Chapter 4: The Environmental Evidence

THE ANIMAL BONES
by Kathy Ayres and Dale Serjeantson

Introduction

A total of 6931 animal bones was recovered from 12th- to 17th-century deposits in the 1984 excavations, and these were identified, recorded and analysed by Bruce Levitan and Bob Wilson. An additional large group of 18th-century horse bones (about 3000) from the 1984 excavations was recorded by Bob Wilson. A paper on butchery at the palace has since been published (Wilson and Edwards 1993).

Another 267 animal bones were recovered from the later excavations and have been identified and recorded by Dr J Mulville at the Faunal Remains Unit, University of Southampton. Measurements were taken after von den Driesch (1976), and the age stages of cattle, sheep and pig were taken from Payne (1973), Halstead (1985) and O'Connor (1988), respectively. The bones recovered from the later excavations have been added to the earlier group, and all the data (7198 bones) were analysed. Conclusions reached in the report by Levitan and Wilson are included in this report.

Animal bone was recovered from all periods of occupation from the first half of the 12th century (Period 3) onwards. From some periods the data was sparse, and therefore only those periods which provided significant quantities of mammal bone have been included in the analysis of the bones reported upon here. These are Periods 5, 6, 7 and 9, ranging from the late 12th/early 13th century through to post-medieval. A total of 6401 bones (89% of the total assemblage) is dealt with here. The discussion of birds and fish includes bones from Period 8 (15th and 16th centuries) due to the larger quantity of material. The few bones from other periods were mainly recovered during the first year of excavation and can be found in the archive report by Levitan and Wilson.

Taphonomy

There is very little evidence of burning or gnawing on the bones from any period. Of the 34 bones with evidence of gnawing, 21 are dated to the post-medieval period, and are mostly from cattle and ovicaprids (Table 4.1). Other species which showed signs of gnawing are pig, dog, fallow deer, rabbit and badger. Twenty six bones show evidence of burning; 22 were unidentified mammal bones, but 4 were from sheep/goat in Period 9 (Table 4.2).

Summary of the animal bones from period 5 – late 12th and early 13th centuries

Main domesticates

The assemblage from Period 5 dated from the late 12th to early 13th century and consisted of 1342 bones, nearly 500 (37%) of which were identifiable to species (Table 4.3). These were mainly recovered from the east garderobe, courtyard, Solar Tower and North Range. Cattle, sheep/goat and pig dominate the assemblage and of these, pig is the most numerous, making up half of the recorded fragments of the three species. Sheep/goat account for just over a third of the fragments and the proportion of cattle is low.

There are few cattle bones, but most parts of the body are present (Table 4.4). The single available jaw can be aged to a very young animal of less than one month old (Table 4.5). The fusion data suggests that most of the cattle consumed were slaughtered between the ages of two to four years (Table 4.8).

Within the sheep/goat assemblage the prime meat bones are the most prevalent, with few fragments of the head and feet present (Table 4.4). Lambs are indicated by four jaws all aged to under one year (Table 4.6), and by the fusion data with deaths within the first and second years of life (Table 4.9). Older animals aged over three and four years are also represented. A single sheep pelvis can be sexed and is male.

Although most parts of the pig skeleton are represented in the assemblage, the most numerous elements are parts of the head, and perhaps indicate the consumption of brain, tongue, etc. Other meat bearing bones are present, and a high frequency of metapodials was also noted, perhaps indicating the presence of the whole carcass on site (Table 4.4). Dental data is limited, but the available mandibles ranged from immature to adult, with four out of the six being aged as subadult (Table 4.7). The fusion evidence suggests animals which had not yet reached full maturity (Table 4.10) with the majority of bones unfused or just fusing.

Horse and dog were found, but fewer than 10 bones each. Both kittens and cats were identified. A partial cat skeleton, together with two adult and two foetal cat humerii were excavated from the infill of the Solar Tower.

Wild species

Three species of deer, red, fallow and roe were identified in the assemblage, with red being the most

Table 4.1 Animal bone: Gnawed fragments.

Period	5	6	7	9
Species				
Dog	1	0	0	0
Cattle	0	3	0	8
Sheep/goat	0	2	2	9
Pig	0	3	1	0
Fallow deer	0	1	0	2
Rabbit	0	0	0	1
Badger	0	0	0	1
Total	1	9	3	21

Table 4.2 Animal bone: Fragments showing signs of burning.

	Sheep/goat	Mammal
Period		
5	0	4
6	0	7
7	0	1
9	4	10
Total	4	22

frequent. A number of hare bones from several individuals were recovered from the infill of the Solar Tower. The evidence suggests that the Bishop or his representative were hunting game. The ratio of wild to domestic species is the highest in this period. Two rabbit bones were identified from layer 471, although being a burrowing animal the bones may be intrusive.

Table 4.3 Animal bone: Number of Identified Species Present (NISP).

Period	5	6	7	9
Species				
Cattle	48	158	87	135
Sheep/goat	119	234	431	300
(Sheep	0	0	0	2)
(Goat	3	0	0	1)
Pig	167	196	72	91
Red deer	5	7	0	2
Fallow deer	3	18	10	40
Roe deer	1	2	0	3
Hare	52	1	5	2
Rabbit	3	1	0	10
Horse	7	22	10	81
Dog	10	1	5	79
Cat	64	11	70	9
Badger	0	0	0	4
Hedgehog	1	0	0	0
Rodent	1	1	0	0
Mole	0	0	1	0
Common shrew	2	0	0	0
House mouse	11	0	0	0
Water vole	1	0	0	0
Rat	2	0	4	0
Frog	0	0	1	0
Subtotal	*497*	*652*	*696*	*756*
Cow sized	0	2	0	0
Sheep sized	0	2	0	3
Unid. Mammal	845	1157	803	988
Total	1342	1813	1499	1747

NB Sheep and goat bones included in sheep/goat totals.

Summary of the animal bones from period 6 – mid-late 13th century

Main domesticates

A total of 1813 fragments of animal bone was recovered, mainly from the courtyard, moat and North Range (though the last of these went out of use early in this period). Of this total 652 bones (36%) were identified to species. The three main domesticates again dominate the assemblage, but pig bones are no longer the most prevalent, sheep bones being most numerous. Pig is the second most numerous species according to fragment count, and the fall in its relative proportion is compensated by a rise in the number of cattle bone fragments.

Parts of the head and feet of cattle are present, but again it is bones from the main trunk of the body which are the most frequent (Table 4.11). A calf was identified from a jaw, aged between 1–8 months (Table 4.5), and from a neonatal metatarsal. There is a higher proportion of fused bones than in the previous period, indicating that some of the animals consumed were mature (Table 4.12).

As in the previous period prime meat bones dominate the sheep/goat assemblage; head and foot bones are present, but in lower quantities (Table 4.11). The fusion evidence reveals the presence of one neonatal lamb, but there is no evidence for others under the age of one year (Table 4.13). A high proportion of fused bones suggests that more sheep were slaughtered for consumption between three and four years, with one mandible aged between four to six years (Table 4.6).

Parts of the head again form a large part of the pig assemblage. Other parts of the body were recorded and of these, scapula and tibia are frequent (Table 4.11). Juvenile and subadult animals are represented in the dental data (Table 4.7), and the fusion data provide evidence of animals slaughtered within their second year of life as well as some reaching the ages of three to four years (Table 4.14).

Seven horse bones were recorded, mostly from the moat fills. Only one dog bone, a tibia, has been identified, and eleven bones of cat, mostly from layers in the courtyard.

Table 4.4 Animal bone: Period 5, anatomical elements present.

	Cattle	Sheep/goat	Pig
Element			
Skull	4	7	24
Mandible	5	7	14
Teeth	0	5	22
Atlas	1	0	1
Scapula	4	8	6
Humerus	2	9	3
Radius	1	12	3
Ulna	1	7	14
Metacarpal	1	3	12
Pelvis	4	10	6
Femur	3	8	1
Tibia	4	13	7
Metatarsal	1	6	25
Astragalus	2	1	1
Calcaneum	1	2	2
1st ph	1	4	6
2nd ph	0	0	3
3rd ph	0	0	2
Tarsal	1	0	0
Cerv. vert	0	1	0
Thor. vert	3	1	1
Vertebra	9	15	14
Total	48	119	167

Table 4.5 Animal bone: Cattle dental data (age at death after Halstead 1985).

Period	5	6	7	9
Age				
0–1 mo.	1	0	0	0
1–8 mo.	0	1	0	0
>18–36 mo.	0	0	0	0
30–36 mo.	0	0	0	1
Adult	0	0	0	1
Total	1	1	0	2

Table 4.6 Animal bone: Sheep/goat dental data (after Payne 1973).

Period		5	6	7	9
Stage	*Age*				
A	0–2 mo.	0	0	0	0
B	2–6 mo.	3	0	1	0
C	6–12 mo.	1	0	0	0
> D	1–2 yrs	0	0	0	2
E	2–3 yrs	0	0	0	1
F	3–4 yrs	0	0	0	2
G	4–6 yrs	0	1	1	2
Total		4	1	2	7

Table 4.7 Animal bone: Pig dental data (after O'Connor 1988).

Period	5	6	7	9
Age				
Juvenile	0	1	0	0
Immature	1	0	0	0
Subadult	4	5	7	2
Adult	1	0	0	1
Total	6	6	7	3

Table 4.8 Animal Bone: Period 5, fusion data for cattle.

	Element	Fused	Unfused
	Humerus D	2	0
Subtotal < 2 yrs		*2*	*0*
	Metacarpal D	1	0
Subtotal < 3 yrs		*1*	*0*
	Femur D	0	1
	Ulna P	1	0
	Tibia P	0	1
Subtotal < 4 yrs		*1*	*2*

(P = Proximal D = Distal).

Table 4.9 Animal bone: Period 5, fusion data for sheep/goat.

	Element	Fused	Unfused	Fusing
	Humerus D	3	2	0
	Radius P	1	0	0
Subtotal < 2 yrs		*4*	*2*	*0*
	Tibia D	3	1	0
	Metacarpal D	0	2	0
	Metatarsal D	1	2	0
Subtotal < 3 yrs		*4*	*5*	*0*
	Humerus P	2	0	0
	Femur P	1	0	0
	Femur D	1	0	1
	Ulna P	1	2	0
	Radius D	1	1	0
Subtotal < 4 yrs		*6*	*3*	*1*

(P = Proximal D = Distal).

Wild species

Red, fallow and roe deer were all recorded. Fallow is the most frequent with 18 bone fragments, whilst red and roe have 7 and 6 fragments respectively. A single hare bone was recorded, and a single rabbit bone from the East Range was identified.

Table 4.10 Animal bone: Period 5, fusion data for pig.

	Element	Fused	Unfused	Fusing
	Radius P	1	1	0
Subtotal < 1 year		*1*	*1*	*0*
	Metapodial D	0	1	1
	Tibia D	2	3	0
Subtotal < 2 yrs		*2*	*4*	*1*
	Femur D	0	1	0
	Ulna P	0	1	1
	Radius D	0	2	0
	Tibia P	0	1	0
Subtotal < 4 yrs		*0*	*5*	*1*

(P = Proximal D = Distal).

Table 4.11 Animal bone: Period 6, anatomical elements present.

	Cattle	Sheep/goat	Pig
Element			
Skull	6	6	32
Nasal	0	1	0
Mandible	12	12	39
Teeth	16	13	32
Atlas	0	1	1
Scapula	11	17	12
Humerus	9	16	7
Radius	6	27	9
Ulna	1	4	9
Metacarpal	3	8	5
Carpal	2	1	1
Pelvis	14	18	2
Femur	11	8	4
Tibia	19	43	11
Metatarsal	7	14	14
Astragalus	7	2	3
Calcaneum	7	1	4
Tarsal	1	1	0
1st ph	4	8	3
2nd ph	2	0	0
3rd ph	2	2	0
Cerv. vert	0	2	0
Thor. vert	0	1	4
Vertebra	18	28	4
Total	158	234	196

Table 4.12 Animal bone: Period 6, fusion data for cattle.

	Element	Fused	Unfused	Fusing
	Scapula	1	0	0
Subtotal < 1 year		*1*	*0*	*0*
	Humerus D	2	0	0
Subtotal < 2 yrs		*2*	*0*	*0*
	Tibia D	4	3	1
	Metacarpal D	1	1	0
	Metatarsal D	1	0	0
Subtotal < 3 yrs		*6*	*4*	*1*
	Humerus P	1	1	0
	Calcaneum	0	1	0
	Femur P	1	1	0
	Femur D	0	1	0
	Tibia P	2	1	0
Subtotal < 4 yrs		*4*	*5*	*0*

Table 4.13 Animal bone: Period 6, fusion data for sheep/goat.

	Element	Fused	Unfused	Neonatal
	Scapula	3	0	0
Subtotal < 1 year		*3*	*0*	*0*
	Humerus D	7	1	0
	Radius P	7	0	0
Subtotal < 2 yrs		*14*	*1*	*0*
	Tibia D	8	1	0
	Metacarpal D	4	1	0
	Metatarsal D	2	2	1
Subtotal < 3 yrs		*14*	*4*	*1*
	Femur P	0	2	0
	Femur D	0	2	0
	Ulna P	0	1	0
	Radius D	1	2	0
	Tibia P	1	1	0
Subtotal < 4 yrs		*2*	*8*	*0*

Summary of the animal bones from period 7 – 14th century

Main domesticates

Nearly 1500 bones were recovered from the 14th-century contexts, of which 696 (46.5%) could be identified to species. Sheep/goat bones are dominant in the assemblage and account for nearly three quarters of the fragment count for the three main domesticates. The counts for cattle and pig at 15% and 12% (respectively) are again similar.

All parts of the cattle skeleton are present (Table 4.15), and the majority of the recorded fragments come from the meatier bones from the main trunk of the body. No jaw could be aged and the limited fusion evidence suggests that animals were slaughtered in their second or third years (Table 4.16).

Table 4.14 Animal bone: Period 6, fusion data for pig.

	Element	Fused	Unfused	Fusing
	Humerus D	3	0	1
	Radius P	5	0	0
Subtotal < 1 year		*8*	*0*	*1*
	Metapodial D	0	5	0
	Tibia D	0	3	0
Subtotal < 2 yrs		*0*	*8*	*0*
	Calcaneum	1	1	0
Subtotal < 3 yrs		*1*	*1*	*0*
	Femur P	0	2	0
	Ulna P	1	1	0
	Radius D	1	3	0
	Humerus P	0	0	1
	Tibia P	0	2	1
Subtotal < 4 yrs		*2*	*8*	*2*

Table 4.15 Animal bone: Period 7, anatomical elements present.

	Cattle	Sheep/goat	Pig
Element			
Skull	3	5	9
Nasal	0	0	0
Mandible	1	8	8
Teeth	5	7	14
Atlas	1	0	1
Axis	0	1	0
Scapula	5	7	3
Humerus	2	4	5
Radius	5	8	3
Ulna	1	2	4
Metacarpal	4	49	6
Pelvis	8	11	5
Femur	3	8	2
Tibia	11	20	4
Fibula	0	0	1
Metapodial	0	1	0
Metatarsal	4	45	0
Astragalus	2	3	0
Calcaneum	5	0	1
Tarsal	11	23	0
1st ph	1	75	1
2nd ph	5	42	1
3rd ph	0	33	3
Cerv. vert	0	0	0
Thor. vert	0	14	0
Lumbar vert	1	7	0
Sacrum	1	1	0
Caudal vert	0	49	0
Vertebra	8	8	1
Total	87	431	72

Table 4.16 Animal bone: Period 7, fusion data for cattle.

	Element	Fused	Unfused
	Humerus D	0	0
	Radius P	1	0
Subtotal < 2 yrs		*1*	*0*
	Tibia D	2	1
	Metacarpal D	2	0
	Metatarsal D	2	1
Subtotal < 3 yrs		*6*	*2*
	Humerus P	0	1
	Femur P	0	1
	Radius D	1	1
	Tibia P	1	0
Subtotal < 4 yrs		*2*	*3*

Table 4.17 Animal bone: Period 7, fusion data for sheep/goat.

	Element	Fused	Unfused
	Scapula	1	0
Subtotal < 1 year		*1*	*0*
	Humerus D	2	0
	Radius P	2	0
Subtotal < 2 yrs		*4*	*0*
	Tibia D	7	0
	Metacarpal D	16	6
	Metatarsal D	14	8
Subtotal < 3 yrs		*37*	*14*
	Humerus P	1	0
	Femur P	2	0
	Radius D	1	0
	Tibia P	1	0
Subtotal < 4 yrs		*5*	*0*

The sheep/goat bone assemblage comprises a very high proportion of metatarsals and phalanges (Table 4.15) and probably originated as other than food waste. The majority of the sheep/goat metapodials and phalanges were excavated from the backfilling of the cellar in the West Block and from a robber trench of the west wall of the North Range. Both lambs and sheep were recorded, and a mandible is aged to under six months (Table 4.6) and fused bones indicate ages of three years and older (Table 4.17). A second mandible is aged between four to six years.

Although the high proportion of bones from the head of the pig continues in this period, many long bones are also present, but few feet (Table 4.15).

Table 4.18 Animal bone: Period 7, fusion data for pig.

	Element	Fused	Unfused	Neonatal
	Humerus D	1	0	1
	Radius P	2	0	0
Subtotal < 1 year		*3*	*0*	*1*
	Metapodial D	0	1	0
	Tibia D	0	0	1
Subtotal < 2 yrs		*0*	*1*	*1*
	Calcaneum	0	1	0
Subtotal < 3 yrs		*0*	*1*	*0*
	Femur P	0	0	1
	Femur D	2	0	1
	Humerus P	0	0	1
	Tibia P	0	0	1
Subtotal < 4 yrs		*2*	*0*	*4*

NB in Period 7 both ends of the bone are recorded as being neonatal.

The presence of piglet was recorded with three neonatal bones, whilst all seven mandibles can be aged as subadult (Table 4.7), and the limited fusion evidence provides an age range of one to three years (Table 4.18).

Some horse and dog bones are present. The recorded cat bones (70 in total) include the skulls of 10 individuals; ageing based on mandibles indicates eight juveniles and one subadult. Again the vast majority were recovered from the infill of the cellar in the West Block.

Wild species

The proportion of wild species in the assemblage is at its lowest in this period, with only fallow deer and hare identified.

Summary of the animal bones from period 9 – 17th and 18th centuries

Main domesticates

A total of 1747 bones was recovered, of which 756 (43.8%) were identified to species. Sheep/goat continues to dominate the assemblage in the post-medieval period. The proportion of this species falls by comparison with the previous period, but remains high at nearly 50% of the three main domestic species. The proportion of cattle is higher and that of pig lower.

The cattle assemblage continues to be dominated by bones from the main trunk of the body, with few heads or feet (Table 4.19). There was little fusion evidence for those dying before their third year, with the fused bones indicating ages of about four years (Table 4.20). Two mandibles were found and are

Table 4.19 Animal bone: Period 9, anatomical elements present.

	Cattle	Sheep/goat	Pig
Element			
Horn core	0	3	0
Skull	5	3	15
Zygomatic	1	0	2
Nasal	0	1	1
Atlas	0	0	1
Axis	0	1	0
Mandible	5	13	8
Teeth	12	8	11
Scapula	11	9	6
Humerus	9	18	6
Radius	13	19	1
Ulna	1	7	5
Metacarpal	2	14	1
Pelvis	22	7	11
Femur	9	8	5
Tibia	12	30	8
Metapodial	0	1	3
Metatarsal	7	25	1
Astragalus	3	1	0
Calcaneum	3	1	2
Tarsal	1	10	0
1st ph	4	5	2
2nd ph	2	2	0
3rd ph	2	2	0
Cerv. vert	0	1	1
Thor. vert	3	0	0
Lumbar vert	2	0	0
Sacrum	0	1	1
Caudal	0	3	0
Vert	6	7	0
Total	135	200	91

Table 4.20 Animal bone: Period 9, fusion data for cattle.

	Element	Fused	Unfused
	Scapula	3	0
Subtotal < 1 year		*3*	*0*
	Humerus D	1	1
	Radius P	3	0
Subtotal < 2 yrs		*4*	*1*
	Tibia D	5	0
Subtotal < 3 yrs		*5*	*0*
	Humerus P	0	1
	Femur P	3	0
	Femur D	1	1
	Radius D	0	3
	Tibia P	0	2
Subtotal < 4 yrs		*4*	*7*

Table 4.21 Animal bone: Period 9, fusion data for sheep/goat.

	Element	Fusing	Fused	Unfused
	Scapula	0	0	1
Subtotal < 1 year		*0*	*0*	*1*
	Humerus D	0	14	0
	Radius P	0	7	0
Subtotal < 2 yrs		*0*	*21*	*0*
	Tibia D	2	7	1
	Metacarpal D	0	7	1
	Metatarsal D	0	13	2
Subtotal < 3 yrs		*2*	*27*	*4*
	Femur P	1	0	0
	Femur D	1	0	0
	Radius D	0	2	1
	Tibia P	2	1	0
Subtotal < 4 yrs		*4*	*3*	*1*

aged at over three years (Table 4.5). A pelvis has been sexed as female.

The assemblage of sheep/goat bones from the post-medieval period is mostly long bones, with few fragments of the skull, but several metatarsals and tarsals are present (Table 4.19). All mandibles were recorded as over the age of one year, with four being over the age of three years (Table 4.6). The majority of bones are fused up to the age of approximately three years (Table 4.21). There is some evidence for animals living beyond this age. A single pelvis could be sexed as male.

In addition to the large number of skull fragments and teeth in the pig bone assemblage, the meatier bones are numerous (Table 4.19). The ageing data includes evidence for pigs dying within their first and second years (Table 4.22), and three mandibles can be aged as subadult and adult (Table 4.7).

Table 4.22 Animal bone: Period 9, fusion data for pig.

	Element	Fused	Unfused	Fusing
	Humerus D	1	1	2
	Radius P	1	0	0
	Scapula	0	0	4
Subtotal < 1 year		*2*	*1*	*6*
	Metapodial D	1	1	1
	Tibia D	0	0	2
Subtotal < 2 yrs		*1*	*1*	*3*
	Femur P	0	0	2
	Femur D	1	0	2
	Ulna P	1	2	0
	Tibia P	0	1	2
Subtotal < 4 yrs		*2*	*3*	*6*

A substantial quantity of horse bones were recorded in this period and a separate report on these has been published by Wilson and Edwards (1993). There are also at least eight individual dogs from robber trenches and from a pit inside the Solar Tower. There is a small quantity of cat bones, mostly from the infill of the garderobe in the West Block (context 487).

Wild species

Fallow, red and roe deer are all present with fallow again the most frequently identified with 40 fragments of bone. A few fragments of hare have been identified and the consumption of rabbit may be indicated by its presence in the garderobe. A badger skull, jaw and pelvis fragments were also recovered from the infill of the garderobe in the West Block.

Butchery

Butchery evidence was limited and is summarised in Table 4.23. Chop and cut marks were found on cattle, sheep, pig, red and fallow deer and dog. Most of the butchery marks have been recorded on the meatier bones of both the domestic and the wild species, and therefore could be evidence of processing of the carcasses for consumption. Exceptions to this include a red deer antler with evidence of chopping from a Period 5 context and a chop mark on a dog tibia in the post-medieval period; the former may suggest bone and/or antler working. The eight bones from Period 7 which show signs of butchery are all from sheep/goat lower legs, and include seven metacarpals and an astragalus.

The butchery evidence mainly indicates the secondary processing of the carcass. There is little evidence either here or in the assemblage as a whole for heads or feet of cattle, suggesting either that no slaughtering or primary butchery was carried out on site or that the waste was disposed of elsewhere.

Small mammals

Small mammals were recovered by hand-picking and also by sieving. A hedgehog *(Erinaceus europaeus L.)*

Table 4.23 Animal bone: Butchery evidence.

Period	5	6	7	9
Species				
Cattle	0	3	0	10
Sheep/goat	0	2	8	9
Pig	0	2	0	0
Dog	0	0	0	1
Red deer	2	0	0	0
Fallow deer	0	0	0	2
Total	2	7	8	22

humerus was identified in the 12th-century assemblage, and mole *(Talpa europaea)* in the post-medieval period. Both these species were also identified at Faccombe Netherton (Sadler 1990) where they had been trapped in a garderobe pit, and at West Cotton (Albarella and Davis 1994). A small number of rodents was also identified: water vole from the east garderobe (context 142) in Period 5 and black rat from infill layers and other spreads from Periods 5 and 7. Two other fragments of rodent bones were recorded from Periods 5 and 6, but cannot be identified to species. Black rat is not commonly found but there is evidence of the species far inland by the end of the Roman period (Armitage 1994), and it was recorded at St.Ebbe's (Wilson *et al.* 1989) in nearby Oxford, and from Saxon contexts at Faccombe Netherton (Sadler 1990).

Sieved material

Material from a small proportion of contexts was sieved and only two, both from Period 5, yielded animal bones. House mouse and common shrew were recovered from the fill of the east garderobe (context 142) and a pig metatarsal was found in the sieved material from a burnt layer in the East Range (context 300). These have been included in Table 4.3.

Measurements

The majority of measurable bones are of sheep/goat, the quantity of metapodials in particular allowing for withers heights to be calculated (Table 4.24). The formula used is that of Teichert, quoted in von den Driesch and Boessneck (1974). The ranges and means of the withers heights fall within those calculated for other sites of the period, such as Castle Mall in Norwich (Albarella *et al.* 1997) and Launceston (Albarella 1997). At Castle Mall the increase of sheep withers heights over time was investigated. The increase in size from medieval to post medieval times is thought to be due to a change from sheep kept primarily for wool to sheep bred for meat, where a larger body mass was needed. This increase started in Launceston from the 15th century. Although the mean value of distal tibia breadth increases at the Mount House (Table 4.25), as at Castle Mall, the mean values for withers heights falls. The sample from the Mount House is, however, small. No withers heights could be calculated for cattle or pig.

Table 4.24 Animal bone: Withers heights calculated for sheep/goat.

Bone	Period	Range	Mean	N
Metacarpal	6	562–571	567	3
	7	513–606	542	10
	9	502–558	547	8
Metatarsal	7	481–617	541	7
	9	468–598	526	14

Table 4.25 Animal bone: Distal breadth of tibia for sheep/goat.

Period	Range	Mean	N
5	240–250	230	2
6	230–300	251	7
7	230–280	251	7
9	230–290	265	4

Bird remains

Most of the bird bones present were recovered by hand and a few were present in the samples taken for sieving (Table 4.26). The quantity is small when compared with the fish bones. The majority of bird bones are from the North Range. The sieved samples are from the fills of east and north-west garderobes (contexts 111 and 142 and context 658 respectively), the courtyard (context 617) outside the North Range, the East Range (context 150) and part of the fill (context 554) of the North Range garderobe pit which was infilled prior to the construction of the West Range.

As might be expected, domestic fowl *(Gallus gallus)* are predominant in all periods, with goose, probably domestic goose *(Anser anser)*, the next most frequent species. Many of the goose long bones and some of the domestic fowl long bones bear cut marks. Four bones of pigeon *(Columba sp.)* may be from the wild rock or the stock dove, but are more likely to be domestic. There is no mallard *(Anas platyrhynchos)* or domestic duck.

The wild birds include two smaller ducks, teal *(Anas crecca)* and another identified as garganey *(Anas querquedula)*. Other water fowl present are: cormorant *(Phalacrocorax carbo)*, which summer around the coast, but are found inland in winter, swan *(Cygnus sp.)* and grey heron *(Ardea cinerea)*.- Heron *(Ardea cinerea)* is usually caught by hawking, and both this and swan were considered as delicacies. Other species present that were caught for consumption by hawking or trapping are the partridge *(Alectoris sp.)*, woodcock *(Scolopax rusticola)* and redwing *(Turdus iliacus)*. The proportion of wild birds is high particularly in the late 12th and 14th centuries (Periods 5 and 7).

Two sparrowhawk (*Accipiter nisus*) bones were recovered from Period 7; these were the only raptor bones recovered. The sparrowhawk is a small hawk, and if kept as a sporting bird was for children or individuals of low status. The bishop and the individuals in his immediate entourage would have used larger hawks.

Some bird bones such as those of sparrow *(Passer sp.)*, starling *(Sturnus vulgaris)*, jackdaw and rook *(Corvus frugilegus)* may be from birds that lived around the site, and were either caught by cats or died at the site of natural causes.

Table 4.26 Animal bone: Bird remains (hand retrieved and sieved).

	Period 5 AD1175–1225		Period 6 13th century	Period 7 14th century		Period 8 15th century
	Hand	*Sieved*	*Hand*	*Hand*	*Sieved*	*Hand*
Species						
Domestic fowl	13	8	33	40	2	21
Goose (cf dom.)	5	0	8	12	0	4
Cormorant	0	0	0	1	0	0
Grey heron	0	0	0	1	0	0
Swan	2	0	0	0	0	0
Teal	0	0	0	1	0	0
Garganey	0	0	0	1	0	0
Sparrowhawk	0	0	0	0	2	0
Partridge	0	0	0	1	0	0
Woodcock	0	0	0	1	0	0
Pigeon/dove	0	0	0	4	0	0
Redwing	0	0	0	0	1	0
Sparrow	0	2	0	0	1	0
Starling	0	0	2	0	0	0
Jackdaw	0	0	0	0	0	1
Rook	2	0	2	0	0	0
Subtotal	*22*	*10*	*45*	*62*	*6*	*26*
Unid.	9	2	17	28	10	10
Total	31	12	62	90	16	36

Fish remains

Most of the fish bones recovered are from sieved samples, but some were recovered by hand (Table 4.27). The samples were taken from the east garderobe (context 142), from the garderobe (context 658) at the north-west corner and from the infill (context 554) of the garderobe pit, also at the north-west corner.

The bones of large marine fish such as cod *(Gadus morhua)* and ling *(Molva molva)*, which were salted and dried and traded as preserved fish (stockfish), would be expected to be recovered by hand sorting; these were identified in Periods 5 and 8. Ling becomes more common in the late and post medieval periods on other sites in southern England (Serjeantson and Locker, ND).

The other marine fish, here bass *(Dicentrarchus labrax)* and flatfish, were a delicacy if, as is likely, they were eaten fresh. By the 12th century, fresh marine fish were available in local markets throughout England. The low ratio of marine to freshwater fish at the Mount House is paralleled at Eynsham Abbey (Serjeantson *et al.* forthcoming) and reflects the distance from the coast.

Herring *(Clupea harengus)* were normally preserved, and eels *(Anguilla anguilla)* may have been

Table 4.27 Animal bone: Fish remains (hand retrieved and sieved).

	Period 5 AD1175–1225				Period 6 13th century		Period 7 14th century	Period 8 15th century
	Hand	*Hand*	*Hand*	*Sieved*	*Hand*	*Sieved*	*Sieved*	*Hand*
Context	234	211	617	142	111	554	658	150
Species								
Eel	0	0	0	4	0	35	0	0
Herring	0	0	0	4	0	21	0	0
Pike	1	0	0	0	0	0	0	0
Cod	0	1	0	1	0	0	0	0
Ling	0	0	0	0	0	0	0	1
Bass	1	0	1	0	1	0	0	0
Flatfish	0	0	0	0	0	2	0	0
Subtotal	*2*	*1*	*1*	*9*	*1*	*58*	*0*	*1*
Unid.	0	0	0	15	0	0	16	0
Total	2	1	1	24	1	58	16	1

too. These species were the two most commonly eaten and are most often found in sieved samples from deposits with fish bones. At Witney, eel bones are more common than herring. Since eel bones are more robust, the higher number may be a consequence of better preservation. Pike (*Esox lucius*), especially large pike, were a delicacy and at the Mount House pike bones have been identified in 12th-century deposits.

The relative numbers of fish bones recovered cannot be taken to represent the relative quantities of fish consumed because loss of fish bones through taphonomic factors is much greater than for mammal bones or medium- and large-size birds. However, the range of fish is quite wide, and the quantity quite large, and this may reflect the fact that Witney belonged to a bishop, who would have eaten fish as part of his religious observances perhaps more often than a secular owner. By contrast, at Middleton Stoney castle (Levitan, 1984), which was in secular occupation, few fishbones were found in the garderobe even though bones of many small birds were present. Together the quantity and range of fish and bird bones are typical of a wealthy site.

Spatial analysis

Levitan and Wilson structured their report with an emphasis on spatial variation within the assemblage. The conclusions drawn from both the earlier report and the material from later excavations are discussed below.

There were differences in the deposits recorded from the interiors of buildings and external areas. Internal areas were characterised by smaller species, for example, the Solar Tower and East Range had high proportions of sheep/goat and other smaller species such as cat and hare. These areas were also characterised by kitchen or table waste such as small bones left in the meat during cooking or removed in preparation. Levitan and Wilson thought that the bias towards smaller bones in the infill layers of the Solar Tower was at least in part due to food scraps brought in by stray cats. These deposits are now thought to derive from an external midden, but this would be subject to picking over by cats and other animals, creating the same types of residue.

The fills of the garderobes contained mainly sheep and pig bones rather than larger cattle and horse bones. The garderobe fills are variously dated: context 142 to the late 12th century; context 658 to the 14th century, and context 487 to the 17th century. The deposits consisted of both table waste, comprising smaller bones, and butchery waste, comprising cattle metapodials, sheep and pig skull and lower limbs fragments. The indications are of a mixture of rubbish. Some small mammals were also identified; these had either crawled in up the outfall chutes or had fallen in and got trapped.

The majority of bones were recovered from external contexts and in particular from the courtyard areas. These areas contrasted with the internal areas in the higher proportion of cattle bones and greater range of species represented. These areas are less likely to have been cleared of rubbish than those inside the buildings and Levitan and Wilson described these as 'more typical castle deposits' because of the range of species and the presence of waste from kitchen preparation. Many of the courtyard deposits came from the North Range, which by the mid-13th century had gone out of use, and appears to have been used as a continuation of the courtyard for waste disposal and general dumping. These areas produced a mixture of waste including some table waste as well as earlier butchery waste. There was a mixture of cattle upper limbs and sheep upper and lower limbs, together with pig skull fragments and also a large proportion of sheep/goat metapodials and toes that were not food remains. The date of this material is 14th century. The moat assemblage also consisted mainly of horse and cattle bones.

The disposal of non-food species such as dog, cat and horse was concentrated within a few areas. These were mostly infill deposits, including those in the Solar Tower, in a cellar within the West Block and in robber trenches. Some bones of these species were also deposited in the moat.

Discussion

In all the main periods of activity the assemblage consisted of a mixture of primary occupation deposits such as floors and garderobes, and secondary dumped deposits connected with infilling or embanking. There was a shift in the location of the bones from the 12th century, when most bones came from the primary high status residential area (in and around the Solar Tower), to the 13th century when more bones came from the North Range and adjacent courtyard. This, however, produced surprisingly few changes in the character of the total site assemblage. The animal bones are characteristic of a high status site in a number of ways and this is seen most clearly in the assemblage from late-12th- to 13th-century deposits.

A high proportion of pig, which are kept primarily for meat, is a characteristic of high status sites. Pigs do not offer secondary products like cattle and sheep, and as a consequence they were only kept in large numbers by those who could afford animals purely for consumption. In the 12th century, pig accounted for a half of all fragments recorded from the three main domesticates and, although sheep replace pig as the most numerous species in later periods, the proportion of pigs remains high compared with other sites, especially urban sites in Oxford and Abingdon (Wilson 1975).

The age at which cattle and pig were slaughtered indicates animals of prime age and good quality meat. The presence of a very young calf in a 12th- to 13th-century context may indicate the consumption of veal, which is rare. There was no evidence from the bone assemblage for veal consumption at nearby Eynsham Abbey (Serjeantson *et al.* forthcoming).

Lamb was also being consumed from the 12th through to the 14th century. The meatier bones of the body were present for all three main domesticates (cattle, sheep and pig) suggesting prime cuts of meat through all periods. Within the pig assemblage, the proportion of head/skull fragments was high, perhaps suggesting the consumption of delicacies such as brain. Boar's head was eaten as a luxury and at feasts in the medieval period, and piglet bones identified in Period 7 (14th century) may be evidence of the consumption of suckling pig. In the medieval period most of the body was eaten, and Ryder (1984) lists the range of offal consumed including tripe, chitterlings (pigs intestines), cow heel and pig feet as well as sheep's head, lamb's tails and testicles.

The increase in the proportion of sheep can be fitted in to a general trend noted at other medieval sites. During the medieval period British wool was highly valued and fetched the highest prices and it was therefore economical to retain a higher proportion of sheep and to keep them to an older age, providing as many clips of wool as possible. Both the increase in the proportion of sheep over time and the older age of the animals are recognised at the Mount House. The large proportion of sheep/goat metapodials and phalanges in the 14th century (Period 7) may suggest that some whole animals were present on site in which case they may have been kept for their wool and eaten when old.

In the late 14th century the estate had begun breeding and selling sheep (and to a lesser extent cows) on a larger scale (Steane 1985, 180). The neonatal lambs and calves which have been identified in the medieval periods may be indicative of this breeding. They may also indicate that some milking took place on site. The dominant bones in the assemblage, however, are the prime meat bones, and if whole animals were present on site, and were slaughtered there, the primary butchery waste must have been disposed of elsewhere.

Food and drink formed a major item in the expenditure of the upper classes with households usually able to obtain supplies of fresh meat and fish throughout the year (Dyer, 1983). The hunting of deer was legally restricted to the wealthier classes as the deer of royal parks were prohibited to everyone bar the king and nobility. Many of the nobility also had their own parks, and the bishop had such a park at Witney, the existence of which is reflected in the high proportion of deer from the Mount House. Red deer was the most frequent in the 12th century, but from the mid-13th century onwards the proportion of fallow increased. By the 14th century, fallow was the only deer species present. This development is mirrored on other sites in the medieval period, with fallow becoming more common than red deer from the later Middle Ages and roe remaining scarce throughout (Grant 1988). The native species (red and roe deer) remained wild and appear to have been allowed to range beyond the park pale. Fallow deer were a Mediterranean species introduced by the Normans and suffered in hard English winters, and had to be given both food and shelter (Roberts 1988, 78–9). Gradually the native species were hunted to extinction, and the fallow deer, which were managed, were increasingly thrived and came to be relied upon. The medieval hunt was either the chase (on horseback, and always after red or roe deer) or the stable (shooting at fallow deer driven from butts). The bishops of Winchester indulged in both. Deer bone proportions drop in castle contexts in the late 15th and 16th centuries (Grant 1988) and even though this is so at the Mount House, the proportions remain high when compared to other sites.

Hare is commonly found on high status sites, for example at Faccombe Netherton where it was hunted and caught at every period. The bird and fish bones also suggest a varied diet. Both domestic birds and a high proportion of wild/game birds were recorded, including delicacies such as heron and swan. The high proportion of freshwater fish is similar to that of Eynsham Abbey, and delicacies such as freshwater pike, marine bass and flatfish were consumed. The freshwater fish probably came from the nearby river Windrush on which the Bishop controlled the fishing rights.

Dog remains are found frequently at some high status sites, and would have been used for hunting, herding, guarding and as pets. The dog bones from the Mount House were not measurable, and thus the size and likely role of the dogs cannot be established. The proximity of the bishop's park would suggest that the dogs might have been kept for hunting deer, as well as pets and guard dogs.

The cat and kitten skeletons recovered from the Solar Tower in the 12th century were thought by Levitan and Wilson to have been the remains of stray cats. The cats, however, could have been pets rather than strays, and may have been used to keep down the numbers of vermin. McCormick (1988) has suggested that in medieval times cats were exploited for their pelts, with a large number and variety of skins/furs being worn in the medieval period by the richer members of society. In archaeological material this can be recognised either by knife marks on the bones or the presence of large numbers of juvenile animals (Serjeantson 1989). Note however, that both Maltby (1979) and Serjeantson (1989) emphasise that it is possible to skin an animal and leave no butchery marks. The presence of kittens at the Mount House and the absence of paws and tail, which were sometimes left on the fur with bones still attached, may suggest the furs being removed. Evidence for skinning has also been noted at St Ebbe's in Oxford and West Cotton (Albarella and Davis 1994) where a quantity of young kittens was recorded together with skinning marks.

Comparisons with other sites

The Mount House data can be compared with a variety of other sites of the period, including Middleton Stoney (Levitan 1984), Banbury Castle

(Wilson 1976), Faccombe Netherton (Sadler 1990) and the religious sites of Eynsham Abbey (Serjeantson *et al.* forthcoming) and Cogges Priory (Wilson 1982). Urban sites in the city of Oxford and Abingdon (Wilson 1975) can also be compared.

The high proportion of pig bones was observed in 12th-century assemblages from Eynsham Abbey, Cogges Priory, Middleton Stoney and in 13th-century contexts from Faccombe Netherton. The assemblage from Banbury castle had more sheep/goat than pig bones, but estimates of minimum numbers of animals showed that pig predominated. In contrast, there are many sheep and few pigs from sites within the city of Oxford, which presumably reflects households of lower status.

From the 13th century onwards, the predominance of sheep was observed in the majority of sites surveyed, both high status sites such as Oxford Castle (Wilson and Locker unpublished) and Banbury Castle, and urban sites in Oxford and Abingdon (Wilson 1975). The large proportion of cattle at Eynsham Abbey probably reflected the fact that the majority of the assemblage was recovered from large pits in the courtyard. The higher status sites such as the Mount House, Banbury Castle and Faccombe Netherton continued to have high proportions of pig compared to the urban sites. Grant (1989) and Albarella (1997) have noted the frequency of mature cattle and also the increasing proportion of young animals in the 14th and 15th centuries, which is taken to show the increasing importance of cattle as a source of meat. The trend is seen in high status sites such as Eynsham, Faccombe Netherton, and Banbury Castle as well as lower status urban sites. The evidence from the manor of Middleton Stoney confirms the growing importance of cattle for meat with a higher proportion of young adults.

At Eynsham, lambs accounted for up to 10% of the recorded bone assemblage in the 14th century, but the majority of sites had a predominance of mature or adult sheep, and although these would have provided meat, the emphasis was on milk and wool. This was true of Faccombe Netherton, Eynsham, Banbury, Middleton Stoney, Abingdon and the Hamel in Oxford (Wilson 1980).

The high frequency of game, in particular deer, at the Mount House was mirrored at Oxford Castle, Banbury Castle, Eynsham and Faccombe Netherton. Although the proportion fell during Periods 6 and 7 at the Mount House, it remained high in comparison with many other sites, in particular those in the towns. Oxford Castle had a high percentage of deer in the 12th and 13th centuries, but this diminished in later phases. Nonetheless fallow is often recorded in late and post-medieval groups.

Summary

The animal bones reflect the high status of the Mount House from the 12th century through to the end of medieval period. The bishop and his household enjoyed a variety of meat and fish at their table, and in large quantities. They included beef, possibly veal, mutton, pork, lamb and chicken as well as game such as venison, hare, wild birds, marine and freshwater fish. Boar's head, swan and heron may been eaten at feasts. Such a diet is comparable to that enjoyed in other high status sites of the period, both in Oxfordshire and further afield.

Table 4.28 Plant remains: Waterlogged seeds from 558/14.

Species	Common name	Number of seeds
Ranunculus cf. *repens* L.	Buttercup	8
R. flammula L.	Lesser spearwort	1
R. sceleratus L.	Crowfoot	3
Papaver rhoeas L. *dubium* L. *lecoqii Lam.* or *hybridum* L.	Poppy	1
P. argemone L.	Poppy	2
Fumaria sp.	Fumitory	1
Capsella bursa - pastoris Med.	Shepherd's purse	6
Silene cf. *vulgaris* (Moen.)Gk.	Bladder campion	1
Agrostemma githago L.	Corn cockle	1
Stellaria media gp.	Chickweed	1
Chenopodium album L.	Fat hen	1
Atriplex sp.	Orache	41
Rubus fruticosus agg.	Blackberry	1
Conium maculatum L.	Hemlock	1
Bupleurum rotundifolium L.	Thorow-wax	1
Aethusa cynapium L.	Fool's parsley	1
Polygonum aviculare agg.	Knotgrass	18
Rumex acetsella agg.	Sheep's sorrel	1
R. obtusifolius L.	Broad-leaved dock	6
Rumex spp.	Dock	16
Urtica dioica L.	Stinging nettle	309
Corylus avellana L.	Hazel	1
Fraxinus excelsior L.	Ash	1
Hyscyamus niger L.	Henbane	3
Lycopus europaeus L.	Gipsy-wort	1
Plantago major L.	Great plantain	28
Sambucus nigra L.	Elder	1
Bidens tripartita L.	Bur marigold	129
Anthemis cotula L.	Stinking mayweed	2
Arctium sp.	Burdock	1
Carduus sp.	Thistle	4
Cf. *Cirsium* sp.	Thistle	1
Centaurea sp.	Knapweed	1
Sonchus oleraceus L.	Sow-thistle	2
S. asper (L.) Hill	Sow-thistle	3
Taraxacum sp.	Dandelcon	3
Alisma sp.	Water-plantain	1
Luzula sp.	Woodrush	1
Eleocharis S. *Palustres* p.		2
Isolepis setacea (L.) R.Br.		1
Carex spp.	Sedge	6
Gramineae gen.et sp.indet.	Grass	14
Ignotum		1
Total		628

Table 4.29 Plant remains: Other waterlogged remains from 558/14.

Species	Common name	Part	Occurrence
Bryophyta	Moss	Stem Fragments	+
Rumex sp.	Dock	Stem Fragment	+
Vicia faba L.	Field Bean etc.	Stem Fragment	+

LATER 12TH- AND 13TH-CENTURY PLANT AND INVERTEBRATE REMAINS
by Mark Robinson

The moat (Tables 4.28 and 4.29)

A waterlogged sample (context 558/14) of later 12th-century date from the bottom of the northern arm of the moat was examined for plant and invertebrate remains. The plant results are summarised in Tables 4.28–4.29. The moat comprised an isolated system, which was not fed from a stream, so the presence of 11 shells of *Planorbis planorbis*, a 'catholic' aquatic mollusc, suggests that the moat held at least some water during the year. No other molluscs were present. Achenes of *Bidens tripartita* (bur marigold) were abundant in the sample and this annual of waterside places probably grew on mud exposed when the water level of the moat dropped in summer. A few weeds of other marsh plants, mostly Cyperaceae, which probably grew in the moat, were also present. The majority of the remaining weeds were from herbs of disturbed and neglected ground, especially *Atriplex* sp. (orache) and *Urtica dioica* (stinging nettle). Such conditions probably prevailed on the ditch sides and in its immediate vicinity. *Plantago major* (great plantain) seeds were well represented and this might reflect trampled areas. Single seeds of *Agrostemma githago* (corn cockle) and *Bupleurum rotundifolium* (thorow-wax), and a stem fragment of *Vicia faba* (field bean) attest the presence of a little agricultural debris, but the moat did not contain botanical or entomological evidence for the dumping of substantial quantities of organic refuse. There was little evidence which might suggest the presence of any woodland or scrub in the vicinity of the site.

The tower garderobe (Tables 4.30–4.32)

A sample of late 12th- to early 13th-century date from context 142 at the bottom of the chute to the east garderobe of the Solar Tower was found to contain small semi-digested bone fragments and seeds, both of which are typical of latrine deposits, preserved by calcium phosphate mineralization. The occurrence of calcium phosphate mineralization would suggest that liquid sewage had been retained in the bottom of the chute and indeed the stonework showed a 'tide mark' below which the limestone had been eroded.

Surprisingly, very few of the mineralized seeds were from possible culinary plants. By far the most abundant seeds were from *Bupleurum rotundifolium* (thorow-wax), an annual weed of cornfields which was very much dependent upon former agricultural practice for its survival in Britain and has now probably suffered extinction as a wild plant in Britain. Several seeds of other cornfield weeds such as *Agrostemma githago*(corn cockle) and *Lithospermum arvense* (corn gromwell) were also present. It is not easy to explain the origin of this mineralized seed assemblage. *Bupleurum rotundifolium* seeds only ever

Table 4.30 Plant remains: Mineralized seeds from the garderobes.

Species	Common name	Number of seeds Context142	Context 658
Brassica or *Sinapis* sp.	Mustard etc.	2	1
Cf. *Silene* sp.	Campion	1	–
Agrostemma githago L.	Corn cockle	2	–
Vitis vinifera L.	Grape	–	28
Rubus sp.	Blackberry etc.	–	1
Cf. *Rubus* sp.	Blackberry etc.	2	–
Fragaria vesca L.	Wild strawberry	–	16
Prunus domestica L.	Plum	–	12
Prunus sp.	Sloe, plum etc.	–	7
Cf. *Pyrus* or *Malus* sp.	Pear or apple	–	1
Conium maculatum L.	Hemlock	1	–
Bupleurum rotundifolium L.	Thorow-wax	71	–
Umbelliferae gen.et sp. Indet.		9	1
Urtica dioica L.	Nettle	–	1
Ficus carica L.	Fig	–	57
Lithospermum arvense L.	Corn gromwell	4	–
Cf. *Ballota nigra* L.	Black horehound	–	7
Carex sp.	Sedge	–	2
Ignota		6	5
Total		98	139

Table 4.31 Invertebrate remains: Mineralized diptera puparia from the garderobes.

Species	Common name	Number of puparia Context 142	Context 658
Thoracocheata zosterae (Hal.)		1	32
Cf. *Leptocera* sp.		–	26
Fannia sp.		–	2
Diptera gen.et sp.indet.		1	55

Table 4.32 Plant remains: Carbonised remains from the garderobes.

Species	Common name	Type	Context 142	Context 658
Quercus sp.	Oak	Charcoal	Much	Present
Triticum sp. - free threshing	Rivet or bread wheat	Grain	–	23
Triticum sp.	Wheat	Grain	–	15
Avena sp.	Oats	Grain	–	5
Cereal gen.et sp. indet		Grain	–	29
Ignotum		Seed	–	1

seem to be a very minor component of waterlogged medieval sewage, whereas fragments of *Agrostemma githago* seeds are often extremely numerous. Preservation by calcium phosphate replacement, however, is a process which seems to favour intact seeds and seed fragments are much less likely to survive. It is suggested that the origin of the cornfield weed seeds in this sample is as impurities in flour products that were consumed. The milling of the grain would have broken most of the *Agrostemma* seeds, rendering them unsuitable for preservation, where as the smaller, harder seeds of *Bupleurum* would have been more likely to remain intact. Thus, it possible that biased preservation resulted in the high proportion of *Bupleurum* seeds.

The low proportion of seeds from culinary species in this deposit was in complete contrast to the result from the garderobe at the north-west corner (see below). It seems on this evidence that whoever used the garderobe did not enjoy a very rich diet, a diet more appropriate to a prisoner fed on bread made with impure flour than the bishop of Winchester. Invertebrate remains were sparse in the sample. It did, however, contain much oak charcoal, possibly from ashes from a hearth.

The north-west garderobe (Tables 4.30–4.32)

Numerous fish bones, small or semi-digested bone fragments, seeds of culinary fruits preserved by calcium phosphate mineralization and mineralized fly puparia were recovered from a sample of sediment 658 from a 14th-century garderobe at the north-west corner of the manor. The seeds include grape, wild strawberry, plum and fig. They show that whoever used the latrine enjoyed a diet that included exotic fruit. The fly puparia were mostly *Thoracochaeta zosterae* and cf. *Leptocera*, taxa with larvae that can live in sewage and other foul semi-liquid organic materials with a high nutrient content, but an oxygen deficit. *T.zosterae* is now almost entirely restricted to decaying seaweed but has been recorded in great abundance from other medieval latrines. Flotation of a sample from this context recovered a little oak charcoal and some charred wheat grains.