Chapter 6: Environmental Evidence

Animal bone *Lena Strid and Rebecca Nicholson*

Introduction

The animal bone assemblage consisted of a total of 8697 re-fitted fragments from securely dated contexts. Of these, 5539 fragments (63.7%) were hand collected and 3158 fragments (36.3%) were recovered from sieved bulk samples. The majority of the sieved remains were unidentifiable to taxa. While the site contained features from the late Neolithic up to the modern period, the bulk of the assemblage was late Neolithic and late Iron Age/early Roman. The scarcity of features more recent than early Roman suggests that the settlement was abandoned at the end of the early Roman period. The bones from later Roman and post-medieval features are included in overall tables, but will not be discussed further.

The bones were identified using a comparative skeletal reference collection in addition to standard osteological identification manuals, such as Bacher (1967), Cohen and Serjeantson (1996), Hillson (1992), Schmid (1972) and Woelfe (1967). All the animal remains were counted and weighed, and where possible identified to species, element, side and zone. For zoning, Serjeantson (1996) was used, with the addition of mandible zones by Worley (forthcoming). Sheep and goat were identified to species where possible, using Boessneck *et al.* (1964) and Prummel and Frisch (1986). They were otherwise classified as 'sheep/goat'. Long bone fragments, ribs and vertebrae, with the exception for atlas and axis, were classified by size, 'large mammal' representing cattle, horse and deer, 'medium mammal' representing sheep/goat, pig and large dog, 'small mammal' representing small dog, cat and hare, and 'microfauna' representing animals such as frog, rat and mice.

The general condition of the bones/context was graded on a 6-point system (0-5). Grade 0 equating to very well preserved bone, and grade 5 indicating that the bone had suffered such structural and attritional damage as to make it unrecognisable. For ageing, Habermehl's (1975) data on epiphyseal fusion was used. Cattle horn cores were aged according to Armitage (1982), using texture and appearance of the horn core surface. Tooth wear was recorded using Grant's tooth wear stages (Grant 1982), and correlated with tooth eruption (Habermehl 1975). In order to estimate an age for the animals, the methods of Halstead (1985), Payne (1973) and O'Connor (1988) were used for cattle, sheep/goat and pig respectively. Sexable elements, that is, cattle and sheep pelves, pig canine teeth and deer antlers were recorded, using data from Boessneck *et al.* (1964), Prummel and Frisch (1986), Schmid (1972) and Vretemark (1997). Observance of medullary bone in birds were used to indicate the presence of egg-laying hens. Measurements were taken according to von den Driesch (1976), using digital callipers with an accuracy of 0.01 mm. Large bones were measured using an osteometric board, with an accuracy of 1 mm.

Overview of assemblage

The assemblage is dominated by domestic mammals, mainly cattle, sheep/goat and pig. There was secure identification of sheep in the late Neolithic (Phase 1), mid-late Iron Age (Phase 3), late Iron Age/early Roman and early Roman assemblages (Phase 4). Goat was only identified in the Neolithic and the early Roman assemblages, in both cases from horn core fragments. Considering the general scarcity of goat compared with sheep in Iron Age and Roman assemblages (King 1991, 16), it is likely that the majority of the sheep/goat remains belong to sheep. Game is only found in the Neolithic phase. Bones from commensal microfauna were recovered from features of several periods. However, because these animals often burrow, they may be later inclusions. Bird bones are rare and with

Table 23: Animal bone: Preservation level for bones from all phases

Phase	*n*	*0 Excellent*	*1 Good*	*2 Fair*	*3 Poor*	*4 Very poor*	*5 Extremely poor*
Late Neolithic	5556	2.50%	5.00%	20.10%	47.80%	24.60%	-
Beaker-Bronze Age	298	-	2.70%	14.10%	79.50%	3.70%	-
Mid Iron Age	506	7.30%	25.30%	41.30%	24.10%	2.00%	-
Late Iron Age	256	1.20%	9.00%	35.20%	41.40%	13.30%	-
Late Iron Age / Early Roman	1137	0.90%	8.10%	28.30%	46.80%	15.90%	-
Early Roman	775	0.30%	3.90%	40.80%	45.30%	9.80%	-
Late Roman	73	4.10%	63.00%	12.30%	16.40%	4.10%	-

Table 24: Animal bone: Gnawed and burnt bones from all phases

Phase	*n*	*Gnawed bones*	*Gnawed bones (%)*	*Burnt bones*	*Burnt bones (%)*
Late Neolithic	5556	6	0.1%	613	11.0%
Beaker-Bronze Age	298			9	3.0%
Mid Iron Age	506	5	1.0%	93	18.4%
Late Iron Age	256	5	2.0%	24	9.4%
Late Iron Age / Early Roman	1137	13	1.1%	29	2.6%
Early Roman	775	4	0.5%	13	1.7%
Late Roman	73	1	1.4%		
Post-medieval - modern	23			3	1.3%
TOTAL	8624	34	0.4%	784	9.1%

Table 25: Animal bones by feature type from all phases

Phase	*n*	*Pit*	*Ditch*	*Gully*	*Burial*	*Spread*	*Posthole*
Late Neolithic	5556	5556					
Beaker-Bronze Age	298		26		273		
Mid Iron Age	506	506					
Late Iron Age	256		241	2		3	10
Late Iron Age / Early Roman	1137	300	834				1
Early Roman	775	590	163	12		10	
Late Roman	73		73				
Post-medieval - modern	23	18					
TOTAL	8624						

the exception of domestic fowl in the post-medieval assemblage, all avian remains are from wild birds. A single fish bone, an eel vomer, was recovered from a late Roman sieved sample. Eel is a very common fish in Roman assemblages (Locker 2007).

Overall, bone preservation level is fair to poor (Table 23), which has implications for the recognition of thin cut marks and minor pathologies. It is therefore highly likely that the relatively small number of recorded butchery marks and pathologies is due to the condition of the bone. Gnawed bones were rare (Table 24), but again this is likely to be skewed by bone condition in the Neolithic assemblage, where almost a quarter of all bones had no visible original surface. The frequency of gnawed bones in assemblages from other periods is more likely to be accurate, as there are few difficulties in observing traces from gnawing on bones which are fairly or moderately poorly preserved. Burnt bones are relatively abundant in the late Neolithic and the late Iron Age/early Roman assemblages. The fragments were fairly evenly distributed between features; no discrete bone dumps were identified (Table 25).

Phase 1 – Late Neolithic

The late Neolithic assemblage came from a range of pits spread across the site. Pig, followed by cattle, was the most common animal in the assemblage, regardless of quantification method (Table 26). Since pigs are often under-represented in bone assemblages, particularly where bone preservation is poor, this suggests that pigs were indeed an important source of meat. The dominance of pig is in great contrast to the mid- and late-Neolithic site at Horcott Pit, some 15 km further east, where cattle dominate (Evans 2009, 108). Assemblages dominated by pig bones have often been interpreted as evidence for feasting, possibly indicating a display of wealth (Serjeantson 2006, 119). However, other important factors to consider include bone condition, local environment and feature type. Normally, denser bones such as those from large mammals and adult individuals survive better than bones from smaller mammals and juveniles, and the more porous pig bones are often under-represented (Lyman 1994, 289; Symmons 2005). Studies of Iron Age and Roman assemblages have shown that sites dominated by ditches are often dominated by bones from large mammals, whereas sites dominated by pits tend to be richer in medium mammal bones (Rielly 2009, 206). However, since the Neolithic assemblages from both Kingshill North and Horcott derive exclusively from pits, in this case it is probable that differences in the local environment may have been a significant factor determining the difference in species dominance. Sheep and goats are more suited than cattle to dry hill land with poorer pasture quality, whereas cattle prefer pastures on heavy wetland soils (Davis 1987, 181; Hamilakis 2000, 279). Pigs, on the other hand, can be fed exclusively on kitchen waste, but are traditionally associated with fattening on acorns and beech mast (Albarella 2006, 77). The site of Kingshill North lies on the border between the Cotswolds and the river valleys of the Thames and its tributaries, and the inhabitants could therefore use both the forested hills of the Cotswolds for pannage and sheep pasture and the Churn river valley for cattle pasture. In contrast, Horcott, which lies further from the Cotswolds and near the river Coln, lies in a catchment area more suited to the grazing of cattle.

In contrast to later periods, where sheep are more commonly found than goat (Hambleton 1999, 14), there is little evidence for the inter-species relationship between sheep and goats on the British mainland in the Neolithic (Clutton-Brock 1989). The fact that four horn core fragments were recovered from pit (8058), possibly from the same individual, would therefore be a useful addition to the existing data.

Epiphyseal fusion data is largely consistent with ageing data from dental eruption and wear; cattle and sheep/goat were mainly slaughtered as adults, whereas most pigs were younger than 1.5 years when slaughtered (Tables 27-30). This is also the case at Horcott, suggesting that despite a focus on different species, the actual animal husbandry in this region was very similar. Pigs, with their great fecundity, were kept solely for meat and slaughtered young. Cattle were mostly used for pulling ards and milking, while sheep/goat provided milk and, in the case of sheep, wool. At this date, wool would have been removed by plucking or combing rather than by clipping; Neolithic sheep are thought to have been similar to the Soay, which have an annual moult (Ryder 1964). Surplus animals were probably culled as sub-adults. The dental evidence for ageing caprines is scant at both sites, but suggest that sheep/goats were not kept to advanced ages.

Table 26: Number of identified bones/taxon by chronological phase. MNI is within parentheses.

Species	*Neolithic*	*Beaker-Bronze Age*	*Middle Iron Age*	*Late Iron Age*	*Late Iron Age Early Roman*	*Early Roman*	*Late Roman*	*Post-med - Modern*
Cattle	121 (4)	271 (1)	11(2)	30 (2)	69 (3)	70 (3)	1 (1)	
Sheep/goat	93 (3)		40 (4)	22 (1)	142 (7)	118 (4)	1 (1)	2 (1)
Sheep	2		3		2	7		
Goat	4					1		
Pig	538 (10)	1 (1)	2 (1)	3 (1)	8 (2)	5 (1)		
Horse			2 (1)	3 (1)	24 (2)	18 (2)	2 (1)	
Dog	2 (1)		93 (2)		4 (1)	1 (1)	1 (1)	
Dog/fox	1							
Rabbit								1 (1)
?Aurochs	2 (1)							
Red deer	1 (1)							
Roe deer	9 (1)							
Deer sp.	63	1						
House mouse								
Mouse sp.	2							
Field vole	13 (2)		1 (1)					
Bank vole / Field vole	5		1					
Shrew sp.	1							
Domestic fowl								3 (1)
Crow / Rook			25 (2)					
Raven					1 (1)			
Indet. bird	2				1			5
Amphibian	1				3			
Eel							1 (1)	
Microfauna	61		10		4		1	
Small mammal	20				1	1		
Medium mammal	441		95	30	76	85	3	
Large mammal	211	2	16	15	112	101	53	
Indeterminate	3963	23	207	153	690	368	10	12
Total fragment count (NISP)	5556	298	506	256	1137	775	73	23
Total weight (g)	14015	2449	1122	1404	9047	6901	344	23

Table 27. Animal bons, all phases: dental analysis of cattle, using Halstead (1985)

Phase	*n*	*0-1 months*	*1-8 months*	*8-18 months*	*18-30 months*	*30-36 months*	*Young adult*	*Adult*	*Old adult*	*Senile*
Neolithic	1							1		
Bronze Age	2								2	
MIA										
LIA										
LIA/ER	3			1		1		1		
ER	4			1		2		1		

Table 28. Animal boes, all phases: dental analysis of sheep/goat, using Payne (1973)

Phase	*n*	*0-2 months*	*2-6 months*	*6-12 months*	*1-2 years*	*2-3 years*	*3-4 years*	*4-6 years*	*6-8 years*	*8-10 years*
Neolithic	3				1		2			
EIA-MIA	1						1			
LIA	1								1	
LIA/ER	9		2	1	3	2		1		
ER	8			1	1	1	1	3	1	

Table 29. Animal bones, all phases: dental analysis of pig, using O'Connor (1988)

Phase	*n*	*Juvenile*	*Immature*	*Sub-adult*	*Adult*	*Elderly*
Neolithic	11	3	7	1		
MIA	1		1			
LIA						
LIA/ER	1			1		
ER						

Deliberate slaughter of juvenile animals for meat or to free milk for dairy production is tentatively suggested by several neonatal and juvenile bones from cattle, sheep/goat and pig. However, these may represent natural mortalities, implying that breeding animals were kept close to, or within, the settlement. The other domesticated species, dog, is present in small numbers. Judging by epiphyseal fusion and bone surface structure, all dogs were fully grown at the time of their death. While butchery marks were absent, the use of dog meat for human consumption cannot be excluded.

Game is represented by aurochs, red deer and roe deer bones. A further 47 antler fragments were also present. The aurochs bones consist of one second phalanx (9101) and one femur fragment (8814). The femur is unfused and therefore cannot be measured. It is, however, of a similar size as a modern fused cattle femur, which is far larger than domestic Neolithic cattle. Measurements from the phalanx (Table 31) fall in between measurements from male and female aurochsen from Denmark (Degerbøl 1970, 124-125). Generally, animals on islands are smaller than their continental counterparts due to genetic isolation (Magnell 2006, 58-59). This suggests that the aurochs from Kingshill North may have been male, although due to the scarcity of comparative measurements from British aurochsen, this must be regarded as a tentative interpretation. Aurochs (*Bos primigenius*) bones are rarely found on sites in England which post-date the Neolithic and they seem to have become extinct in Britain by the end of the second millennium BC (Lynch *et al.* 2008; Yalden 1999, 128-129). Stable isotope analysis of aurochs and cattle bones from British Neolithic sites supports the hypothesis that aurochs inhabited a forested landscape while domestic cattle lived on open grassland, although the authors note that the results could also indicate that aurochs inhabited wetland rather than forest (Lynch *et al.* 2008, 1033). Six red deer antlers and one roe deer antler included a shed burr, indicating that they had been collected in spring for antler working or to be used as pickaxes or hoes (cf. Clutton-Brock 1982). One pig third metatarsal (9151) and one pig third phalanx (9101) were noted during recording as being very large and could possibly be from wild boar. However, as these were not measurable, it was not possible to confirm or reject this hypothesis. The small number of bones from wild mammals indicates that hunting would have provided a minor supplement to a diet focused on dairy products and meat from domestic mammals together with grain and vegetable-based produce (Serjeantson 2006, 121-122).

Deposits of articulated animal remains from Neolithic sites are rare (Morris 2008, 66-67). Kingshill North included one such deposit, that of a neonatal pig. The pig was found in the single fill (8819) of pit 8455 together with a mixture of disar-

Table 30. Animal bones, all phases: Epiphyseal closure of cattle, sheep/goat, pig and horse. Articulated skeletons excluded.

	Neolithic		*BA*		*EIA-MIA*		*LIA*		*LIA/ER*		*ER*	
	n%	*unfused*	*n%*	*unfused*	*n%*	*unfused*	*n%*	*unfused*	*n%*	*unfused*	*n%*	*unfused*
CATTLE												
Early fusion	13	7.7%	2	0.0%			2	0.0%	11	0.0%	3	0.0%
Mid fusion	14	14.3%					2	50.0%	9	33.3%	4	25.0%
Late fusion	3	33.3%							2	0.0%	6	16.7%
SHEEP/GOAT												
Early fusion	5	20.0%			2	0%	1	0.0%	8	25.0%	3	33.3%
Mid fusion	2	0.0%							2	50.0%	7	28.6%
Late fusion	9	0.0%			1	0%			4	50.0%		
PIG												
Early fusion	17	41.2%							1	0.0%		
Mid fusion	52	94.2%									2	100.0%
Late fusion	9	67.7%							1	100.0%		
HORSE												
Early fusion							1	0.0%	7	0.0%	3	0.0%
Mid fusion							1	0.0%				
Late fusion									2	0.0%	3	33.3%

Table 31. Measurements of the second phalanx from aurochs in the Neolithic Kingshill North assemblage compared with aurochsen from Denmark (Degerbøl 1970)

Site	*Species*	*Bone*	*Measurement*	*n*	*Mean*	*Min*	*Max*
Kingshill North	Aurochs	Phalanx 2		1	53.4		
Kingshill North	Aurochs	Phalanx 2	Bp	1	37.1		
Denmark (male)	Aurochs	Phalanx 2	Bp	7	40.9	39.0	43.0
Demark (female)	Aurochs	Phalanx 2	Bp	6	33.8	32.0	36.0
Kingshill North	Aurochs	Phalanx 2	Bd (estimated)	1	(30.2)		
Denmark (male)	Aurochs	Phalanx 2	Bd	6	35.2	33.0	38.0
Demark (female)	Aurochs	Phalanx 2	Bd	6	28.9	27.0	31.0
Kingshill North	Aurochs	Phalanx 2	SD	1	28.1		
Denmark (male)	Aurochs	Phalanx 2	SD	8	32.4	31.0	34.0
Demark (female)	Aurochs	Phalanx 2	SD	9	26.6	26.0	28.0

Table 32. Greatest length and greatest distal width of cattle and sheep/goat bones in the Neolithic Kingshill North assemblage and contemporary sites in Britain (ABMAP)

Site	*Species*	*Bone*	*Measurement*	*n*	*Mean*	*Min*	*Max*
Kingshill North	Cattle	Metatarsal	Bd	4	53.3	52.1	54.4
ABMAP (E-L Neolithic)		Metatarsal	Bd	4	57.8	53.5	63.2
Kingshill North	Cattle	Tibia	Bd	3	64.3	62.5	67.2
ABMAP (E-L Neolithic)		Tibia	Bd	6	66.8	59.6	72.5
Kingshill North	Sheep/goat	Tibia	Bd	2	25.5	25.3	25.7
ABMAP (E-L Bronze Age)		Tibia	Bd	4	22.6	21.2	23.5
ABMAP (E-L Iron Age)		Tibia	Bd	54	22.7	19.9	25.4
ABMAP (Early Roman)		Tibia	Bd	67	23.1	20.0	29.8
ABMAP (Late Roman)		Tibia	Bd	101	25.4	20.1	29.8

ticulated animal bone, pottery sherds and flint sherds. The context record does not note whether the pig was fully articulated in the pit or not, but most body parts were present. While butchery marks were absent, this should not be regarded as evidence that the piglet was not eaten, as experiments have shown that butchery marks may be absent on bones from carcasses that were butchered and filleted (Strid 2000, 37).

The measurable bones were few, but some tentative conclusions can be made from inter-site comparisons. The Kingshill North cattle were within the same size range as animals from contemporary sites in south-western England (Table 32). There were no comparable sheep/goat measurements from Neolithic sites. A comparison with British sites from later periods showed that the Kingshill North sheep were the same as late Roman sheep. Whether this size difference is attributable to a difference in breed or (more likely at this date) in sex composition is unclear, owing to the small numbers of bones.

Butchery marks were recorded on bones from cattle, pig and indeterminate medium mammal. Cut marks on tarsal bones and proximal metapodials, indicating disarticulation of the lower legs, occurred on both cattle and pig. Cut marks from skinning were only found on one distal cattle metacarpal. Longitudinal splitting to facilitate marrow extraction was recorded on two cattle long bones. Evidence of filleting was noted on one pig radius and on two ribs from medium mammal. One rib from a piglet or lamb had been chopped off near the vertebral column. Taken as a group, the butchery marks provide evidence of skinning, disarticulation, portioning and filleting of the carcass. The scarcity of butchery marks is not surprising, partly because of the poor bone condition in this phase, and partly because even with good bone preservation, not all bones from food waste display butchery marks (Magnell 2003).

An articulating radius and ulna from sheep/goat were the only bones in the Neolithic assemblage that displayed pathological conditions. A smooth bone growth was recorded on the lateral edge of ulna/radius joint surface of the radius and on the corresponding part of the ulna; the aetiology is uncertain. The ulna can fuse naturally to the radius, and it may be the beginning of this process which is observed here.

Phase 2 – Beaker to Bronze Age

The Phase 2 assemblage derives from three features: a Beaker burial (8588), its associated ring ditch (8454), and middle Bronze Age burial 1905 (Table 26).

A total of 270 cattle bone fragments were recovered from contexts 8589 and 8641, the upper fills of burial 8588. With the exception of a distal scapula fragment, the cattle remains derived exclusively from the head and lower feet, but it is not possible to tell whether the head and feet belong to the same animal. However, while such an assemblage would normally suggest butchery waste, the position on top of a human burial makes it more likely that the bones represent a hide with these elements intact. Using Halstead's interpretation of dental wear, the cattle falls in the age range Old Adult (Table 27). The metapodials were too fragmented to be measured for withers' height or calculation of the animal's sex (cf. Mennerich 1968). Transverse cutmarks were observed on a lateral metapodial, traces from the disarticulation of the metapodial from the upper leg. The lack of pathologies suggests that the animal may not have been used intensively for heavy traction.

There are no other similar 'head and hooves' deposits of animal bones in association with human burials at Kingshill North. Neolithic and Bronze Age 'head and hooves' burials are relatively common in continental Europe, but they occur only rarely in Britain (Piggott 1962; Pollex 1999). Three known British examples are Fussell's Lodge, a Neolithic long barrow in Wiltshire (Ashbee 1966), Bishop's Cannings (Robertson-Mackay 1980) and Barrow Hills (Barclay and Halpin 1999), two early Bronze Age barrow mounds in Wiltshire and Oxfordshire respectively. Fussell's Lodge contained one set of cattle head and hooves within the burial chamber. Unfortunately, it is again not possible to say with certainty that the skull and foot bones came from the same animal, as they were not immediately adjacent. The metapodials in this case were fused, and would thus derive from an animal of at least two years of age. Butchery marks were not noted, but whether this is due to poor recording or genuine absence is not certain (Morris 2008, 78-79). The cattle remains at Bishop's Cannings comprised a skull, four metapodials and associated phalanges, which were placed together in the fill at the edge of the burial cut. All teeth were well worn, and the incisor wear suggested an age of 6-10 years. A metric analysis of skull and horncore suggested that the animal was female. Butchery marks were not noted (Morris 2008, 87; Grigson 1980, 164-167). The cattle remains at Barrow Hills comprised one horn core and one metatarsus, which were placed in the ditch around the barrow, thus removed from the main burial. There was no information regarding the age of the animal (Barclay and Halpin 1999, 156; Williams 1948).

The rarity of head and hooves burials in Britain is intriguing. Were these burial goods the exclusive privilege of a certain group in society, connected to religious beliefs or social status? It has been argued that the hide in itself may have been the valuable item, and burials with cattle hides that did not contain attached skeletal elements would be invisible in the archaeological material (Morris 2008, 87).

A small number of animal bones, which included one cattle molar, one cattle second phalanx, one pig calcaneus and one deer antler fragment, derived from the ring-ditch that surrounded burial 8588 (group 8454). Apart from the fragmented piece of shed deer antler, possibly waste from antler working, the remains suggest butchery waste and kitchen waste disposal.

The second burial with animal grave goods was 1905. This middle Bronze Age burial included the lower torso of a sheep placed on the deceased's left side near the head. The sacrum was complete, indicating that this was not two separate leg joints being placed in the grave. Context records show that parts of the context had been excavated before it was discovered that it was an articulate animal burial. The presence of further sheep remains in the burial fill – one axis, one left mandible, one right radius, one left ulna and one right metacarpal – suggests that an entire sheep/goat that was deposited in the grave originally. The burial cut was rather shallow, only 0.39 m deep, suggesting that plough damage may have been responsible for the disarticulation of the remains. All sheep bones were fused, indicating an age-at-death of more than 3.5 years. Morphological traits on the pelvis indicated that the animal was female. The bone condition was poor and butchery marks could not be observed. The burial fill also contained one cattle metatarsal fragment, which may be an accidental inclusion. Middle Bronze Age burials are very rare in Britain (Healy pers.comm.) and it is therefore difficult to compare this animal deposit with similar contexts. Animals have been deposited in graves from both earlier and later periods (Mannermaa 2008; Whimster 1981, 106); they may have been remains from a funeral feast or may have been intended as food for the afterlife.

Phases 3 and 4 – Iron Age and early Roman

The Iron Age and early Roman group consists of four phased assemblages (Phases 3 and 4a-d). Each contains fewer than 300 fragments in total from the three major domesticates, as well as fewer than a minimum of 30 individuals (MNI), thus rendering any comparison between these taxa and groups tentative regardless of quantification method (Hambleton 1999, 39). Nevertheless, with the exception of the late Iron Age assemblage (Phase 4a/b), where cattle dominated slightly, sheep/goat was consistently the most common taxa (see Table 26). This was particularly true for the late Iron Age/early Roman (Phase 4c) and early Roman (Phase 4d) assemblages, where sheep/goat were strongly dominant. As the Phase 4c assemblage is dominated by bones recovered from ditches and the Phase 4d assemblage mostly derived from pits, assemblage differentiation between feature types is not likely to be a major reason for the sheep/goat dominance in the later phases.

Livestock

In general, a predominance of sheep/goat has been seen as typical of native British sites, whereas cattle and pig dominated Romanised settlements (King 1991, 17). This is, however, a simplified definition. Apart from the possible bias from feature type representation (see above), the local environment may favour different species. Dry hill land is, for example, more suitable for sheep than cattle (Davis 1987, 181). Neither of these hypotheses takes into account trade in live animals, which may skew the remaining animal bone assemblages.

Nearby contemporary sites show a great variation in species frequency. The dominance of cattle at the Iron Age settlement of Duntisbourne Grove may be caused by skewed recovery, since over 95% of the bones came from ditches. The intra-site ratio of sheep and pig is probably more accurate, as environmental studies indicate a woodland environment, more suited for pig than sheep (Powell 1999, 431-433). A similar environment is suggested for Middle Duntisbourne, which is consistent with its relatively high ratio of pig (Powell 1999, 437). The other Cotswold site, the Ditches enclosure, is also dominated by cattle, although there is a large intra-site variation in species abundance between different areas of the excavation area (Rielly 2009, 196-197).

All the comparative sites in the region – Ashton Keynes, Longdoles Field and Warrens Field (Cotswold Water Park), Latton Lands, Cotswold Community – were dominated by cattle, except for the small mid-late Iron Age phase of Cotswold Community, where sheep were most frequent (Knight 2007; Poole 2009; Strid 2010; Sykes 2007a; Sykes 2007b). The consistent abundance of cattle and scarcity of pig suggests a landscape with open fields and few, if any, large areas of woodland. The predominance of sheep/goat for at Cotswold Community may be due to a decrease of wetland pastures or an increased importance of wool production (Strid 2010, 237).

Dental ageing data for cattle and pig from Kingshill North were scarce, a reflection of the small assemblages sizes, and no particular age-at-death pattern could be discerned Tables 27 & 29). Ageable sheep/goat mandibles were more common and displayed a wide range of slaughter ages. Phase 4c shows a peak in young sheep/goats, whereas Phase 4d was dominated by slightly older animals. It is, however, unclear whether this reflects a true change of emphasis in sheep/goat husbandry, or whether the imprecise dating of Phase 4c has generated a false data pattern (Table 28). Epiphyseal fusion suggests that most cattle and sheep/goats were slaughtered as sub-adults or adults. In contrast, as is usually the case, pigs were generally slaughtered before they were fully skeletally matured (Table 30). The lack of older cattle may suggest cattle husbandry to a larger extent focused on meat production and less on the use of cattle for traction. However, the sample size is small and, in Phase 4d, there is a distinct possibility that live cattle were sold to the Roman military fort at Cirencester. Most cattle in the early levels of Cirencester were 1-5 years of age, representing prime meat (Thawley

1982, 214). Most sheep/goats were killed as sub-adult and young adults, which suggests a sheep/goat husbandry which was mostly focused on a combined meat-, dairy- and wool-production. As such, the sheep would yield one or two years' worth of wool clips before slaughter, as well as provide two to four lambs to replenish the herd. The dental data from the Phase 4d provide evidence that several individuals were kept past four years of age, suggesting that wool production became an increasingly important part of a sheep husbandry. It would be tempting to connect this to developments in Cirencester, which would be a market for several types of goods that the military itself could not produce.

Juvenile animals were relatively uncommon. A total of 48 lamb bones were deposited in Phase 4c enclosure ditch 8413. Three astragali displayed cut marks from disarticulation of the lower limbs or from skinning. Skinning cut marks are on their own not necessarily an indication that the animals were eaten, but as no articulated remains were noted during excavation of the ditch, it would suggest that the lamb remains represented food waste. In contrast, only one calf bone was recovered. A total of four bones in the Phase 4c assemblage could be sexed: one cattle and two sheep/goat pelves, and one pig maxillary canine, all deriving from females. However, the sample size was too small to yield any useful information regarding animal husbandry.

From the above we can tentatively conclude that during the Iron Age and early Roman periods, animal husbandry at Kingshill North functioned at subsistence level, where surplus young animals were culled for meat, and the remainder were kept for a few more years during which they yielded wool and milk. Cattle were also used for traction. This kind of strategy appears to have been fairly typical for contemporary rural settlements in the Cotswolds as well as in the Thames valley, although a variation of this strategy is suggested for late Iron Age/early Roman sites such as Longdoles Field, Cotswold Community and Ditches. Longdoles Field and Cotswold Community have an almost equal amount of young and old cattle (Sykes 2007a; Strid 2010), suggesting that here the use of secondary products became more important.

It has been argued that the increase of cattle that was associated with Romanisation was not so much related to the increase of beef consumption, but rather reflected the increased use of cattle for traction following an expansion in arable land needed to feed a growing population (Grant 1989, 138). At the Ditches, north of Cirencester, the bone assemblage contained a large number of old cattle, almost 70% being five years or older (Rielly 2009, 201). Most of the sexable cattle were female, suggesting that an important focus of the Ditches economy was dairy products. Rielly hypothesises that cheese could have been sold to the Roman military fort in Cirencester (Rielly 2009, 207). Similar trade has not been observable for Kingshill North, but since the settlement was abandoned after or during the early Roman period, there may have been little time for any changes in animal husbandry to leave traces in the bone assemblage.

Although the number of measureable bones was small, the Kingshill North cattle and sheep/goats appear to be within the same size range as animals from contemporary sites in the region (Table 33). Elsewhere, a size increase in domestic livestock has been reported from other parts of Britain and the Netherlands during the Roman period (Dobney 2001, 38-39).

Butchery marks were recorded on a total of 13 bones from cattle, sheep/goat, large and medium mammal. As expected in a rural Iron Age and early Roman settlement, the main disarticulation of the carcass was carried out with knives (Maltby 2007, 60-61). Cut marks were mainly placed at long bone ends, although cut marks also occurred on the shaft of one sheep/goat humerus and one long bone from a large mammal, the latter consistent with filleting. Chop marks were only noted twice, both on the coronoid process of two cattle mandibles, indicating disarticulation of the jaw.

Table 33. Greatest length and greatest distal width of cattle and sheep/goat bones in the late Iron Age - early Roman Kingshill North assemblage and contemporary sites in Britain (ABMAP 2003)

Site	*Species*	*Bone*	*Measurement*	*n*	*Mean*	*Min*	*Max*
Kingshill North	Cattle	Metatarsal	GL	1	219.5		
ABMAP (LIA-ER)		Metatarsal	GL	18	207.0	188.4	234.2
Kingshill North	Cattle	Tibia	Bd	3	57.7	53.3	61.2
ABMAP (LIA-ER)		Tibia	Bd	101	55.6	47.2	76.0
Kingshill North	Sheep/goat	Metatarsal	GL	1	126.9		
ABMAP (LIA-ER)		Metatarsal	GL	8	130.6	110.0	147.5
Kingshill North	Sheep/goat	Metatarsal	Bd	1	20.2		
ABMAP (LIA-ER)		Metatarsal	Bd	18	20.8	16.5	24.1
Kingshill North	Sheep/goat	Tibia	Bd	1	21.2		
ABMAP (LIA-ER)		Tibia	Bd	100	23.0	19.9	29.8

Pathological conditions were rarely observed in the material. Infected molar roots (Baker and Brothwell 1980, 150) were recorded on one Phase 4a/b and one Phase 4c sheep/goat mandible, while bone absorption at the fourth premolar and first molar was seen on one Phase 4d sheep/goat mandible. The last case suggests infection of the gum, possibly from food lodged between its teeth (Baker and Brothwell 1980, 153).

Other animals

Apart from possibly intrusive microfauna, other animals in the Kingshill North assemblage included only horse, dog and corvid. Notably, articulated skeletons of a dog and a corvid were recovered from the base of middle Iron Age pit 8851 (see below); otherwise, dog remains were rare. Judging by epiphyseal fusion and bone surface structure, all dogs were adult or sub-adult at the time of death, and the absence of pathologies suggests that they were not obviously maltreated. Horse remains were more common in the assemblage, and were more frequent than pig in the later phases. Apart from an unfused distal radius, indicating an age at death of less than 3.5 years, all bones were from skeletally mature animals. This supports Harcourt's hypothesis that in the Iron Age, horses were kept in feral free-ranging herds, and captured and broken in as adults when the need arose (Harcourt 1979, 158). Cut marks were not observed on either dog or horse remains, and probably neither animal was eaten. A few examples of cut marks from disarticulation and/or filleting on horse and dog bones have been observed on contemporary sites (Knight 2007; Wilson *et al.* 1978, 125), although when viewing Iron Age and early Roman assemblages overall, these are clearly rare incidents, possibly connected to hunger periods or ritual/medicinal use of the meat (Maltby 1996, 23-24). One Phase 4c horse atlas had ossified ligament attachments at the dorsal side of the cranial joint surface, which may be a sign of muscle strain. Perhaps the animal had been used to power a quern, preventing it from moving its head freely. The absence of game at Kingshill North is consistent with other Iron Age and early Roman assemblages in the Cirencester region, suggesting that hunting was a rare pastime.

A deposit of particular interest is the articulated skeletons of a dog and a corvid (crow/rook, Corvus corone/frugilegus) in the base of Phase 3 pit 8851. A radiocarbon date on the corvid distal humerus and carpometacarpus gave a date of 394-209 cal BC (95%; NZA-33476). The dog and corvid skeletons were mostly complete and the lack of some skeletal elements is probably due to retrieval or taphonomic factors. Despite using Tomek and Bochenski's (2000) manual for species identification of corvid bones, the morphological traits were inconclusive regarding crow or rook. Measurement of the dog bones provided an estimated withers' height of 52 cm, which is in the average range for Iron Age dogs (Harcourt 1974, 162). Specialised physical types of dog seem not to have been available in Britain until the Roman period (Harcourt 1974), and we may assume that this was an all-round working dog, possible bred for herding or guarding purposes.

Deposition of complete animals in pits are commonly found in Britain throughout the Iron Age, although the interpretation has varied between disposal of a dead animal not fit for consumption to deposit of a ritual nature (Hill 1995, 28). Cunliffe has argued that the placement of sacrifices in the bottom of storage pits was connected to the appeasement of chthonic spirits and deities (Cunliffe 2003, 146-147). This hypothesis fits well into the symbol of the dog as a guardian, thus extending its role in living society to the spirit world (cf. Smith 2006, 12-13). Dogs are indeed rather common in Iron Age articulated burial groups, whereas birds are relatively rare (Morris 2008, 103, 110; Smith 2006, 13). Of the wild birds, raven is the most frequent species, although one complete and two partial crows/rook skeletons were found at Owslebury (Morris 2008, 103-104, 169). Corvids have in many cultures, including Celtic and Roman, been linked to death and the underworld, and it may be in this aspect that they were considered suitable for sacrifice (Serjeantson and Morris 2011, 99-102).

Conclusions

The late Neolithic settlement at Kingshill North was focused on cattle and pig husbandry. The high incidence of pig suggests that woodland was locally available, together with open fields for cattle pasture and arable cultivation. The presence of local forest may also be implied by the presence of aurochs, red deer and roe deer. Ageing data suggest that cattle and sheep/goat were mainly kept for secondary products, such as milk, wool and traction, with surplus animals slaughtered as sub-adults for meat. Pigs were kept exclusively for meat. Game was rare, which suggests that hunting was a relatively rare pastime which contributed very little to the everyday diet.

The Beaker/Bronze Age assemblage was dominated by a 'head and hooves' burial, that is, cattle skull, metapodials and phalanges from inhumation grave 8588. The cattle bones are probably the remains of a hide with head and feet attached. While 'head and hooves' burials are not very common in Britain, as opposed to continental Europe, it is possible that hides without skeletal remains were relatively common grave goods, but generally have not survived.

The Iron Age/early Roman assemblage derives from the last phase of the Kingshill North settlement. The Iron Age animal bone assemblage is rather small, but tentatively suggests that sheep/goat was more common in the middle Iron Age, whereas cattle increased in importance in the late Iron Age. The late Iron Age-early Roman assemblages were dominated by sheep/goat. It is unclear whether this is connected to changes in the local environment favouring sheep/goat, increased wool production or trade in cattle to the military fort in Cirencester. Pigs were scarce and game absent, indicating that the forested landscape of the Neolithic had been transformed into an open landscape by the Iron Age.

Articulated burial groups of a possible ritual nature were identified in the middle Iron Age assemblage, which contained the skeletons of one crow/rook and one dog in the base fill of a pit. It is not possible to say with certainty why the animals were deposited but it has been suggested that dogs may have been seen as guardians against underworld spirits and deities or sacrificed as appeasement to such.

Land snails *Carl Champness*

Thirty samples were examined from the excavations at Kingshill North. These derived from a variety of settlement feature types – pits and ditches dating to the Neolithic, Bronze Age, Iron Age and Roman periods. An initial assessment of the samples indicated preservation and abundance of molluscan remains was highly variable across the site (Stafford, in OA 2009). The richest assemblages derived from pits dated to the late Neolithic and features assigned to the late Iron Age/early Roman period. Preservation was otherwise quite poor, particularly in those features dated to the early Bronze Age. Detailed analysis was carried out on samples from 11 features in order to provide a comprehensive species list for these periods. The results of this analysis, along with a summary of the assessment results from the remaining samples, are presented below. Further details of the assessment, including supporting tables can be found in the site archive.

Method

All samples were processed during the assessment stage at Oxford Archaeology. Samples processed specifically for molluscan remains consisted of 2 litres of sediment, disaggregated in water, floated onto 0.5mm nylon mesh and air-dried. The residues were also retained to 0.5 mm. For the purpose of assessment the flots were then scanned under a binocular microscope at magnifications of x10 and x20 and an estimate of abundance recorded. The flots of larger bulk samples (10-40 litres) from other features, primarily allocated for the retrieval of charred plant remains, were also examined in order to provide a comprehensive assessment for all the periods represented across the site.

The flots and residues of samples selected for further analysis were systematically picked for identifiable mollusc fragments. Due to the large volumes of sediment processed, only a proportion of the finer grade (1-0.5 mm) residues from the bulk samples were sorted. Flotation in these samples appears to have been good with only very occasional items retained in the residues. The species present in each assemblage were identified and whole shells and apical fragments counted. Shells of *Cecilioides acicula* were excluded because this species burrows deeply and provides no useful information on conditions as a sediment or soil formed. *C acicula* can be extremely numerous and its inclusion in the total tends to obscure the results from the other species. Nomenclature follows Kerney (1999). Habitat groupings follow the scheme of Evans (1972, 1984).

Phase 1: Late Neolithic pits 8058, 8064, 8392 and 8813

The flots from eleven samples were examined from four Neolithic pits containing early Grooved Ware pottery. The artefact-rich feature fills and stratigraphic evidence would suggest that the majority of the pits were deliberately backfilled during short periods of activity. The pit samples therefore provide snap-shots of the environments surrounding the pits during a particular phase of activity, but do not contain a sequence to provide evidence of environmental change.

Preservation of molluscan remains was generally poor. The assemblages were all very similar and of low diversity, dominated mostly by open country species, *Vallonia excentrica*, the obligate xerophile *Helicella itala*, and to a lesser extent *Vallonia costata* and *Pupilla muscorum* (Table 34). This suggests that the soil used to backfill the pits formed in a dry open landscape, probably rough grassland. Smaller numbers of shade-loving species were present in two sequences, particularly context 8063 from pit 8064 and 8815 from pit 8813. These included *Discus rotundatus*, *Carychium tridentatum* and *Oxychilus cellarius*, which suggest more enclosed conditions, perhaps scrub or some form of woodland, were, or had previously been, present in the area.

One cautionary note to be made regarding the assemblages is the very low numbers of shells compared with the large volume of processed sediment, together with the consistent presence of *Candidula intersecta* and *C gigaxii*, considered to be Roman introductions in the Upper Thames Valley (Kerney 1999). This suggests that a component of these assemblages may consist of intrusive elements and are therefore not wholly representative of the environment prevailing at the site during the Neolithic period.

Phase 2: Beaker to Bronze Age

Only one feature dated to the late Neolithic/early Bronze Age period (Phase 2) was sampled and this was exclusively funerary in character. Five samples were taken from the early Bronze Age barrow ditch (group 8454). This produced a predominantly open-country assemblage, but included both shade-loving and open-country species, along with a small

Table 34: Land snails (Phase 1). Key: C – catholic species, O – open-country, S – shade-loving.

Period		*Neolithic*	*Neolithic*	*Neolithic*	*Neolithic*	*Neolithic*	*Neolithic*	*Neolithic*	*Neolithic*	*Neolithic*	*Neolithic*	*Neolithic*
Feature Type		*Phase 1*	*Phase 1*	*Phase 1*	*Phase 1*	*Phase 1*	*Phase 1*	*Phase 1*	*Phase 1*	*Phase 1*	*Phase 1*	*Phase 1*
Fill of		*Pit*	*Pit*	*Pit*	*Pit*	*Pit*	*Pit*	*Pit*	*Pit*	*Pit*	*Pit*	*Pit*
Group Number		*8058*	*8058*	*8064*	*8064*	*8064*	*8392*	*8392*	*8392*	*8813*	*8813*	*8813*
context		*8056*	*8057*	*8062*	*8063*	*8089*	*8393*	*8394*	*8424*	*8815*	*8816*	*8817*
Sample No		*32*	*33*	*20*	*21*	*22*	*57*	*58*	*101*	*197*	*198*	*199*
Depth												
Vol.		*37*	*18*	*30*	*27*	*27*	*39*	*28*	*10*	*9*	*9*	*9*
Taxa	*Habitat*											
Carychium tridentatum (Risso)	S			1								
Cochlicopa spp.	C									6	2	
Vertigo pygmaea (Draparnaud)	O		1		2						1	
Vertigo pusilla (Müller)	S											
Pupilla muscorum (Linné)	O	6	4	8	10	2	2	2		2	6	5
Vallonia costata (Müller)	O			8	10	3	2	1		2	5	5
Vallonia excentrica (Sterki)	O	8	7	12	12	5	4	2		9	20	20
Vallonia spp.	O			3	2		3	5				
Acanthinula aculeata (Müller)	S											
Ena obscura (Müller)	S											
Punctum pygmaea (Draparnaud)	C									2		
Discus rotundatus (Müller)	S		2	9	3	2		2		16	8	7
Vitrina pellucida (Müller)	C							1				
Vitrea spp.	S			5	2					2		
Nesovitrea hammonis (Ström)	C			1								
Aegopinella pura (Alder)	S											
Aegopinella nitidula (Draparnaud)	S			1								
Oxychilus cellarius (Müller)	S	2		7	7	5		10		3		
Zonitidae indet.	S										1	
Euconulus fulvus	C											
Clausiliidae indet.	S											
Clausilia bidentata (Ström)	S				2							
Helicidae indet.	O										1	
Candidula spp.	O	6										
Candidula gigaxii (Pfeiffer)	O		4	5	5		9	5		3		3
Candidula intersecta (Poiret)	O				1							
Cernuella virgata (da Costa)	O	7				4						
Helicella itala (Linné)	O	1	2		4	1						1
Trichia hispida (Linné)	C	3	5	3	3	6		1	4	3		
Cepea/Arianta sp.	C			1	1							1
Total		33	25	64	64	28	20	29	4	48	44	47
per litre		1	2	2	2	1	1	1	0.4	5	5	5

number of catholic species (Table 35). On the whole, the barrow assemblage was one of the better preserved assemblages and consisted of 152 individuals. Similar to the Neolithic samples, the open-country component was dominated by xerophile species *V excentrica* and *H itala*, with lesser quantities of *P muscorum* and *Vertigo pygmaea*. Of the more restricted shade-loving species present, *Vitrea contracta* and *Oxychilus cellarius* dominated. The open-country component is indicative of a dry open environment, probably grassland. *V contracta* and *O cellarius*, although classified as shade-loving, has rather more catholic habitat preferences than *D rotundatus* and thrives in well-vegetated places, including tall grassland and scrub.

Phase 4: Late Iron Age and Roman

Ten samples from pits and ditches dated to the Iron Age and Roman periods were examined during the analysis. The assemblages were among the better preserved, though unexceptional, and consisted of a restricted range of open-country species (*H itala*, *V excentrica*, *P muscorum*, *V pygmaea*), indicating that dry open conditions and well-established grassland and/or arable prevailed at the site (Table 36). Groups from Phase 4c enclosure ditch 8413 (context 8705) and a broadly-dated pit (context 8795; Phase 4) were dominated by open-country species. There is a significant increase in a very limited range of open-county species (*V excentrica* and *H itala*) that

Table 35: Land snails (Phase 2). Key: C – catholic species, O – open-country, S – shade-loving.

Period		*BA*	*BA*	*BA*	*BA*	*BA*
Feature Type		*Phase 2*	*Phase 2*	*Phase 2*	*Phase 2*	*Phase 2*
Fill of		*Ring ditch*	*Ring ditch*	*Ring ditch*	*Ring ditch*	*Ring ditch*
Group Number		*8439*	*8441*	*8452*	*8528*	*8597*
context		*8440*	*8442*	*8451*	*8530*	*8640*
Sample No		*68*	*69*	*70*	*86*	*163*
Depth						
Vol.		*10*	*10*	*10*	*23*	*10*
Taxa	*Habitat*					
Carychium tridentatum (Risso)	S			1		
Cochlicopa spp.	C					2
Vertigo pygmaea (Draparnaud)	O	1		1	2	2
Vertigo pusilla (Müller)	S					
Pupilla muscorum (Linné)	O	2			4	7
Vallonia costata (Müller)	O	3	2	8	2	9
Vallonia excentrica (Sterki)	O	3	6	8	3	20
Vallonia spp.	O					
Acanthinula aculeata (Müller)	S					
Ena obscura (Müller)	S					
Punctum pygmaea (Draparnaud)	C		1			
Discus rotundatus (Müller)	S			2	3	3
Vitrina pellucida (Müller)	C					1
Vitrea spp.	S				2	16
Nesovitrea hammonis (Ström)	C					
Aegopinella pura (Alder)	S			1		
Aegopinella nitidula (Draparnaud)	S	1			2	2
Oxychilus cellarius (Müller)	S					6
Zonitidae indet.	S					
Euconulus fulvus	C					
Clausiliidae indet.	S				1	
Clausilia bidentata (Ström)	S					
Helicidae indet.	O					
Candidula spp.	O		5	4		
Candidula gigaxii (Pfeiffer)	O	5				
Candidula intersecta (Poiret)	O					
Cernuella virgata (da Costa)	O					
Helicella itala (Linné)	O		1	2	5	4
Trichia hispida (Linné)	C				2	3
Cepea/Arianta sp.	C			1	1	
Total		15	15	25	23	72
per litre		2	2	3	1	7

Table 36: Land snails (Phase 4). Key: C – catholic species, O – open-country, S – shade-loving.

Period		*LIA-Rom*	*LIA-Rom*	*LIA-Rom*	*LIA-Rom*	*LIA-Rom*	*LIA-Rom*	*LIA-ER*	*LIA-ER*	*LIA-ER*	*LR*	*LR*	*LR*	*LR*
		Phase 4	*Phase 4*	*Phase 4*	*Phase 4*	*Phase 4*	*Phase 4*	*Phase 4c*	*Phase 4c*	*Phase 4c*	*Phase 4f*	*Phase 4f*	*Phase 4f*	*Phase 4f*
Feature type		*Pit*	*Pit*	*Pit*	*Pit*	*Pit*	*Pit*	*Ditch*	*Ditch*	*Ditch*	*Ditch*	*Ditch*	*Ditch*	*Ditch*
Group Number		*8795*	*8795*	*8795*	*8102*	*8102*	*8102*	*8705*	*8705*	*8705*	*9013*	*9013*	*9013*	*9013*
context		*8793*	*8794*	*8828*	*8106*	*8107*	*8108*	*8707*	*8707*	*8706*	*8939*	*8939*	*9012*	*9012*
Sample No		*192*	*190*	*191*	*27*	*28*	*29*	*297*	*298*	*299*	*293*	*294*	*295*	*296*
Depth								*0.00-0.20*	*0.20-0.30*	*0.30-0.50*	*0.00-0.20*	*0.20-0.45*	*0.45-0.65*	*0.65-0.85*
Vol.		*20*	*36*	*20*	*27*	*28*	*29*	*17*	*13*	*15*	*15*	*17*	*16*	*16*
Taxa	*Habitat*													
Carychium tridentatum (Risso)	S				6	44								
Cochlicopa spp.	C		2		1	2					1	4		
Vertigo pygmaea (Draparnaud)	O		2	1	3						10	36	9	43
Vertigo pusilla (Müller)	S					2								
Pupilla muscorum (Linné)	O		22	3	3	3	2	2	1		12	26	6	3
Vallonia costata (Müller)	O		6	1	6	8						22		
Vallonia excentrica (Sterki)	O	14	25	12		6	7	39	20	3	65	190	44	74
Vallonia spp.	O					1								
Acanthinula aculeata (Müller)	S				1									
Ena obscura (Müller)	S					1								1
Punctum pygmaea (Draparnaud)	C					6					2	9		3
Discus rotundatus (Müller)	S				18	75								
Vitrina pellucida (Müller)	C													
Vitrea spp.	S				9	15								
Nesovitrea hammonis (Ström)	C				1									
Aegopinella pura (Alder)	S				3	18								
Aegopinella nitidula (Draparnaud)	S				2	6					8	33	20	36
Oxychilus cellarius (Müller)	S		2		5	4								
Zonitidae indet.	S							1						
Euconulus fulvus	C					1								
Clausiliidae indet.	S													
Clausilia bidentata (Ström)	S				2	4								
Helicidae indet.	O													
Candidula spp.	O						2	1						
Candidula gigaxii (Pfeiffer)	O		4	1	4	2								
Candidula intersecta (Poiret)	O													
Cernuella virgata (da Costa)	O						1		1					
Helicella itala (Linné)	O		5	2	2			2			5	20	6	8
Trichia hispida (Linné)	C	8	3	2		5		30	11	3	89	168	31	60
Cepea/Arianta sp.	C										1			2
Total		22	71	22	66	203	20	75	33	6	193	508	116	230
per litre		1	3	1	2	7	1	4	3	0.4	13	30	7	14

are representative of open dry short grassland. This corresponds with significant decreases in shade-loving species and an increase in the percentage of catholic species. Both *H itala* and *P muscorum* favour short open grassland environments, but can tolerate disturbed ground. *P muscorum* is less tolerant of arable cultivation, but is often found associated with bare open ground within short grassland, and potentially associated with intense grazing.

The assemblage from pit 8102 (Phase 4) showed a marked contrast to those of the other late Iron Age and Roman features in that they were significantly more diverse and abundant. The pit was dominated by shade-loving species, which reached up to 74% of the totals. The most abundant species were *D rotundatus*, *C tridentatum* and various zonitids, indicating leaf litter and the presence of broad-leaf deciduous woodland. Lesser numbers of rupestral species that live on and under tree trunks (*Clausilia bidentata* and *Acanthinula aculeata*) were also present along with occasional specimens of *Vertigo pusilla* and *Acicula fusca*. The latter species is generally rare on archaeological sites, never occurring in great numbers, and is considered to be a good indicator of wooded conditions (Evans 1972, 141-142). Open-country species were present in lesser quantities, averaging 25-30%. This component of the assemblage, however, was dominated by *V costata*, representing between 10% and 4%. Although *V costata* is essentially considered to be an open grassland species, it has been recorded in lesser numbers in more enclosed environments. Evans (1972) suggested it could achieve up to 12% abundance in open woodland and 6% in closed canopy. *V costata*'s ability to inhabit woodland environments means it is essentially one of the first of the open-country species to take advantage or colonize disturbed or newly cleared areas. Open country xerophile species (*V excentrica*, *H itala*, *P muscorum*) were present in insignificant numbers. However, the presence of *Candidula* sp, does indicate that more recent material has contaminated the assemblage. Overall, the pit assemblage suggests that deciduous woodland existed in the late Iron Age or Roman landscape, or at the very least this feature was back-filled with soil that had formed under woodland conditions. There is some evidence to indicate an open aspect to the woodland canopy, perhaps grassy clearings, or that the land had recently been cleared with open-country species beginning to colonize. This is in stark contrast to the assemblages associated with the main settlement enclosure that indicated disturbed open conditions.

The late Roman field boundary ditch 8203 (Phase 4f) produced the richest assemblage of all the samples (context 9013). The assemblage was very similar in nature to the main settlement enclosure ditch, being dominated by open-country species, but with the two notable exceptions of the shade loving *Aegopinella nitidula* and dry open country *Vertigo pygmaea*. The latter is not found in woodland, whereas *A nitidula* inhabits a wider variety of shaded environments that include moist grassland, and can tolerate bare ground and arable fields. The increased numbers of *A nitidula* may indicate the presence of arable fields close to the boundary.

Discussion

The results of the molluscan analysis from the late Neolithic features at Cirencester are somewhat inconclusive. The assemblages were dominated by species indicative of dry open conditions, probably tall grassland, perhaps with localized scrub/woodland surrounding. However, molluscan preservation was extremely poor and there are signs of later intrusion. Indeed, the number of individuals per litre from the majority of the features would not have produced useful assemblages, particularly for the late Neolithic, had the samples been the more usual two-litre sized samples.

From the late Neolithic period onwards at Cirencester there is evidence for the development of much more open environments of dry short grassland/scrub which appear to have prevailed into the Bronze Age. This is consistent with an open landscape associated with funeral monuments and practices, which may have originally been intended to be viewed from some distance.

The establishment of the late Iron Age/early Roman ditch 8413 within the site marks a transition to more disturbed ground conditions, although still in a predominantly open short grassland environment, with evidence of grazing and bare ground. However, the woodland assemblage located in pit 8102, located to the north of the main settlement, indicates a possible phase of secondary woodland regeneration away from areas of intense activity. By the mid to late Roman period, large arable fields were present to the south of the site.

There is a general lack of palaeo-environmental sequences around Cirencester to indicate past environmental change. Previous work has tended to focus on the identification of waterlogged and peat deposits in particular to provide a sequence of vegetational change. This has been provided by pollen, insects, and plant remains from palaeochannels, fen deposits and a growing number of waterlogged deposits from waterholes and deep features associated with settlement. These studies generally suggest extensively open conditions by the early-mid Bronze Age, with an intensification of grazing and arable cultivation during the Iron Age and Roman periods (Lambrick 2009).

Within the wider context of the Upper Thames Valley, sites such as Gravelly Guy and Horcott Pit on the River gravels suggest that during the early Bronze Age at least part of the second gravel terrace was being used for permanent pasture (Lambrick and Allen 2004). The area around the Devil's Quoits was also predominantly open grassland during the later Neolithic and early Bronze Age (ibid). Further afield, evidence from Barrow Hills, Radley, suggested that Mesolithic woodland had given way to grassland by the middle Neolithic and that conditions on the site remained open until the Late Bronze Age when a phase of local vegetation regeneration took place (Robinson 1999). A similar phase of woodland survival (or regeneration) was recorded in the mid to late Iron Age at Duntisbourne, on the upper slopes of the Cotswolds (Mudd *et al.* 1999, 77-97). Further evidence of land abandonment and woodland regeneration has been recorded after the Neolithic at other sites, mainly on the chalklands. This regeneration occurred at various periods in later prehistory and may be related to a countrywide trend as seen in pollen diagrams (Evans 1993). Locally, however, there appears to be much variation within the area regarding the timing of woodland clearance and periods of secondary woodland regeneration. This may have been partly in response to shifting settlement patterns and abandonment of areas within the uplands during the Iron Age and Roman periods.

Charred plant remains *Wendy Smith*

Introduction and methodology

In total, 117 bulk samples from a variety of features were assessed. The assessment results were fairly unproductive, with most samples producing little or no charred plant remains. However, several samples merited further analysis because of their date and/or archaeological significance, even though the samples were not particularly rich. These include four late Neolithic pit samples, two middle Iron Age pit samples, one late Iron Age sample from within a ditch and one Roman cremation sample. The samples were analysed in order to explore what plants were in use during the Neolithic, what cultivated cereals were in use during the Iron Age and Roman periods, and to determine whether ritual selection of plants was evident.

Samples were processed by flotation using a modified Siraf-style flotation machine. The resulting flot was sieved to 250µm and the heavy residue, which does not float, was sieved to 500µm. The dried heavy residue was sorted by eye for charred plant remains.

The present author sorted charred plant remains from flots and from unsorted heavy residue fractions using a low-power binocular microscope at magnifications between x12 and x30. The entire flot and heavy residue fractions were sorted for charred plant remains. Identification of plant remains (including charcoal) was made by direct comparison to the Oxford Archaeology reference collection, as well as standard identification keys (eg Cappers *et al.* 2006). Nomenclature for the plant remains follows Stace (1997) for indigenous species, and Zohary and Hopf (2000) for cultivated species. The traditional binomial system for the cereals is maintained here, following Zohary and Hopf (2000, tables 3 and table 5).

Quantifications of most seeds (in the broadest sense) were made on embryos, except in the case of hazel (*Corylus avellana* L.) nutshell fragments, and crab apple (*Malus sylvestris* L.) hypanthium (fruit) fragments. In the case of the crab apple fragments, it is unlikely in any case that these would total more than one individual crab apple. Fragments of hazel nutshells were weighed and then equated to complete hazel nutshells. The estimate count of complete hazel nutshells used here is based on a calculation presented by Wendy Carruthers in Mithen *et al.* 2001, whereby 42 g of charred hazel nutshell fragments are equivalent to 100 hazelnuts.

Results

Phase 1 – Late Neolithic

A total of four samples from three late Neolithic pits produced small quantities of plant remains (Table 37). Pit 9096 produced one possible cereal grain, and both pit 9096 and pit 9100 produced small quantities of indeterminate cereal/ large grass caryopses. Unfortunately, these were poorly preserved, often fragmented remains of cereal/grass caryopses, so more secure identification was not possible. All three pits produced hazel (*Corylus avellana* L.) nutshell fragments, but only pit 9100 produce crab apple (*Malus sylvestris* L.) pips and fruit wall (hypanthium) fragments. In general, the hazel nutshell results were extremely poor for pits 8100 and 9096 (that is, fewer than two whole hazelnuts). Although these could conceivably be the remains of food preparation, it is also possible that these are merely nuts inadvertently burned with hazel wood fuel. Unfortunately, charcoal from both samples 35 and 286 was primarily less than 2 mm and, therefore, unlikely to be identifiable, so this possibility can only be suggested without testing. However, the samples from pit 9100 are significantly richer, with 23.4 hazel nutshells estimated from the fragments recovered from sample 272. The recovery of crab apple pips and fruit wall (hypanthium) fragments from this sample as well as charred hazel nutshells could also imply preparation of another wild foodstuff. Nevertheless, it is unlikely that this amounts to more than one individual crab apple and, therefore, it also could simply have been burned inadvertently with apple-wood fuel. Again, charcoal recovered from samples 272 and 273 were relatively small-sized (<2 mm) and, therefore, were not recommended for further analysis. As a result, it is not possible to ascertain if apple wood fuel was in use or not.

Unfortunately, the limited quantity of charred plant remains (fewer than or equal to two seeds per litre of sediment sampled – see Table 37) means that it is difficult to ascertain if these remains represent accidentally charred tree fruits or nuts inadvertently burned with wood fuel, or if they are indeed background noise from processing or disposal of wild foodstuffs. The limited recovery of charred

Table 37: Neolithic plant remains

Sample No	*35*	*272*	*273*	*286*	
Context No	*8098*	*9101*	*9102*	*9097*	
Feature No	*8100*	*9100*	*9100*	*9096*	
Feature Type	*pit*	*pit*	*pit*	*pit*	
Sample Volume (L)	*10 L*	*20 L*	*40 L*	*40 L*	
Flot Volume (ml)	*14 ml*	*85 ml*	*70 ml*	*90 ml*	
Seeds per litre of sediment (excluding ?ancient seeds)	*1.77*	*2.02*	*0.16*	*1.55*	
Latin binomial					*English Common Name*
FLOT					
Cereals					
Cereal - indeterminate	-	-	-	1	
Cereal / POACEAE - indeterminate	-	4	-	2E	
Tree/ Shrub					
Corylus avellana L. - nutshell fragments (no [weight (g)] = conversion)	98 [0.7g] = 1.7 HNS	>1000 [8.0g] = 19 HNS	72 [0.3g] = 0.7 HNS	121 121 [0.6g] = 1.4 HNS	hazel
Malus sylvestris L. - hypanthium fragment (with flower remnant)	-	1	-	-	crab apple
Malus sylvestris L. - hypanthium fragment	-	3	-	-	crab apple
Malus sylvestris L. - pip	-	9E	-	-	crab apple
cf. *Malus sylvestris* L. - pip (?immature)	-	-	2	-	possible crab apple
Weed/ Wild					
Chenopodium spp.	-	-	-	3†	goosefoot
Atriplex spp.	++†	+++†	26†	12†	orache
Rumex sp.	-	1	-	-	dock
Veronica hederifolia L.	-	-	-	2†	ivy-leaved speedwell
Unidentified - fruit stone fragment	-	-	-	-	-
Unidentified - ?tuber fragment	-	-	2	1	-
Unidentified - highly vitrified, amorphous fragments	17	-	+++	57	-
Unidentified - highly vitrified, amorphous ?fruit fragments	-	+++	-	-	-
Unidentified	-	-	-	1	-
HEAVY RESIDUE FRACTIONS					
>10 mm Heavy Residue					
Corylus avellana L. - nutshell fragments (no [weight (g)] = conversion)	-	10 [1.2g] = 2.9 HNS	-	-	hazel
10 – 4 mm Heavy Residue					
Corylus avellana L. - nutshell fragments (no [weight (g)] = conversion)	-	-	3 [0.3g] = 0.7 HNS	-	hazel
4 - 2 mm Heavy Residue					
Corylus avellana L. - nutshell fragments (no [weight (g)] = conversion)	-	99 [0.2g] = 0.5 HNS	38 [0.3g] = 0.7 HNS	-	hazel
Unidentified - highly vitrified, amorphous fragments (<4mm)	-	-	+	-	-
2 - 0.5 mm Heavy Residue					
Corylus avellana L. - nutshell fragments (no [weight (g)] - conversion)	-	-	48 [0.1g] = 0.2HNS	-	hazel
Unidentified - highly vitrified, amorphous fragments (<2mm)	-	-	++++	-	
TOTAL IDENTIFICATIONS (excluding ?ancient seeds)	17.7	40.4	6.3	62	
Other Remains					
cf. Oyster shell fragment (most likely decayed from oolitic limestone)	-	1	-	-	-
Bone fragments (?human) - <4mm	-	+++	-	-	-
Molluscs (land snails - especially *Cecilioides acicula*)	-	++++	-	-	-

Nomenclature follows Stace (1997). Key: + = <5, ++ = 5 - 10, +++ = 10 - 50, ++++ = 50 - 100 and +++++ = >100. NE = estimate count of whole items based on fragments and N† = items which may not be ancient. In all cases 100% of the flot or heavy residue fraction was sorted.

Table 38: Middle Iron Age plant remains

Sample No	*25*	*278*	
Context No	*8142*	*9084*	
Feature No	*8143*	*9083*	
Feature Type	*pit*	*pit*	
Sample Volume (L)	*29 L*	*8 L*	
Flot Volume (ml)	*160 ml*	*35 ml*	
Seeds per litre of sediment	*2.86*	*31.25*	
Latin Binomial			*English Common Name*
Cereal Grain			
Hordeum spp.	11	9	barley
Triticum spp. - indeterminate	10	8	wheat
Cereal - indeterminate	9E	12E	cereal
Cereal/ POACEAE - detached embryo		6	cereal/ large grass
Cereal/ POACEAE - indeterminate	15E	24E	cereal/ large grass
Cereal Chaff			
Hordeum spp. - six-rowed type rachis node	-	2	barley
Hordeum spp. - indeterminate rachis node	-	3	barley
cf. *Hordeum* spp. - indeterminate rachis node	-	2	possible barley
Triticum dicoccum Schübl. - glume base	5	18	emmer
Triticum dicoccum Schübl./ *spelta* L. - indeterminate spikelet fork	-	1	emmer/ spelt
Triticum dicoccum Schübl./ *spelta* L. - indeterminate, glume base	9	2	emmer/ spelt
Triticum spelta L. - spikelet fork	-	1	spelt
Triticum spelta L. - indeterminate glume base	-	2	spelt
Triticum spp. - indeterminate rachis node	3E	23E	wheat
Triticum spp. - indeterminate glume fragment	+	+	wheat
Cereal/ POACEAE - indeterminate culm node	1	1	cereal/ large grass
Tree/ Shrub			
cf. *Prunus spinosa* L. - thorn	-	1	blackthorn/ sloe
Weed/ Wild Plants			
Chenopodium spp.	-	15E	goosefoot
Atriplex spp.	-	15E	orache
Silene spp.	-	2	campion
Fallopia convolvulus (L.) Á. Löve	-	2	black-bindweed
Rumex spp.	-	2	dock
Malva spp.	-	2	mallow
cf. *Thlaspi arvense* L.	-	1	possible field penny-cress
Medicago spp./ *Melilotus* spp./ *Trifolium* spp.	-	2	medick/ melilot/ clover
cf. *Veronica hederifolia* L.	-	1	possible ivy-leaved speedwell
Galium spp.	3	8E	bedstraw
Valerianella dentata (L.) Pollich	-	3	narrow-fruited cornsalad
Eleocharis uniglumis (Link) Schult./ *palustris* (L.) Roem. & Schult.	-	1	common/ slender spike-rush
cf. *Eleocharis uniglumis* (Link) Schult./ *palustris* (L.) Roem. & Schult.	-	1	possible common/ slender spike-rush
Avena sp.	-	1	oat
Avena spp. - awn fragments	-	+	oat/ brome
Avena spp./ *Bromus* spp.	7	1	brome
Bromus spp.	4	-	annual meadow-grass- type
Poa annua L. - type	-	3	Grass Family
POACEAE - small-sized caryopsis	-	45	Grass Family
POACEAE - medium-sized caryopsis	-	22	-
Unidentified	-	3	-
Unidentified - bud	1	-	-
Unidentified - bud scar (? Herbaceous plant)	1	1	-
Unidentified - ?bud/ ?catkin fragment	1	-	-
Unidentified - highly vitrified, amorphous clumps	+++	-	-
Unidentified - high vitreous objects (?plant)	-	4	-
Indeterminate	3	-	-
TOTAL IDENTIFICATIONS	83	250	

Nomenclature follows Zohary and Hopf (2000) for cultivated plants and Stace (1997). Key: + = <5, ++ = 5 - 10, +++ = 10 - 50, ++++ = 50 - 100 and +++++ = >100. NE = estimate count of whole items based on fragments. Data based entirely on the flot and in all cases 100% of the flot was sorted.

plant remains and the dominance of tree fruits and nuts is quite typical of Neolithic deposits (Moffett *et al.* 1989), especially in Gloucestershire (eg Nympsfield chambered tomb – Arthur and Pardine 1975; Hazelton North – Straker 1990).

Phase 3 – Middle Iron Age

Two middle Iron Age pit samples were fully analysed (Table 38). Sample 25 was fairly poor, producing only 83 identifications equivalent to 2.86 seeds per litre of sediment sampled. Some 54% of identifications from sample 25 were of cereal grain. Unfortunately, preservation of cereal grain was relatively poor and identification was only made to barley (*Hordeum* spp.) or wheat (*Triticum* spp.). Cereal chaff was not particularly abundant (21.7% of all identifications). However, glume wheat chaff was present and where possible to make identification to species level, only emmer (*Triticum dicoccum* Schübl.) was identified. A limited number of weed or wild taxa were recovered, dominated by indeterminate cultivated or wild oat (*Avena* spp.)/brome grass (*Bromus* spp.).

Sample 278 was much richer, producing 250 identifications in total. Weed or wild plants account for 50.8% of all identifications from sample 278. Many of the weed/wild taxa are typical weeds of cereal crops such as goosefoot (*Chenopodium* spp.), orache (*Atriplex* spp.), dock (*Rumex* spp.), narrow-fruited cornsalad (*Valerianella dentata* (L.) Pollich) and indeterminate wild/ cultivated oat/ brome grass (*Avena* spp./ *Bromus* spp.). Indeterminate small, medium or large wild grasses (POACEAE) were abundant, accounting for 28% of all identifications from this sample. Like sample 25, cereal grain was relatively poorly preserved and identification was only made to barley (*Hordeum* spp.) or wheat (*Triticum* spp.). Cereal chaff was not particularly abundant (22% of all identifications). However, glume wheat chaff was present and where possible, most glume bases were identified as emmer (*Triticum dicoccum* Schübl. – n = 18). Two spelt (*Triticum spelta* L.) glume bases were also identified, which could either indicate that spelt was a contaminant of this crop (either in the field or in storage) or that both crops were cultivated and cereal crop processing waste was subsequently mixed on deposition into this pit feature.

These results were consistent with late Bronze Age/early Iron Age results by Pelling (1999) and late Bronze Age results by Ede (2000) from Shorncote Quarry, especially in terms of the abundance of brome (*Bromus* spp./ *Bromopsis* spp. – reported by Pelling (1999) as *Bromus*/ *Eubromis*) and other indeterminate wild grasses. Early Iron Age charred plant remains from Bampton in Oxfordshire (approximately 20 miles east of Cirencester) also were poorly preserved and present only in low concentrations (Pelling 2000).

Brome (*Bromus* spp.) grass (also known as 'chess' or 'rye brome', although specifically this refers to *Bromus secalinus* L.) was recovered from the Kingshill North samples, although in relatively low concentrations. Both brome grasses and wild and cultivated species of oat are native to the British Isles and, therefore, can occur naturally in the wild. At present, both brome and the indeterminate wild/cultivated oat are classified as a weed/wild plants primarily because we cannot assume they were cultivated intentionally. However, given their relative abundance in some samples, perhaps they are better regarded as a crop in their own right, even if not necessarily grown for human consumption. Certainly, Campbell (2000, 50) has speculated that brome was cultivated for fodder at early Iron Age Danebury (and environs) and was then replaced by oat in the late Iron Age. The development of hay meadows for the intentional cultivation of grass feed for livestock also dates to sometime in the Iron Age (eg Hodgson *et al.* 1999)

Phase 4a – Late Iron Age

A layer (8985) within an intervention (8907) through ditch 8563 was sampled (Table 39). The sample was relatively poor with only 143 items quantified. However, the sample's volume was relatively small, only 2.5 litres, and therefore produced a relatively abundant assemblage of 53 items per litre of sediment sampled, which means this was the richest sample encountered at the site. Approximately 10% (n = 15) of all identifications were cereal grain. Only indeterminate cereal and indeterminate wheat (*Triticum* spp.) grains were identified. Cereal chaff accounted for 26% of all identifications (n = 37); unfortunately, due to poor preservation glume bases could not be identified to species level. Weed/wild taxa dominated this sample, accounting for 57% (n = 82) of all identifications. Indeterminate medium grass (POACEAE) caryopses and rye-grass (*Lolium* spp.) caryopsis were most frequently encountered.

The poor preservation and low density of charred plant remains is similar to other prehistoric charred plant remains from the upper Thames terrace and in Gloucestershire in particular (eg Ede 1999; Pelling 1999; Pelling 2001). Poor preservation means that it is not possible to determine what role emmer (*Triticum dicoccum* Schübl.) or spelt (*Triticum spelta* L.) played in late prehistoric Cirencester.

Phase 4e – Early-mid Roman

One relatively poor sample from cremation burial 8227 was analysed (Table 39). In total, only 104 identifications were made from this 15 litre sample, producing just under seven seeds or items per litre of sediment sampled. The majority of plant remains recovered were weed/wild taxa (n = 91 or 87.5% of all identifications), with indeterminate medick/ melilot/clover (*Medicago* spp./ *Melilotus* spp./ *Trifolium* spp.) seeds accounting for a third of the weed/wild assemblage. Again, cereal grain was poorly preserved and identifications could only be pushed as far as genus level, eg barley – *Hordeum* spp. or wheat – *Triticum* spp. Only a few fragments

Table 39: Late Iron Age/early Roman plant remains

Sample No	*239*	*42*	
Context No	*8985*	*8228*	
Feature No	*8907*	*8227*	
Feature Type	*? cremation/?ash layer within ditch*	*cremation pit*	
Phase	*Phase 4a LIA (mid 1C BC– early 1C AD)*	*Phase 4e EROM-MROM (late 1–3C AD)*	
Sample Volume (L)	*2.5 L*	*15 L*	
Flot Volume (ml)	*< 5 ml*	*120 ml*	
Seeds per litre of sediment	*57.2*	*6.93*	
Latin Binomial			*English Common Name*
Cereal Grain			
Hordeum spp.	-	1	barley
Triticum spp. - indeterminate	4	1	wheat
Cereal - indeterminate	5E	3	cereal
Cereal/ POACEAE - detached embryo	1	-	cereal/ large grass
Cereal/ POACEAE - indeterminate	5E	5E	cereal/ large grass
Cereal Chaff			
Triticum dicoccum Schübl./ spelta L. - indeterminate, glume base	12	-	emmer/ spelt
Triticum spelta L. - spikelet fork	-	1	spelt
Triticum spelta L. - indeterminate glume base	1	-	spelt
Triticum spp. - indeterminate rachis node	23E	1	wheat
Triticum spp. - indeterminate glume fragment	+	-	wheat
Cereal - indeterminate internode	1	-	cereal
Tree/ Shrub			
Corylus avellana L. - nutshell fragment	1	1	hazel
Unidentified - nutshell fragments (<2mm)	8	-	-
Weed/ Wild Plants			
Chenopodium spp.	4	7E	goosefoot
Chenopodium spp./ *Atriplex* spp. - internal structure	1	-	goosefoot/ orache
Atriplex spp.	1	6	orache
Polygonum sp./ *Fallopia* sp./ *Rumex* sp./ *Carex* sp. - indet. internal structure	-	1	knotgrass/ black-bindweed/ dock/ sedge
Fallopia convolvulus (L.) Á. Löve	-	2E	black-bindweed
Rumex spp.	2	2	dock
Vicia spp./ *Lathyrus* spp.	-	30E	vetch/ vetchling
Medicago sp./ *Melilotus* sp./ *Trifolium* sp.	-	1	medick/ melilot/ clover
cf. *Conopodium majus* (Gouan) Loret - tuber	-	1	possible pignut
cf. *Daucus carota* L.	1	-	possible carrot
cf. *Torillus* sp.	1	-	possible hedge-parsley
Galium spp.	-	17E	bedstraw
ASTERACEAE - *Anthemis* sp./ *Tripleurospermum* sp. - sized internal structure	1	-	Daisy Family – chamomile/ mayweed type
Avena sp. - floret base	-	1	oat
Avena spp. - awn fragments	+	+	oat
Bromus spp.	-	1	brome
cf. *Lolium* spp. type	27E	-	possible rye-grass type
POACEAE - small-sized caryopsis	6	11	Grass Family
POACEAE - medium-sized caryopsis	24	1	Grass Family
POACEAE - large-sized caryopsis	-	6	Grass Family
cf. POACEAE - stalk	1	+	Possible Grass Family
Unidentified	13E	2	-
Unidentified - bud scar (? Herbaceous plant)	-	-	-
Unidentified - tuber fragments	-	2	-
Unidentified - highly vitreous objects (? Clinker)	-	++++	-
Unidentified - high vitreous objects (?plant)	+	-	-
TOTAL	143	104	

Nomenclature follows Zohary and Hopf (2000) for cultivated plants and Stace (1997). Key: + = <5, ++ = 5 - 10, +++ = 10 - 50, ++++ = 50 - 100 and +++++ = >100. NE = estimate count of whole items based on fragments. Data based entirely on the flot and in all cases 100% of the flot was sorted.

of cereal chaff were recovered. However, a complete spelt (*Triticum spelta* L.) spikelet fork was noted.

These results are quite different from those elsewhere in Cirencester where cereal grain often dominates (eg the Kingscote corn-drier (Giorgi 1998); *Corinium* (Connolly 1982); Frocester Court Roman villa (Clarke 1970); or Upton St Leonards (Clarke 1971)), all of which had very distinct weed floras. However, it is likely that if this sample was indeed related to a funerary pyre, then this is in fact a sample of burnt grass or turves rather than weeds of crop and could explain the discrepancy with other Roman samples, which are frequently associated with corn-driers or crop processing wastes.

Conclusions

Sampling for archaeobotanical remains was relatively intensive at Kingshill North, with 117 samples collected from the 4.5 hectare excavations. Only eight samples, containing moderate densities of plant remains and of archaeological significance, merited further analysis. In general, preservation was poor, but this may be related to the shallow deposition of charred plant remains on agricultural or gardening lands that were likely to be subjected to ploughing or tilling action. Certainly the majority of samples assessed from the site contained modern root, which suggests that they were located at or immediately below modern topsoil levels. However, this trend for poorly preserved plant remains recovered in low densities clearly is not limited to the site and appears to be the case for the immediate region.

One question that remains is whether the cultivation of spelt wheat replaced the cultivation of emmer in this region during later prehistory or whether spelt was merely cultivated alongside emmer. To have a chance of addressing this, it is strongly recommended that samples of no less than 40 litres in volume are collected from any future excavations in this region. The limited evidence from Roman Cirencester, with only one or two samples examined from earlier excavations, means that data gathered from the Roman periods as well as prehistoric periods is of regional importance for this area. Indeed, van der Veen (2007, 204) recommends that a minimum sample volume of 40-60 litres of sediment should be collected and this certainly seems appropriate in cases where a region has produced relatively little Roman archaeobotanical data.

Table 40: Radiocarbon dates

Phase	*Feature*	*Material*	*Lab code*	*δ^{13}C (‰)*	*C14 Age BP*	*Calibrated date (2σ)*
1	Context 8089, pit 8064	Antler fragment	NZA-33477	-23.3	4096 ± 25	2856 cal BC-2809 cal BC (20.8%) 2748 cal BC-2721 cal BC (6.3%) 2698 cal BC-2571 cal BC (67.4%)
1	Context 9102, pit 9100	Charred nutshell	NZA-33150	-23.6	4096 ± 30	2859 cal BC-2807 cal BC (20.8%) 2755 cal BC-2718 cal BC (8.6%) 2703 cal BC-2568 cal BC (63.8%) 2513 cal BC-2500 cal BC (1.9%)
1	Context 8098, pit 8100	Charred nutshell	NZA-33140	-25.1	4109 ± 30	2863 cal BC-2804 cal BC (23.7%) 2759 cal BC-2673 cal BC (71.3%)
1	Context 9097, pit 9096	Charred nutshell	NZA-33151	-26.9	4182 ± 30	2886 cal BC-2834 cal BC (22%) 2815 cal BC-2665 cal BC (72.9%)
1	Context 9101, pit 9100	Charred nutshell	NZA-33224	-23	4415 ± 25	3261 cal BC-3244 cal BC (3.6%) 3100 cal BC-2922 cal BC (91.2%)
2	Skeleton 1903	Human bone	OxA-20188	-20.21	3187 ± 26	1502 cal BC-1415 cal BC (95.4%)
2	Skeleton 1403	Human bone	OxA-20186	-21.53	3718 ± 29	2201 cal BC-2031 cal BC (95.4%)
2	Skeleton 8656, grave 8588	Human bone	OxA-20184	-21.29	3830 ± 29	2458 cal BC-2418 cal BC (5.3%) 2407 cal BC-2376 cal BC (6.3%) 2367 cal BC-2363 cal BC (0.4%) 2351 cal BC-2198 cal BC (82.1%) 2163 cal BC-2152 cal BC (1.4%)
3	Context 8948, pit 8851	Bird bone	NZA-33476	-20.2	2264 ± 25	394 cal BC-349 cal BC (46.3%) 296 cal BC-209 cal BC (48.8%)
3	Context 8142, pit 8143	Charred grain	NZA-33147	-22.6	2266 ± 30	396 cal BC-348 cal BC (43.5%) 302 cal BC-208 cal BC (51.3%)
4a	Skeleton 1104, grave 1102	Human bone	OxA-20187	-20.82	1976 ± 26	41 cal BC-cal AD 75 (95.4%)
4a	Context 8985, ditch 8907, group 8563	Charred grain	NZA-33149	-22.6	2012 ± 30	90 cal BC-cal AD 64 (95.1%)
4b	Skeleton 8724, grave 8723	Human bone	OxA-20185	-20.1	2083 ± 26	181 cal BC-41 cal BC (95.4%)
4e	Context 8228, grave 8227	Charred grain	NZA-33144	-24.3	1834 ± 30	cal AD 86-247 (95%)

Radiocarbon dating *Edward Biddulph*

A total of five radiocarbon dates were initially obtained from skeletons uncovered during the evaluation and excavation. These dates were calculated by the University of Oxford Radiocarbon Accelerator Unit (lab code OxA), and the results are presented above by phase (Table 40). Nine further dates, also shown in Table 40, were obtained from seeds, animal bone and nutshell by the Rafter Radiocarbon Laboratory, Institute of Geological and Nuclear Sciences Ltd (lab code NZA). The uncalibrated dates are in radiocarbon years BP (Before Present – AD 1950) using the half life of 5568 years. Calibration was achieved using IntCal04 atmospheric data (Reimer *et al.* 2004).