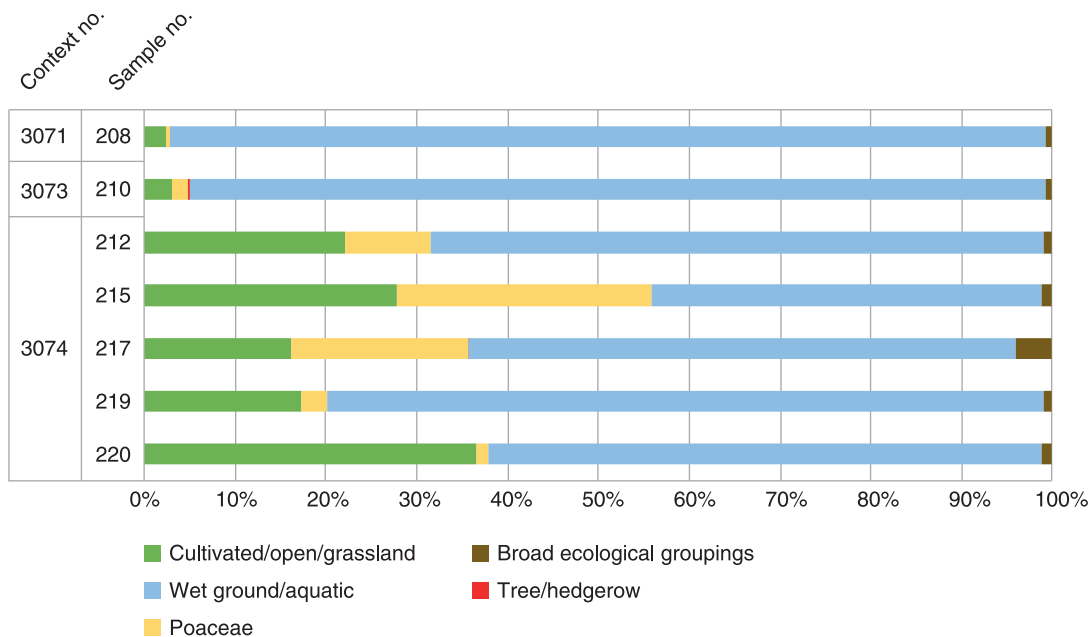


Fig. 5.11 Proportions of waterlogged seeds from different ecological groupings in incremental samples from pit 3067

Berryfields

Table 5.12 Waterlogged plant remains from late Roman pit 3067

	Sample no.	208	210	212	215	217	219	220
	Context no.	3071	3073	3074	3074	3074	3074	3074
	Sample vol. (L)	1	1	1	1	1	1	2
	Proportion of flot sorted	100%	100%	50%	100%	100%	100%	100%
Plants of waste, cultivated or open ground								
<i>Papaver somniferum</i> L.	opium poppy			1		1		
<i>Papaver argemone</i> L.	prickly poppy				1			
<i>Potentilla anserina</i> L.	silverweed							1
<i>Aphanes</i> sp.	parsley-piert					2	5	2
<i>Urtica dioica</i> L.	common nettle	42	16	386	411	99	26	76
<i>Urtica urens</i> L.	small nettle			3	37	1		
<i>Malva sylvestris</i> L.	common mallow			5		17	4	38
<i>Lepidium coronopus</i> (L.) Al-Shehbaz	swine-cress	1			2			1
<i>Brassica rapa</i> ssp. <i>campestris</i> (L.) AR Clapham	wild turnip						1	
<i>Thlaspi arvense</i> L.	field penny-cress			1			3	12
<i>Persicaria</i> sp.	knotweed		1		1		2	3
<i>Polygonum aviculare</i> L.	knotgrass			1	4	6	23	46
<i>Fallopia convolvulus</i> (L.) A. Love	black-bindweed						1	
<i>Stellaria media</i> (L.) Vill.	common chickweed		1	42	123	51	11	34
<i>Chenopodium</i> sp.	goosefoot			25	43	60	>100	>500
<i>Beta vulgaris</i> L.	beet					4	2	3
cf. <i>Beta vulgaris</i> L.						1		
cf. <i>Beta vulgaris</i> L.	beet (fragments)					7	3	1
<i>Hyoscyamus niger</i> L.	henbane			2	3	2		1
<i>Plantago major</i> L.	greater plantain	4		7		5	14	
<i>Laniam purpureum</i> L.	red dead-nettle			3	6	5		13
<i>Laniam</i> cf. <i>purpureum</i> L.				1				
<i>Sonchus asper</i> (L.) Hill	prickly sowthistle	2	10	36	6	31	21	96
<i>Sonchus</i> cf. <i>oleraceus</i> L.	cf. smooth sowthistle			7		1		
<i>Sonchus</i> sp.	sowthistle	4		7	8		4	35
<i>Taraxacum</i> sp.	dandelion		1					
<i>Anthemis cotula</i> L.	stinking chamomile	1	4	4	8	11	6	36
<i>Tussilago farfara</i> L.	colt's-foot						1	
<i>Anthriscus caucalis</i> M. Bieb	bur chervil						2	
<i>Coriandrum sativum</i> L.	coriander							
<i>Aethusa cynapium</i> L.	fool's parsley			3				1
<i>Conium maculatum</i> L.	hemlock			10	1	7	7	8
Grassland plants								
<i>Ranunculus</i> cf. <i>acris</i> L.	meadow buttercup		1		1		1	
<i>Stellaria</i> cf. <i>graminea</i> L.	cf lesser stitchwort			9	36	13	1	2
<i>Leontodon/Picris</i> sp.	hawkbit/hawkweed oxtongue				1			
cf. <i>Leontodon</i> sp.	hawkbit							1
Wood, scrub and hedgerow								
<i>Malus</i> sp.	apple					1		
<i>Crataegus monogyna</i> Jacq.	hawthorn		2					
<i>Corylus avellana</i> L.	hazel		1					
Wet ground and aquatic plants								
<i>Ranunculus sceleratus</i> L.	celery-leaved buttercup	>2000	523	75	33	110	98	198
<i>Ranunculus</i> subgenus <i>Batrachium</i>	crowfoot		2	4	5	55	563	1020
<i>Myriophyllum</i> cf. <i>spicatum</i> L.	spiked water-milfoil		1			1	24	62
<i>Rumex</i> cf. <i>conglomeratus</i> Murray	cf clustered dock			85	4	29	4	18
<i>Rumex</i> cf. <i>maritimus</i> L.	golden dock						3	5
<i>Rumex</i> sp.	dock	3	27	49	42	184	14	54
<i>Montia fontana</i> L.	blinks					1	1	4
<i>Callitriche</i> sp.	water-starwort					1	6	1

Table 5.12 (continued)

	Sample no.	208	210	212	215	217	219	220
	Context no.	3071	3073	3074	3074	3074	3074	3074
	Sample vol. (L)	1	1	1	1	1	1	2
	Proportion of flot sorted	100%	100%	50%	100%	100%	100%	100%
<i>Cirsium</i> cf. <i>dissectum</i> (L.) Hill	meadow thistle					1		
<i>Apium graveolens</i> L.	wild celery		1	473	314	258	25	11
<i>Apium nodiflorum</i> (L.) Lag.	fool's-water-cress	55	185	86	160	213	151	36
<i>Apium</i> cf. <i>repens</i> (Jacq.) Lag.	cf. creeping marshwort	8	26		41	63	22	11
<i>Apium</i> sp.	marshwort	60	41	904	455	154	20	5
<i>Lemna</i> sp.	duckweed	10	83	1	5	29	65	>200
<i>Alisma plantago-aquatica</i> L.	water-plantain		1					
<i>Potamogeton crispus</i> L.	curled pondweed					33	11	2
<i>Potamogeton</i> sp.	pondweed		20		1	48	25	5
cf. <i>Potamogeton</i> sp.	cf. pondweed	1						
<i>Zannichellia palustris</i> L.	horned pondweed					10	26	38
<i>Juncus</i> sp.	rush	>500	>1000			>100	>100	
<i>Juncus</i> sp.	rush (seed head)	3	32					
<i>Eleocharis</i> sp.	spike-rushes		1		3	4	3	6
<i>Carex</i> sp.	sedge	15	64	1	4	11	11	23
Plants from broad ecological groupings								
<i>Ranunculus acris/repens/bulbosus</i>	meadow / creeping / bulbous buttercup	4	1	2	6	4	3	5
<i>Ranunculus</i> cf. <i>sardous</i> Crantz	cf hairy buttercup					1		2
<i>Ranunculus</i> cf. <i>repens</i> L.	creeping Buttercup					1		
<i>Lepidium</i> type	pepperwort					3		
<i>Rumex</i> cf. <i>acetosella</i> L.	cf. sheep's sorrel			1	1	2	3	
<i>Cerastium</i> sp.	mouse-ear			1	3	14	1	
<i>Silene</i> sp.	campion						1	
<i>Atriplex</i> sp.	orache		1	9	10	15	3	7
<i>Verbascum</i> sp.	mullein					9		
cf. <i>Prunella vulgaris</i> L.	cf. selfheal					2		
<i>Cirsium vulgare</i> (Savi) Ten.	spear thistle				4	3		
<i>Cirsium arvense</i> (L.) Scop.	creeping thistle					2		
<i>Cirsium</i> sp.	thistle		3			1		
<i>Cirsium/Carduus</i> sp.	thistle	8		3	2	8	2	9
<i>Lapsana communis</i> L.	nipplewort				1	1		
cf. <i>Lapsana communis</i> L.	cf. nipplewort		1					3
Asteraceae	daisy family		1			12		
<i>Sambucus nigra</i> L.	elder	1						
cf. <i>Chaerophyllum temulum</i> L.	cf. rough chervil	1						
cf. <i>Daucus carota</i> L.	wild carrot							1
Apiaceae	carrot family			8		1		
Poaceae (small)	small grasses		1	32	156	86	17	
Poaceae (medium)	medium grasses	10	10	96	165	40	6	9
Poaceae (large)	large grasses		7	105	376	264	14	24

212 and 215, upper samples within context 3074, see a huge increase in the number of nettle (*Urtica dioica*) seeds alongside an increase in common chickweed (*Stellaria media*) and lesser stitchwort (*S. graminea*). There is also a dramatic increase in the number of grass caryopses, which appears to start slightly earlier, visible already in sample 217. In sample 215, grass seeds and those of open or cultivated ground taxa make up over 55% of the overall seed total.

Seeds of the marshwort genus (*Apium* sp.), which are fairly infrequent in the basal sample, sharply increase in number to form a significant proportion

of the seed assemblage in later levels, especially in sample 212, where there are well over one thousand *Apium* seeds. Marshwort seeds are difficult to identify to species, and the high number of generic *Apium*-species identifications reflects where preservation was too poor to clearly differentiate which type was present. However, among the better preserved items, wild celery (*Apium graveolens*), fool's-water-cress (*A. nodiflorum*) and creeping marshwort (*A. repens*) could be distinguished. These three species appear to change in importance over time: fool's-water-cress is initially dominant in the

lower levels, with wild celery coming to form a more significant component by the top of the fill.

Context 3073

The number of seeds derived from non-wetland or aquatic sources in contexts 3071 and 3073 is low, compared with the fluctuating levels seen in primary fill 3074. Seeds of nettle, which can often be ubiquitous in waterlogged samples, are notably rare, and there are few grass caryopses. However, context 3073 is notable in that it is the only context from the pit to contain evidence for arboreal vegetation. A hazelnut (*Corylus avellana*) and fruits of hawthorn (*Crataegus monogyna*) were recovered from incremental sample 210, and a scan of the bulk flot from this context revealed a number of additional seeds of both these taxa. Both hawthorn and hazel produce fairly large fruits which do not disperse far by themselves, suggesting either that there were trees growing in the immediate vicinity of the pit at this time, or that the items were incorporated in material that was deposited into the pit. Hazel and hawthorn are common hedgerow trees, and the bulk sample also contained a seed of white bryony (*Bryonica dioica*), another hedgerow species. Relatively low values for arboreal pollen suggest that any woodland was probably at some distance from the site (Rutherford, below), but hazel-type, hawthorn-type and willow-type pollen support the interpretation that there was hedgerow at a closer distance. The presence of insects that feed on the foliage of woody vegetation further supports this idea (Allison, above).

Overall, it is aquatic and wet ground taxa that dominate the assemblage from context 3073. Seeds of celery-leaved buttercup and duckweed, both of which were common in the lowest levels of the pit but then declined, show a significant increase and are joined by other aquatics including pondweed (*Potamogeton* sp.) and spiked water-milfoil (*Myriophyllum spicatum*). However, there is no return of the water-crowfoot (*Ranunculus* subgenus *Batrachium*) that was so abundant at the base of the pit, which is almost absent here. Marshworts are frequent, with fool's-watercress appearing to be most common. Waterside plants such as sedges (*Carex* sp.), dock (*Rumex* sp.) and rush (*Juncus* sp.), including a large number of rush seed heads, perhaps suggest a fairly shallow, congested pond with vegetation growing on wet, muddy banks and perhaps a stand of scrubby trees or a hedgerow nearby. The low representation of open-ground taxa, which formed a very high percentage of the contemporary pollen record (Rutherford, below), may be due to a hedgerow or other trees acting as a filter against seeds of vegetation from further afield.

Context 3071

The plant remains from this context were less well preserved than those in the underlying samples, and a more limited suite of plant taxa was identified. The

assemblage was overwhelmingly dominated by seeds of celery-leaved buttercup (*Ranunculus sceleratus*), with seeds of rush (*Juncus* sp.) close behind. Pelling (2008, 354) suggested that the presence of celery-leaved buttercup in a waterhole at Westhawk Farm in Kent was indicative of shallow, mineral-rich water, and it is likely that the depth of water in pit 3067 would by this stage have been relatively shallow. Seeds of the marshwort genus, *Apium*, were fairly common, and although the relatively poor preservation of the plant material in this sample meant that many could not be further identified, a high proportion appeared to be either fool's-water-cress (*A. nodiflorum*) or creeping marshwort (*A. repens*). Common nettle (*Urtica dioica*) occurs fairly frequently in this sample, and there are other indicators of open or even cultivated ground nearby, including grasses (Poaceae), greater plantain (*Plantago major*) and sowthistle (*Sonchus* sp.), but it is the aquatic and wetland taxa that are by far dominant.

Non-native, introduced or cultivated taxa

Beet (*Beta vulgaris*) was recovered from the lowermost three samples from fill 3074 (217, 219 and 220) and examples were also found in the bulk sample examined from context 3073 (Fig. 5.12A). There are four subspecies of *Beta vulgaris*, only one of which, *B. vulgaris* ssp. *maritima* (sea beet), is native; Stace (2010, 492) lists its natural habitat as shores and waste ground near the sea. Van der Veen *et al.* (2008, 28) note that, although it is not possible to distinguish the seeds of cultivated beet from those of the native plant, occurrences of beet 'almost certainly represent cultivated vegetables, especially when found at inland sites.' Beet was not cultivated for its root until the medieval period (Prance and Nesbitt 2005, 73), so earlier examples would have been utilised for its edible leaves.

Two seeds of opium poppy (*Papaver somniferum*) were found within the pit: a charred example from sample 212 and a waterlogged seed from sample 217. Opium poppy is not native to Britain and the earliest archaeological examples date to the Roman period, although it is not an infrequent discovery, being the third most commonly recovered Roman-introduced plant food (van der Veen *et al.* 2008, 14).

Owing to the exceptional preservation of the material from pit 3067, and the fact that by analysing a limited number of one-litre incremental samples a relatively small proportion of the material originally sampled from the pit would be looked at, it was appreciated early on that there was potential for larger, or rarer, items to be missed. Clearly this potential bias was likely to disproportionately affect non-native taxa, which may have been cultivated, traded or deliberately placed into the pit, as opposed to taxa growing naturally in the vicinity which would normally be expected to make up the greater part of the vegetation preserved. Therefore, it was decided that the bulk samples of 30-40L which were processed for

the recovery of charred plant remains (see J Meen, above) should be kept wet and scanned for any additional taxa they might contain. This approach proved to be worthwhile, as two halves of a schizocarp of coriander (*Coriandrum sativum*) were recovered from sample 193 from fill 3074 (Fig. 5.12B). Coriander is a flavouring which has been associated with Roman-style foodways, with people



Fig. 5.12 A) *Beta vulgaris*, beet; B) *Coriandrum sativum*, coriander; C) seeds of *Anethum graveolens*, dill; d) seeds of *Brassica rapa* ssp. *campestris*, wild turnip

adopting 'Roman' diets and tastes (van der Veen *et al.* 2008, 34).

The same context also produced a *Prunus*-type stone. The difficulties in distinguishing between the stones of the *Prunus* genus are well recognised, as there is overlap in the morphologies of the different taxa. Murphy has plotted size ranges of stones of *Prunus spinosa* (blackthorn) and *Prunus domestica* (plum/bullace) from medieval Norwich (quoted in Greig 1991, 324). The stone from Berryfields measures 8mm wide at its broadest point, and is at least 10mm long, the base of the stone being broken off. These measurements place the stone comfortably within the main spread of sizes plotted for stones of *Prunus spinosa* from the Norwich material. Murphy's medieval *Prunus domestica* stones were generally rather longer than they were wide, with few examples greater than 8mm in length, and most of these greater than 13mm in length. The length:width ratio of the Berryfields example is closer to most of the *P. spinosa* examples than to the majority of the medieval *P. domestica* stones. However, *P. domestica* has been found from Roman contexts in Britain (both *P. domestica* ssp. *domestica*, plum, and *P. domestica* ssp. *insititia*, damson). Although they are more common from Roman towns, finds have been recorded from rural sites (van der Veen *et al.* 2008, 17), so the possibility that the stone is from a cultivated plum cannot be entirely discounted.

The bulk sample from context 3073 produced several seeds of dill (*Anethum graveolens*; Fig. 5.12C). Dill is a culinary herb introduced to Britain by the Romans, found today in the wild only as an escapee (Stace 2010, 817). Seeds of dill have been recovered relatively frequently from Roman sites, including from the rural site of Farmoor (Robinson 1979) and the villa at Barton Court Farm (Robinson 1986), both in Oxfordshire.

Other possible cultivated plants include a single seed of apple (*Malus sylvestris/domestica*) from sample 217, and a *Brassica* from sample 219 (both context 3074). The *Brassica* genus includes cabbage (*B. oleracea*), black mustard (*B. nigra*), and turnip (*B. rapa*), but also a wide variety of cultivated subspecies and varieties, most of which have similar seeds. Identifying specific *Brassic*as from archaeological material can therefore be very difficult, but the size and sculpturing of the Berryfields example is characteristic of *B. rapa* ssp. *campestris*, wild turnip (Fig. 5.12D). While its leaves and seeds are edible, the vegetable wild turnip is unlikely to have been cultivated as a root vegetable as the root does not form a tuber (M Robinson, pers. comm.). Finally, wild celery (*Apium graveolens*) was highly abundant in the pit, especially in the upper levels of context 3074. While wild celery is native to Britain, it is more commonly found in coastal habitats (Stace 2010, 821), and where found on inland sites it is often assumed to be cultivated (eg van der Veen 2008). However, its presence in such high numbers at Berryfields and its association with other *Apium*

species suggest in this case that it is more likely that celery was growing wild as part of the damp ground vegetation around the pit.

POLLEN by Mairead Rutherford

Introduction and methods

Assessment of the pollen from two fills (3071 and 3073) of pit 3067 revealed rich and well preserved assemblages. It was anticipated that the analysis of pollen from these fills would further secure the suggested interpretation of the data at assessment and, together with the plant remains and insect work, provide evidence of former environments and potential land-use at and adjacent to the site. The deepest fill, 3074, was also assessed, but was found to contain insufficiently well preserved pollen for further analysis.

Volumetric samples (1ml) were taken from the sub-samples and processed using a standard chemical procedure (method B of Berglund and Ralska-Jasiewiczowa 1986). Pollen identification and nomenclature follows Moore *et al.* (1991) with reference to a small type collection held by OA North. Plant nomenclature follows Stace (2010). Identification of non-pollen palynomorphs (NPP) follows van Geel (1978) and van Geel and Aptroot (2006). Non-pollen palynomorphs are prefixed by HdV (corresponding to their listing in the NPP catalogue in the Hugo de Vries laboratory, University of Amsterdam, The Netherlands).

Pollen counts of at least 500 grains (including trees and shrubs, herbs and fern spores) have been achieved for all of the sub-samples analysed. Pollen was counted from equally spaced traverses across whole slides at a magnification of x400 (x1000 for critical examinations). Pollen data have been presented as percentage diagrams using the computer programs TILIA and TGView (Grimm 1991-2011). The percentage values are based on a total land pollen (TLP) sum that includes trees, shrubs, herbs and fern spores. Non-pollen palynomorphs and deteriorated grains are expressed as percentages of TLP plus the respective sum to which they belong. Rare pollen types (single occurrences of taxa) are marked on the diagrams using a plus (+) symbol. Microcharcoal fragments are not shown on the pollen diagram, because the particles were preserved in abundance in all the sub-samples and impossible to count accurately.

Results

Description

Three sub-samples taken from the deepest monolith sample 192 (3074) yielded poor pollen counts, with a high proportion of the grains crumpled, concealed or broken and consequently not statistically valid for potential analysis. Nevertheless, it is possible to gain some palaeoenvironmental information from these sub-samples. All three sub-samples contained a herb-rich assemblage, dominated by grasses (Poaceae).

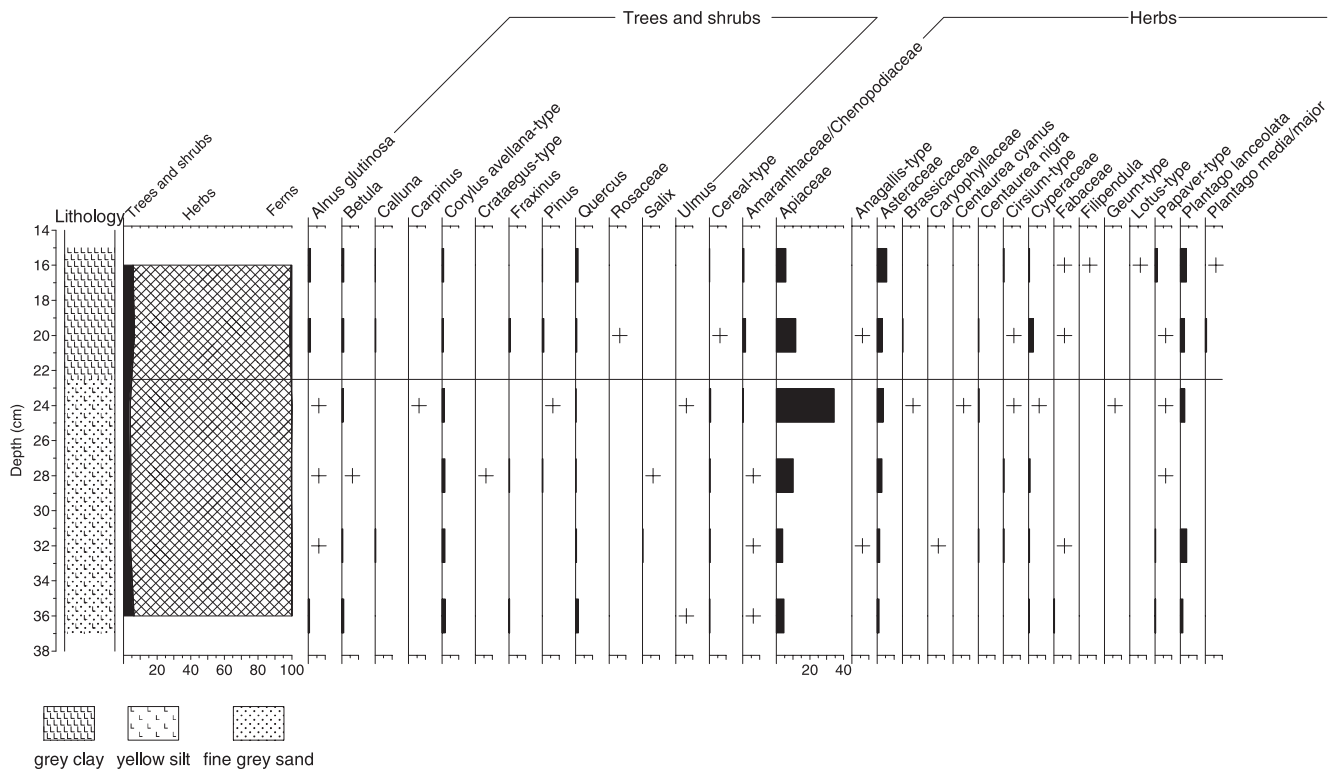


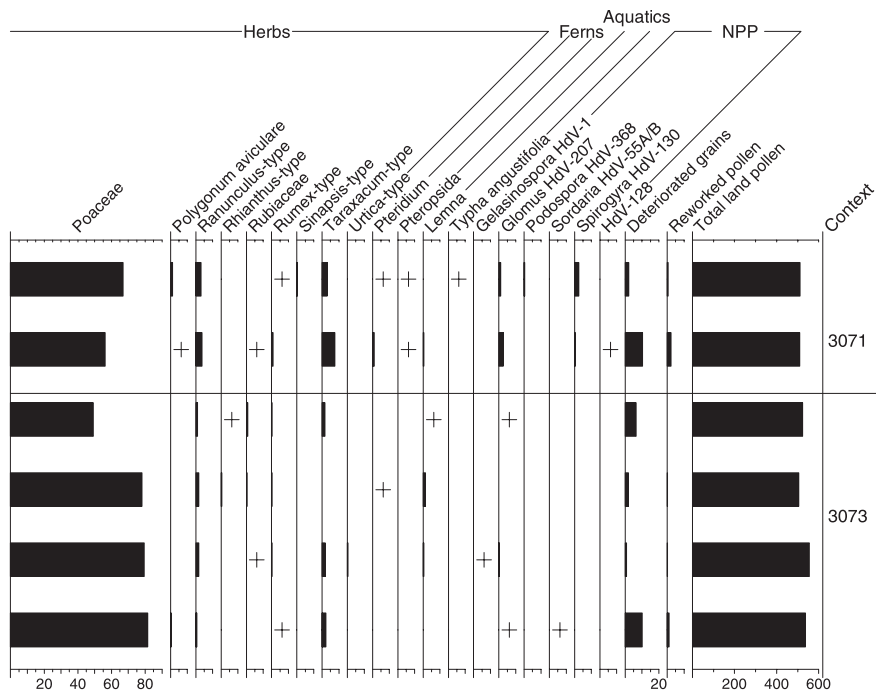
Fig. 5.13 Pollen diagram, pit 3067

Relatively richer pollen assemblages were recovered from the further two sub-samples, including pollen of the carrot family (Apiaceae, a broad group including plants such as pignuts, burnet-saxifrages and fool's parsley), the goosefoot family (Amaranthaceae, formerly Chenopodiaceae, comprising plants such as fat-hen, good king henry and many-seeded goosefoot) and the cabbage family (Brassicaceae, another large group, including plants such as mustards, radishes and cabbages). In addition, pollen of dandelion-type (*Taraxacum*-type), buttercup-type (Ranunculaceae), ribwort plantain (*Plantago lanceolata*), sedges (Cyperaceae), cornflower (*Centaurea cyanus*), common knapweed (*C. nigra*), and pollen of the pinks family (Caryophyllaceae, including pollen from plants such as stitchworts, mouse-ears and campions), was recorded.

Pollen of aquatic plants, including lesser bulrush (*Typha angustifolia*), pondweed (*Potamogeton*) and alternate water-milfoil (*Myriophyllum alterniflorum*) was also present. Fungal spores included relatively high counts of *Chaetomium* (HdV-7A), with occurrences also of *Glomus* (HdV-207), *Sordaria* (HdV-55A/B) and a single record of *Sporomiella* (HdV-113). Microcharcoal particles were commonly recorded. Many deteriorated pollen grains were also present, either concealed, crumpled or broken. Reworking was evident throughout, and included pollen, dinoflagellate cysts, acritarchs and green algae; identifiable taxa indicate an age of early Cretaceous – Jurassic, consistent with the age of the underlying bedrock in the area (BGS, nd).

The pollen analysis results are displayed on the pollen diagram (Fig. 5.13). The deposits sampled from monolith 191, which include fills 3073 and the lower part of 3071, contain pollen suggestive of plants from grassy areas, as well as weeds and cereal-types, and also of plants from woodland and wetland habitats. Grass pollen is the most common type present, representing from 80% of the total pollen counted to just under 50%. A variety and relative abundance of other herbs are also recorded, in particular, pollen of the carrot family, which reaches up to 35% of the total pollen count within the upper part of fill 3073. Other commonly occurring herb pollen types include buttercup-type, daisy-type (Asteraceae), dandelion-type and ribwort plantain. Pollen of other herb types includes consistent occurrences of the goosefoot family, docks/sorrels (*Rumex*-type), sedges, poppy-type (*Papaver*-type) and thistles (*Cirsium*-type). There are also records for sporadic occurrence of pollen of knotgrass (*Polygonum aviculare*), cabbage-family, pea-family (Fabaceae), common knapweed, cornflower, yellow-rattles (*Rhianthus*-type), bedstraws (Rubiaceae), the pinks family, nettles (*Urtica*-type), hoary/greater plantain (*Plantago media/major*) and meadow-sweet (*Filipendula*).

Tree and shrub pollen comprise about 5-6% of the total pollen count, including taxa such as alder (*Alnus*), birch (*Betula*), oak (*Quercus*), hazel-type (*Corylus*-type) and fewer occurrences of heather (*Calluna*), ash (*Fraxinus*), elm (*Ulmus*), hornbeam (*Carpinus*) and willow (*Salix*). Fern spores are poorly represented. However, spores of bracken (*Pteridium*)



represent 1% of the total pollen count within the lower part of fill 3071. Pollen from aquatic plants is represented by consistent occurrences of duckweed (*Lemna*) and a single occurrence, within fill 3071, of lesser bulrush (*Typha angustifolia*). Fungal spores and other non-pollen palynomorphs are generally poorly represented, especially in the lower context 3073, where single occurrences only of *Glomus* (HdV-207), *Sordaria* (HdV-55A/B) and *Gelasinospora* (HdV-1) are recorded. The upper fill 3071 contains more abundant fungal spores of *Glomus* (HdV-207) and relatively common occurrence of the green algal type *Spirogyra* (HdV-130). Deteriorated pollen grains account for approximately 10% of the pollen count, particularly in the deepest sub-samples in each context. These two sub-samples also contain the greatest number of reworked palynomorphs (including long-ranging but typically Cretaceous terrestrial pollen and spores such as *Classopollis classoides*, *Klukisporites crateris* and *Vitreisporites pallidus*, as well as marine and brackish marine taxa, including *Cyclonephelium distinctum*, *Pterospermella* spp., *Micrhystridium* spp. and *Tasmanites* spp.).

Interpretation

The pollen assemblages assessed from the deepest fill, 3074, although poor, suggest that pollen derived from potentially open, grassy areas, for example areas of rough or waste ground such as trackways or perhaps meadowland. This is supported from the counts of pollen of grasses, buttercup-types, daisy-types, ribwort plantain and dandelion-types. The presence of pollen of cornflower may suggest nearby areas of cultivation, as cornflower naturalised in corn fields (Stace 2010). However, there is no record for the presence of cereal-type pollen. Indications for the occurrence of wet areas may be inferred from the presence of pollen grains of aquatic plants, including lesser bulrush, known to occur in reed swamps, lakes, ponds, slow rivers and ditches (Stace 2010). Of interest is the relatively high count for the fungal spore *Chaetomium* (HdV-7A); *Chaetomium* species are cellulose-decomposing fungi occurring on a variety of substrates, including plant remains, fibres, dung and also appear to be linked to archaeological sites where settlements may have provided substrates such as damp straw, clothing and leather (van Geel and Aptroot 2006).

The bulk of the pollen from fills 3073 and 3071 is derived from open, grassy landscapes; a variety of other herbs, such as ribwort plantain, docks/sorrels, buttercup-types, daisy-types and thistles, as well as rarer occurrence of yellow-rattles and common knapweed, all suggest probable meadowland that could have been used for pasturing animals. Ribwort plantain is present throughout; this taxon has been interpreted as an indicator of grazing pressure (Tipping 2002) and is commonly found in grassy areas (Stace 2010) and may be indicative of wet meadows/pastures (Behre 1981).

Sedges and meadowsweets are also found in wet, damp areas (Stace 2010). Of interest is the abundant recovery of pollen of the carrot family; although it is very difficult to identify pollen of the carrot family to species, it is likely that many of the grains may represent pollen of lesser marshwort (*Apium inundatum* group), known from shallow water, bare mud environments. This group also includes wild celery and fool's-water-cress, also commonly found in damp or marshy environments (Stace 2010; see also Meen, above). The freshwater alga *Spirogyra* (HdV-130) is present within the upper context (3071), suggesting that shallow, stagnant water was present in or adjacent to the pit (van Geel 1978). Overall, pollen from these plants suggests damp, rich, grassy habitats or meadows that potentially could have provided high quality grazing areas.

The abundance of grass may also have been used for making hay, for example for overwintering animals (Wiltshire 2006). It is possible that pollen derived from hay may have entered the pit in dung, fodder or animal bedding. Interestingly, pollen and plant macrofossil assemblages yielding high percentages of ribwort plantain, seeds of buttercups, yellow rattles and common knapweed have been described from an early Roman settlement at Claydon Pike in the Upper Thames Valley and this assemblage has been interpreted as indicative of hay meadows (Booth *et al.* 2007, 22).

The presence in the pit of pollen of ruderal plants, for example, pollen of the goosefoot family, hoary/greater plantain and common to abundant dandelion-types, may be suggestive of naturally trampled or deliberate trackways (Behre 1981), or indeed any routeway, perhaps for driving animals, separating fields or linking settlements, and this is supported by the consistent recovery of the fungal spore, *Glomus* (HdV-207), associated with eroded or disturbed soils (van Geel 1978). Rare fungal spores of *Sordaria* (HdV-55A/B) and *Podospora* (HdV-368) would support the presence of grazing animals, although these could have been represented by deer as much as domesticated animals.

Cereal-type pollen grains, the dimensions of which include possible occurrences of barley (*Hordeum*-type) as well as wheat/oats (*Triticum/Avena*-type), occur with pollen of knotgrass and rare cornflowers, both plants associated with cereal cultivation, although knotgrass can also occur on fallow land and on footpaths and ruderal communities (Behre 1981). Cereal-type pollen may be indicative of arable agriculture in the vicinity or local cereal processing, or grains may have entered the pit sequences along with straw or animal dung. The dimensions for cereal-type pollen overlap with those for wild grasses, but can be distinguished with careful identification and within the context of the overall pollen assemblage (Anderson 1979, Tweddle *et al.* 2005; Joly *et al.* 2007). The water-logged and charred plant remains from this site supports the identification of these grains as cereal-types (Meen, above).

Stands of mixed woodland, including birch, ash, oak and pine may have existed regionally on drier soils, with alder occupying damper locations. If locally present, these trees would potentially have contributed much more pollen to the pit record, suggesting the trees were probably located well away from the site. It is possible that woodland tree pollen was brought to the site with other woodland or woodland edge products, such as bracken or heather, which may have been collected for domestic or animal use. An association of pollen of willow, hazel-type, and rosaceous shrubs including hawthorn-type (*Crataegus*-type) may be indicative of development of hedgerows in the surrounding area (Stace 2010).

The fern spores comprise small amounts of bracken and monolete ferns; bracken is known as an aggressive invader of open spaces (Wiltshire 2008), but is also known to grow preferentially in areas subject to burning (Innes 1999). Bracken may possibly have been used as bedding for people or litter for animals and may have been discarded in the pit. An abundance of microcharcoal particles suggests burning episodes, which could have originated from wood burning, for example as a product of domestic hearths or ovens or, potentially, as a result of industrial activity. The fungal spore, *Gelasinospora* (HdV-1) has been associated with charred plant matter (van Geel 1978; van Geel and Aptroot 2006).

Summary of results

The pollen data indicate a largely open meadow/pasture palaeoenvironment, supporting a rich variety of herb flora, including abundant ribwort plantain, daisy-types, dandelion-types, buttercup-types as well as rarer occurrence of yellow-rattles and common knapweed. The grasslands may have been used for pasturing animals and/or possibly to make hay for overwintering animals. Arable agriculture or possible cereal processing may have occurred nearby. However, the pollen could have entered the feature in straw, animal dung or may have been deliberately deposited as waste matter in the pit. The abundance of pollen of the carrot family, along with grasses, sedges and docks/sorrels, suggests that open, wet, muddy habitats existed in the immediate vicinity of the pit. It is possible that wild celery (if that is what the pollen grains represent) were harvested and subsequently disposed of in the pit. Possible development of hedgerows, comprising willow, hazel-type, hawthorn-type and wild roses may be interpreted from the pollen record. Possible woodland stands at some distance from the feature, comprising ash, oak, birch and elm, may also have existed.

Increased counts for dandelion-type pollen, particularly within the upper context (3071), may be indicative of disturbed, cultivated or waste ground; records of hoary/greater plantain and pollen of the goosefoot family may be indicative of trackways. Commonly occurring microcharcoal suggests that

Table 5.13 Radiocarbon determinations

Lab. ID	Context	Feature	Element	$\delta^{13}\text{C}$ (0/00)	Radiocarbon age (BP)	Calibrated date (95% confidence)	Calibrated date (68% confidence)
SUERC-75472 (GU45227)	1638	Posthole 1637	Charred nutshell	-24.1	4963 ± 30	3800-3650 cal BC	3780-3700 cal BC
SUERC-75476 (GU45229)	2999	Cremation burial 2994	Human femur	-21.7	1837 ± 30	cal AD 80-250	cal AD 130-220
SUERC-75477 (GU45230)	5668	Pile B	Oak	-26.7	1826 ± 30	cal AD 80-110 (2.4%) cal AD 120-260 (91.1%) cal AD 300-320 (1.8%)	cal AD 130-230
SUERC-75478 (GU45231)	5667	Pile A	Oak	-25.6	1834 ± 30	cal AD 80-250	cal AD 130-220
SUERC-76716 (GU46011)	1389	Feature 1388	Sheep/ goat humerus	-22.2	2280 ± 32	410-350 cal BC (57.3%) 300-210 cal BC (38.1%)	400-350 cal BC (53.1%) 280-250 cal BC (15.1%)
GU45228	3004	Grave 3003	Human femur		Fail		
GU45823							
NZA-33906	457	Tree-throw hole 459	Seeds	-24.4	1862 ± 25 BP	cal AD 80-230	cal AD 80-110 (10.2%) cal AD 120-180 (41.5%) cal AD 190-220 (16.9%)
NZA-33929	368	Tree-throw hole 367	Animal bone	-21.7	1874 ± 35 BP	cal AD 60-240	cal AD 70-140 (46.8%) cal AD 150-180 (11.4%) cal AD 10-210 (9.2%)
NZA-33936	438	Grave 437	Human bone	-20.2	1706 ± 35 BP	cal AD 250-420	cal AD 260-290 (17.3%) cal AD 290-300 (0.5%) cal AD 320-400 (50.7%)
NZA-33951	455	Grave 453	Human bone	-21.7	1840 ± 25 BP	cal AD 120-240 (92.0%) cal AD 80-110 (2.9%)	cal AD 130-220 (69.8%)

some activity involving wood burning (for example, domestic (hearths) or industrial use (pottery) may have taken place.

AUGER SURVEY *by Christof Heistermann*

An auger hole was drilled to investigate the nature of the waterlogged pit, 3067, and the reddish brown and bluish grey discolouration of the surrounding sediment, which was interpreted as a pond (3062). BH04 was sunk immediately to the north of the with a hand auger to a depth of 2m below ground level (bgl).

The stratigraphy in BH04 was made up entirely of Jurassic Kimmeridge Clay (BGS map 1:50000, sheet 237 Thame). Just above 1m bgl, ground water started to seep into the auger hole. The sediments represent a finely stratified part of the Kimmeridge Clay Formation. It became much firmer with depth and included small pebbles of siltstone and Selenite (Gypsum) close to the base. The lithology in BH04 consisted of alternating layers, 0.06 to 0.23m thick, of dark brownish grey clayey silt and olive grey clay. The clayey silt units were laminated with lenses of fine white detritus of fossils and clay layers. The clayey silt at 0.83 to 0.96m bgl also contained a 20mm thick lens of sandy silt.

The laminated clayey silt layers appeared to conduct water within the Kimmeridge Clay. This natural water occurrence caused colour changes to the local sediments (gley-formation process). The local wetness in the ground may have attracted human attention and led to the digging of the pit that 'tapped' the water table.

RADIOCARBON DATING *by Edward Biddulph*

Radiocarbon determinations were obtained from ten features. Samples were selected in order to address specific research questions that had been identified in the post-excavation assessment (OA 2009; 2017). The dating of two tree-throw holes, the remains of a cremation grave and one inhumation grave was undertaken by the Rafter Radiocarbon Laboratory, New Zealand. A further six samples – from two burials, a pit or posthole, two timbers and a feature of uncertain function – were submitted to the Scottish Universities Environmental Research Centre (SUERC) AMS Facility, Glasgow. Determinations were obtained from all samples but one and the results are summarised in Table 5.13. All calibrated dates have been rounded out to the nearest 10 years as recommended by Mook (1986).