Ancient Monuments Laboratory
Report 118/89

VERTEBRATE REMAINS FROM HAUGHMOND ABBEY, SHROPSHIRE.

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Summary

The bone assemblage from Haughmond Abbey, Shropshire, can be divided into two groups: the disarticulated bones which come from most of the phases, and the animal burials which come from phases 5 and 6 (16th-18th centuries). The former group (11th-18th centuries) is a small assemblage, so detailed analysis is not possible. A comparison of the proportions of the major taxa (cattle, sheep/goat and pig) with other sites shows that Haughmond Abbey is characterised by high proportions of pig bones and occupies the extreme of the range of sites in the respect. It can, however, also be seen to fit into the 'high status' pattern. The burials are a more important but more enigmatic group. There are 14 burials, 11 of pig, 2 of cattle and 1 of horse. 4 of the pigs are from phase 6 and the rest of the burials are from phase 5. Phase 5 is the post-dissolution. An interpretation, which is favoured here, is that they are disease casualties over a number of years. This would account for a number of separate burials (victims of an epidemic would probably have been buried in a single pit). What seems certain is that they are not remains from butchery processes, so do not relate to ordinary economic factors. Other options are discussed in the report.

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VERTEBRATE REMAINS FROM HAUGHMOND ABBEY, SHROPSHIRE

by Bruce Levitan

INTRODUCTION

The bone assemblage was recovered during excavations which took place over the period 1975-1979. The abbey (first excavated in 1907: St John Hope and Brakspear 1909) was the main feature of the site. It lies on a wooded hillside four miles NE of Shrewsbury. The recovery of non-human bones was not, at first, considered to be a high priority. For this reason no sieving was carried out. Moreover, most of the bones came from post-dissolution layers, and it was not until at least three *in situ* animal burials had been removed that the presence and importance of these burials was realised, and proper excavation and recording was pursued. It would be easy to be hyper-critical of this with hindsight, and with the benefit of over ten years' development in the overall methods now employed for bone recovery. Suffice it to say that it is from such mistakes that the lessons are being learnt and that, hopefully, they would not be repeated. One cannot escape, however, the fact that poor recovery and recording greatly impedes bone analysis and decreases the value of the sample.

The abbey was a large and prosperous Augustinian house, and the earliest reliable date is about 1130 AD. By the end of the 12th century it had acquired the full range of conventional buildings as a result from patronage from the local lords. Further building and extension continued during the 13th and 14th centuries. After the dissolution, the church and cloister were demolished but some of the other buildings were converted into a private house which remained in occupation until damaged during the Civil War. Afterwards, the remaining buildings declined to the status of a farmhouse. Excavations by J.J. West took place over six seasons from 1975-79 (two seasons in 1979). Three interim reports have been published which give further detail about the site (West 1975; 1976; 1980).

The bone assemblage which dates to the period of the abbey (Phases 1-4, *c.* 1080-1540) is small (564 bones). Thus the main interest of the site in terms of its bone assemblage relates to the post-dissolution use, during which there appears to have been a private house (Phase 5), a formal garden (Phase 6) and finally a barn and farmyard (Phase 7). Bones from Phase 8, which comprises layers that date from the 19th century onwards, have not been considered. The dating of the phases is roughly as follows:

Phase 1 1080-1130 (13 bones);
Phase 2 1130-1200 (197 bones);
Phase 3 1200-1500 (296 bones);
Phase 4 1500-1540 (58 bones);
Phase 5 1540-1600 (776 bones and eleven burials);
Phase 6 1600-1750 (546 bones and three burials);
Phase 7 1750-1800 (488 bones).

Even though the numbers of bones from Phases 5-7 are greater than from the earlier phases, the samples are not large. The site total of 2374 bones, of which only 935 have been identified to taxon, (excluding the fourteen burials) must be considered to be too small a sample to warrant detailed analysis. Of more interest, however, are the burials, most of which relate to Phase 5, and it is this aspect of the assemblage upon which the analysis will concentrate.

The bone are stored at the English Heritage stores in Atcham, and the catalog-

ue of identifications and related records is kept, in the form of dBASE data files, at the Environmental Archaeology Unit, University Museum, Oxford, and with the main site archive.

THE DISARTICULATED BONES

Table 1 gives a summary of the disarticulated bones, and other than the short discussion that follows, no further mention will be made of this assemblage. The assemblage has been fully recorded, and includes data concerning skeletal part frequency, ageing, measurements, etc. These data are available in the form of dBASE files on IBM compatible floppy disc, or as printout, and will be supplied upon request.

The major feature of the material is the high proportion of pig in phases 1-5. The results in Phases 6 and 7 may be taken as good yardsticks against which to compare the earlier results, for the percentages of the major taxa are typical of many archaeological sites (ie cattle and sheep/goat predominant, pig common but much less frequent). Thus the pattern of pig being as common as, or more common than sheep/goat, and in some phases more common even than cattle, is an unusual one. It must be said that the sample size for Phases 1, 2 and 4 in particular is too small for much emphasis to be placed upon these results, but the fact that they are consistent with Phases 3 and 5 lends some credence to them. (It is also notable that eleven of the fourteen burials are of pig). A selected comparison of sites for proportions of the major taxa (cattle, sheep/goat and pig) is given in Figure 1. Besides Haughmond, there are fifteen 'high status' sites including castles, palaces, abbeys and priories, and five other sites from the region and surrounding counties (Lincoln, Tamworth, Shrewsbury, Brackley and Hereford). The high status sites are quite variable, some with very low proportions of pig (eg Greyfriars, London; Bedford Castle and Taunton Priory) whilst others are quite similar to Haughmond (Okehampton Castle; Maison Dieu, Ospringe, Kent and Bristol Castle in particular). The other sites all have much lower percentages of pig bones (less than 20% pig). Even though Haughmond Abbey is similar to some of the sites, nevertheless, it is clearly at the extreme of the range. It should be noted, however, that this is a selected comparison. Were more sites to be added, this situation might alter (ie Haughmond might be seen to be at less of an extreme in the range), though it seems unlikely that the overall picture would change.

Other than this, there is nothing at all unusual about the assemblage. The occurrence of small numbers of horse, dog and cat bones is typical of many medieval sites, whilst the presence of deer and rabbit is also seen on many such (high status) sites - eg Okehampton (Maltby 1982). The rabbit bones from Phase 3 all come from a pit beneath the cloister floor and this context seems a little odd, but it is possible that the backfill of the pit included some domestic rubbish which contained the rabbit bones (the other bones from this phase come from make up layers, so are more easily explained). Small mammals are rare, probably mainly because of the lack of sieving. The lack of sieving also accounts for the rarity of birds, fish and amphibians. The seventeen blackbird bones are from a single individual.

The scarcity of bones from the abbey is not at all surprising since the areas that were excavated were well away from the kitchens, refectory and locations where food refuse might be expected to accumulate. Contrast this with St. Katherine's Priory, Exeter, for example, where the kitchens and kitchen rubbish deposits were excavated (Levitan, 1989). Similarly, the lack of large bone deposits in Phases 6 and 7 may be attributed to the context. The former, a formal garden, is not a location one would expect to find large quantities of bone (though there were, apparently, some pig skeletons - see below). The

latter was part of a farm yard, and whilst a small amount of bone might be expected, major deposits of bone would be unusual. Phase 5 is more difficult to explain because its overall context is enigmatic. During this phase the buildings of the outer court and abbot's lodging were made into a private house which would have had a farm attached. How the area from which most bones, and all the burials, were recovered relates to this is unclear.

THE BURIALS

Tables 2 and 3 summarise the bones recovered from the burials of pig (Table 2), horse and cattle (Table 3). Figure 2 illustrates the locations of the burials from Phase 5.

Condition of the burials
Table 2 suggests that most of the pigs were complete burials; the lack of certain bones - mainly small bones - probably being ascribable to poor recovery (this can certainly be said of burials 1 and 2 which are of infant pigs whose bones are both small and fragile; and it is notable that there is a rough correlation between age and number of bones recovered, the latter being highest for the older individuals). The cattle and horse burials are incomplete. The horse was only partially recovered, the rest of the burial lying outside the area of the excavation (Figures 2 and 3). The cattle were apparently incomplete at burial.

In one or two cases, the site drawings and photographs suggest some bones may not have been present (Figures 3 and 4), having been removed before burial (the cattle?) or disturbed by later activity, though one cannot rule out the possibility that the missing bones had been removed in spoil before the drawing was made or photograph taken.

The pig burials
Eight burials are from Phase 5 and three are from Phase 6 (Table 2). Burials 1-3, from Phase 6, are all from the same context (437), and indeed had all been bagged up together with no attempt at separation. Presumably this implies that they were not recognised as burials at the time of recovery. They consist of two infants and one juvenile. The infants, with mandibles at wear stage 1, can hardly have been many days or weeks old, whilst the juvenile, with mandibles at wear stage 16, cannot have been much more than a few months old. Their presence in a formal garden is indeed puzzling, and without detailed records of their provenance it is difficult to comment on them. One likelihood is that they were late insertions at a time when the garden had fallen into disuse, and may even have derived from activities relating to later phases. If this scenario is correct, they would very likely have been preserved in an undisturbed state. An alternative is that they were early burials and that the garden activities disturbed them but did not widely distribute the bones. This alternative is favoured by the excavator, but the possibility of later insertions should not be ruled out. Unfortunately, since they were not recognised during recovery, it is impossible to conclude which alternative is more likely.

Burials 8, 9 and 14 were all from different contexts, and presumably, like burial 14 (Figures 2 and 5), were all single burials. Burial 11 (Figures 2 and 3) was in the same context as burial 10, a horse, and is exceptional in this sense, but not in the sense of multiple burials because burials 4-7 all come from two intercutting pits, 449 and 450 (Figures 2 and 7).

Burial 11 (Figure 3) is not a complete burial, and certainly not all the bones

of a complete skeleton are present (Table 2). However, the proximity of the horse burial must be considered as a probable source of truncation if the horse is interpreted as being a later insertion. The site drawing (Figure 3) and photograph are certainly suggestive of this.

There are no site drawings for the other burials, so these too must be regarded as problematic. Burials 4 and 5-7 were in two intercutting pits (Figure 2), and were not realised to be burials until most of the bones had been recovered. They were photographed at the point where they were realised to be burials (Figure 7) and it is clear from this that context 450 definitely contains at least two articulated burials, and in fact it was found to contain three pigs when the bones were identified and recorded.

Burial 8 came from pit 465 (Figure 2) but was not realised to be a burial when recovered, so there is no photograph or site drawing. The number of bones from this burial (Table 2) make it evident that it was, however, a complete skeleton. Burial 9, from pit 466 (Figure 2) was recorded as a burial, but there is no drawing or photograph. This, also, is a substantial part of a complete skeleton, indicating that originally it was complete (Table 2).

The phase 5 burials can be divided into three groups on the basis of age at death continuum using mandibular results (using the method of Grant 1982).

age division	description
(ii)	Burial 7, with mandible wear stage 11, is an infant with 2nd molar not erupted.
(iii)	Burials 5, 6, 8-11 with mandible wear stages of 30, 26, 19, 22 and 20 respectively, are all juvenile with 2nd molar in wear and 3rd molar not yet fully erupted.
(iv)	Burials 4 and 14, with mandible age stages of 37 and 36 respectively, are sub-adults (3rd molar in wear).

The burials from phase 6 add a younger age division (i: 1st molar not erupted) since only burial 3 falls into one of the above (division ii).

This range of ages is, in fact, very representative of the normal pattern found for pigs from many sites where the majority of deaths are of juveniles and young adults.

Table 2 is instructive in terms of the sequence of epiphysial fusion and how this relates to mandible wear stages. In general there is a consistent agreement between them, but there are also inconsistencies. The overall pattern appears to be as follows using the same divisions described above:

age division	description
(i) Early infant:	mandible wear stage 1 (burials 1-2). No epiphyses fused, vertebrae central and neural arch elements not fused.
(iia) Later infant:	mandible wear stage 11 (burial 7). No epiphyses fused, vertebrae central and neural arch elements not fused - bones visibly better formed than (i).
(iib) Early juvenile:	mandible wear stage 16 (burial 3). No epiphyses fused, vertebrae elements fused.
(iii) Later juvenile:	mandible wear stage 19-30 (burials 5, 6, 8-11). Scapula and pelvis fused. Distal humerus, proximal radius, distal metacarpals and metatarsals, and proximal phalanges becoming fused (state J).
(iv) Sub-adult:	mandible wear stage 36-37 (burials 4, 14). All epiphyses from (iii) now fused (state F); in addition distal tibia/-

fibula fused (state F) and proximal humerus and proximal femur becoming fused (state J), leaving still unfused vertebral plates (but caudal F or J), distal radius, ulna proximal and distal, distal femur, proximal tibia, proximal fibula, calcaneum.

Inconsistencies can be seen in burial 6 in particular where the fusion states appear to be less developed than the other burials in the same age division. Note also some inconsistencies between burials 4 and 14 though here the mandible age stages are only one unit apart so such variation is to be expected.

Assemblages such as this one are particularly important for establishing these kinds of relationships and sequences because much of the information about such sequences is based on historical data which is often of dubious use for archaeological assemblages.

Sex determinations (based upon canine teeth) are as follows: male - burials 5, 8, 11 and 3; female - burials 6, 7, 9 and 14 (burial 4 also possibly female). To some extent this result is also in line with the 'typical' pig pattern since the majority of the older individuals would usually be females because most males would be slaughtered at as early an age as possible (in a meat producing economy).

However, despite these similarities to the pig 'norm', these burials must be seen as abnormal because they have not been butchered in any observable fashion (no cut marks, ancient breakage suggestive of butchery, burning). Certainly burial 14 (Figure 5) was not disarticulated in any way before being buried.

Measurements of the bones from burial 4163 were recorded, but because none of the burials is fully mature measurements were not taken on the remainder. Even those bones that were measured had not gained their final size/conformation. The data are available in the site archive.

Horse and cattle burials

The horse burial (10) is a partial skeleton comprising only cranial and axial bones. The patella and sesamoid bones have been included because they come from the same context (Table 3). It is obvious from the site drawings (Figures 2 and 3) that the rest of the skeleton lies outside the excavated area. It is possible that the patella and sesamoid bones do belong to this burial and had been disturbed so were not in articulation with their associated elements. The likelihood that this burial is later than the pig (burial 11) and has truncated the earlier burial has been discussed above.

The burial is of an adult (all permanent teeth in wear), but the stature is uncertain because no measurements were possible. In general appearance, it appears to be horse-size rather than pony-size (ie greater than 14 hands). There is no evidence of any butchery.

The two cattle burials (12 and 13) are separate burials (Figures 4 and 6). Figure 4 makes it immediately evident that there were more bones present *in situ* for burial 13 than have apparently been recovered (Table 3). Certainly the pelvis appears to have been present, and one can postulate that the atlas was probably there although this is not clear from the drawing. It is evident, though, that this was not a complete burial, but comprised only the cranial and axial bones, and possibly also the pelvis. It was a sub-adult (mandible wear stage 36; note that although the 3rd molar is in wear, the deciduous 4th premolar has not been shed, implying that the permanent 4th premolar comes

into wear after the 3rd molar).

The second cattle burial (12) is more substantial (Figure 6). This comprised most of the skeleton except, strangely, the right limbs and the distal part of the left hind limb. This was a juvenile, with mandible at wear stage 22 and most epiphyses unfused (Table 3).

Both burials are the only ones with any signs of butchery. In both cases the horncores have been removed, but with no other signs of butchery. These are rather enigmatic since it is obvious that some treatment has occurred, *viz.* removal of some bones, butchery of skull, but that the carcasses have not been subjected to normal butchery practices.

Discussion

From the foregoing, it will be obvious that the major question to be resolved is the purpose of these burials. Unfortunately there is no easy answer, though some possibilities can be definitely ruled out.

Firstly, these are not the remains from food processing. None of the burials display signs of having been processed in the normal way for removal of meat, nor is there any obvious way that meat could have been removed to leave the burials as represented. (Spit roasting, for example, might preclude butchery evidence in the form of cut marks, but there would have been other characteristic signs).

Secondly, they do not appear to have been burials representing deliberate desecration of the abbey site soon after the dissolution. Whilst it is probably stretching the point too far to suggest that healthy animals may have been killed for this purpose, it may be that diseased ones were used. This interpretation rests upon a crucial dating factor that, unfortunately, cannot be resolved. Desanctification of the site would only be relevant if the burials occurred at the beginning of the phase, ie immediately after the dissolution event. If they occurred later during the phase, the connection becomes more tenuous. However it is not possible to say exactly what date(s) they do relate to. Furthermore the apparently random distribution of the burials over the cloister area argues against such a function.

Thirdly, phase 5 is itself rather enigmatic, coming after the dissolution, and before the conversion of the site into a formal garden (phase 6). The abbot's lodging and some of the other buildings were converted into a private house, so the proximity to this of a series of animal burials appears to be rather odd, though there was a farm attached to the private house.

The only remaining option that seems at all likely is that they are disease casualties, though this is a moot point since although some diseases may not have affected the bones in any way (eg swine fever) there is no direct evidence of death from disease. If they are disease casualties, the manner of the burials (many single burials) implies that this was not an epidemic since many simultaneous casualties would normally be buried together in a single pit. The pigs might have been buried close to the buildings, as here, because they have been kept in sties or runs fairly close to the farm buildings. Horses, also, would have been stabled near the farm buildings. If these are disease casualties, the farmer(s) may have chosen to bury the animals close together but away from the farm. Thus, the most likely explanation seems to be a number of burials that occurred over a period of time and were buried away from the immediate locality of the farm buildings, but nevertheless reasonably close. The cattle burials appear to be enigmatic, especially since they are not complete skeletons and because they have been subjected to some butchery, but

apparently not for food. However, if they too were diseased, the removal of the horncores (for horns) may simply represent the farmer cutting his losses.

In conclusion, it is difficult to see any obvious reason for the burials other than a series of disease casualties buried over an extended period of time.

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Table 1. Summary of taxa from Haughmond Abbey.

Taxon	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 7		
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	
Cattle	2	33	16	29	31	38	4	36	119	39	67	36	89	39	
Sheep/goat			17	31	18	22	1	9	91	30	67	36	76	33	
Pig	4	67	21	38	23	28	6	55	85	28	27	15	30	13	
Horse									1	0	12	6	19	8	
Dog			1	2	1	1			1	0	1	1	4	2	
Cat					1	1					2	1	4	2	
Red deer									1	0	1	1			
Fallow deer									1	0			1	0	
Roe deer											2	1			
Rabbit					8	10			2	1	5	3	8	3	
Mole									1	0					
Ship rat									1	0					
Stoat											1	1			
sub-total	6	46	55	28	82	28	11	19	303	39	185	34	231	47	
Domestic fowl			2	67	5	20			5	50	5	56	4	50	
Goose cf domestic									4	40	3	33	2	25	
Duck family													1	13	
Teal			1	33											
Woodcock					1	4					1	11	1	13	
Blackbird					17	68									
Starling									1	10					
Crow					2	8									
sub-total			3	2	25	8			10	1	9	2	8	2	
Frog									2						
Fish									1		4				
Unid. large mammal	2	29	82	59	56	30	22	47	239	52	200	57	145	58	
Unid. medium mammal	5	71	56	40	122	65	18	38	202	44	117	34	97	39	
Unid. small mammal					1	1	1	2	2	0			1	0	
Unid. bird			1	1	10	5	6	13	17	4	31	9	6	2	
sub-total	7	54	139	71	189	64	47	81	460	59	348	64	249	51	1
Total	13	1	197	8	296	12	58	2	776	33	546	23	488	21	2

Notes:
0% = less than 1%.
Sheep and goat identifications: Phase 2 1/0; Phase 3 3/0; Phase 5 15/0; Phase 6 10/0; Phase 7 12/1; Total 41/1 (sheep/goat).
Animal burials from Phase 4 (11 burials) and 6 (3 burials) not included; the 17 blackbird bones are from a single individual.
Explanation of percentages: percentages for individual taxa are based on taxa sub-totals; percentages for taxa sub-totals are based on Phase totals; percentages for Phase totals are based on site total.

Table 2. Summary of pig burials, Haughmond Abbey.

Phase	6	6	5	6	5	5	5	5	5	5	5
Feature no.			450		468	4100	466	450	450	4163	449
Skeletal element	2	1	7	3	8	11	9	6	5	14	4
Skull	1		1	1	1		1	1	1	1	1
Mandible	2([c]C--)	2([d]C--)	2([k]dV-)	2([m]daC)	2([l]faV)	2(afbV)	2(agcE)	2(aheE)	2(dleE)	2(*lgb)	2(emgb)
mws	1	1	11	16	19	20	22	26	30	36	37
Atlas	X			N	J			1	1	1	
Axis	X			N	N			N	N	U	N
Cervical	5(X)	2(X)	1(X)	4(NN)	5(UU)		3(UU)	4(UU)	5(UU)	5(UU)	4(UU)
Thoracic	3(X)	4(X)	4(X)	13(NN)	14(UU)	6(UU)	14(UU)	12(UU)	14(UU)	14(UU)	14(UU)
Lumbar	1(X)	2(X)	4(X)	6(NN)	6(UU)	6(UU)	6(JU)	5(UU)	5(UU)	6(UU)	7(UU)
Sacrum			N+	N+	N+	U+	J+	N+	J+	UU	NN
Caudal							1			2(FF)	4(JJ)
Sternum			1	1	1	1	1	1	1	1	1
Rib	15	5	2	25	28	14	22	25	26	28	24
Scapula	R(X)	2(X)	2	2(N)	2(F)		2(J)	2(F)	2(F)	2(F)	2(F)
Humerus	2(XX)	2(+X)	2(U+)	2(UU)	2(UJ)		2(UJ)	2(UU)	2(UJ)	2(JF)	2(JF)
Radius	2(XX)	R(XX)	2(NN)	2(UU)	2(JU)		2(JU)	2(JU)	2(JU)	2(FU)	2(FU)
Ulna	2(XX)		2(+U)	2(UU)	2(UU)	2(+U)	2(UU)	2(UU)	2(UU)	2(UU)	2
Carpal	1			3	6		4	2	3	7	6
Metacarpal II				R(N)	R(U)	2(U)		R(U)		R(F)	L
Metacarpal III	2(X)	1(X)	2(N)	2(N)	2(U)	2(U)		2(U)	2(U)	2(F)	2
Metacarpal IV	2(X)	1(X)	2(N)	2(N)	2(U)	2(U)		R(U)	2(U)	R(F)	2
Metacarpal V			L(N)		L(U)	2(U)	L(J)	2(U)		R(F)	2
Pelvis	2(X)	2(X)	2(N)	2(N)	2(F)	2(F)	2(J)	2(F)	2(F)	2(F)	2(F)
Femur	2(UU)	2(XU)	2(UU)	2(UU)	2(UU)	2(UU)	2(UU)	2(UU)	2(UU)	2(UU)	2(JU)
Patella					2	L			2	R	
Tibia	2(XX)	2(XX)	2(UU)	2(UU)	2(UU)	2(UU)	2(UN)	L(UU)	2(UU)	2(UF)	L(U+)
Fibula		1(X+)	1	2(NN)	2	2(NU)	2(N+)	2	2	2(NF)	2(N+)
Astragalus			2	2	R	2		2	L	2	
Calcaneum	L(X)	R(X)	2(U)	2(U)	R(N)	2(U)	2(U)	2(N)	2(U)	2(U)	
other Tarsal				3	3	2	3	4	6	2	2
Metatarsal II				R(U)	2(U)	2(U)	R(N)	2(U)	R(F)	R(F)	
Metatarsal III	2	1(X)	2(N)	2(U)	R(U)	L(U)		2(U)	R(F)	R(F)	
Metatarsal IV	2	1(X)	2(N)	R(U)	R(U)	R?(U)	R(U)	2(U)	R(F)	R(F)	L
Metatarsal V					R(U)	2(U)	?(U)	R(J)	R(U)	R(F)	
Phalanx 1	2		4(N)	5(U)	4(U)	5(F)	4(U)		5(J)	4(F)	4
Phalanx 1 (ab)				3(U)	4(U)	4(F)	1	3(J)	3(J)	4(F)	1
Phalanx 2				2(U)	4(U)	4(F)	1(U)	3(U)	6(J)	3(F)	4
Phalanx 2 (ab)					3(U)	4(F)			2(J)	1(F)	
Phalanx 3				1			1		2	2	
Phalanx 3 (ab)						2	1			1	
Sesamoid										5	
Sex			F	M	M	M	F	F	F	M	F
Number of bones	54	32	48	101	117	91	88	96	113	120	100

Notes:

? = identification uncertain. Where symmetry not given it was not determined.

Bracketed data are ageing results. For mandibles the wear states using the method of Grant are given for 4th premolar [deciduous 4th premolar in square brackets] followed by 1st to 3rd molars; * = tooth not present; - = tooth not erupted, crypt not yet visible (pre eruption state C). mws = mandible wear stage.

For epiphysial fusion, the proximal or anterior (where relevant) is given first. F = fused, J = just fused (fusion line open), N = not fused, U = not fused but epiphysis present, X = not fused and very immature, + = part of bone not present. Note that a U does not imply all epiphyses were present, eg for thoracic vertebrae 14(UU) need not indicate all 28 epiphyses are present. Where fusion state not given = no data.

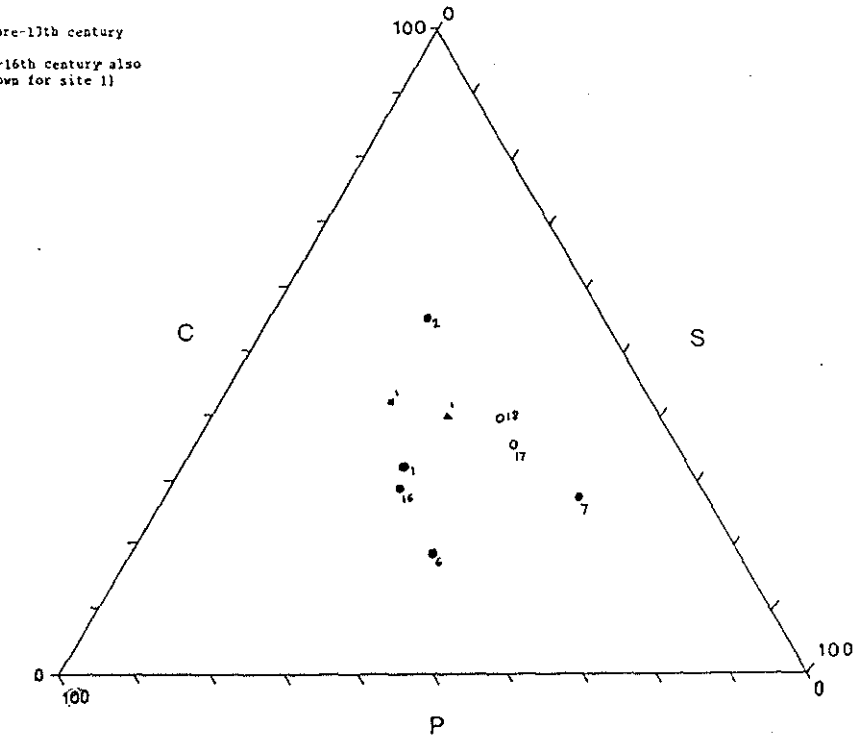
Table 3. Summary of cattle and horse burials, Haughmond Abbey.

Skeletal element	Horse	Cattle	
	10	12	13
Feature	4100	4109	4106
Skull	1	1	1
Mandible	2	2([j]gcC)	2([m]kgc)
Atlas	1	N	
Axis	F	1	N
Cervical	5(FF)	5(UU)	5(UU)
Thoracic	2(FF)	12(UU)	13(UU)
Lumbar	2(FF)	6(UU)	6(UU)
Sacrum		U+	U+
Caudal		2(UU)	
Sternum		1	1
Rib	6	23	20
Costal cart.			4
Scapula		L(F)	
Humerus		L(UJ)	
Radius		L(FU)	
Ulna		L(UN)	
Carpal		5L	
Metacarpal		L(U)	
Pelvis		2(N)	
Femur		L(UU)	
Patella	1	L	
Tibia		L(U+)	
Astragalus			
Calcaneum			
other Tarsal			
Metatarsal			
Phalanx 1		2L(U)	
Phalanx 2		2L(F)	
Phalanx 3		2L	
Sesamoid	2	4	
Number of bones	23	80	55

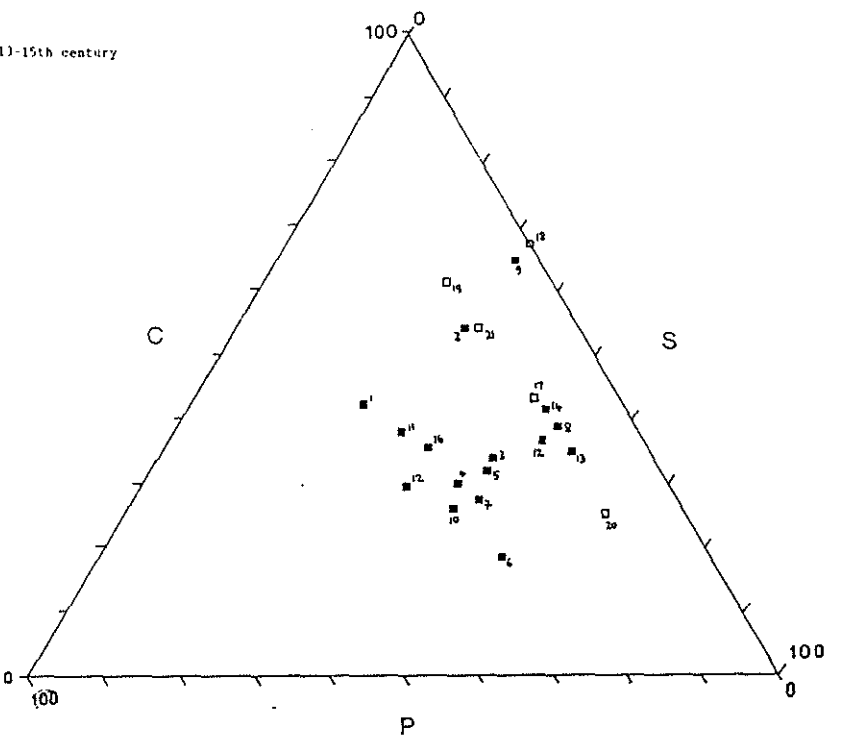
Notes: see Table 2 for key to codes

i) pre-13th century

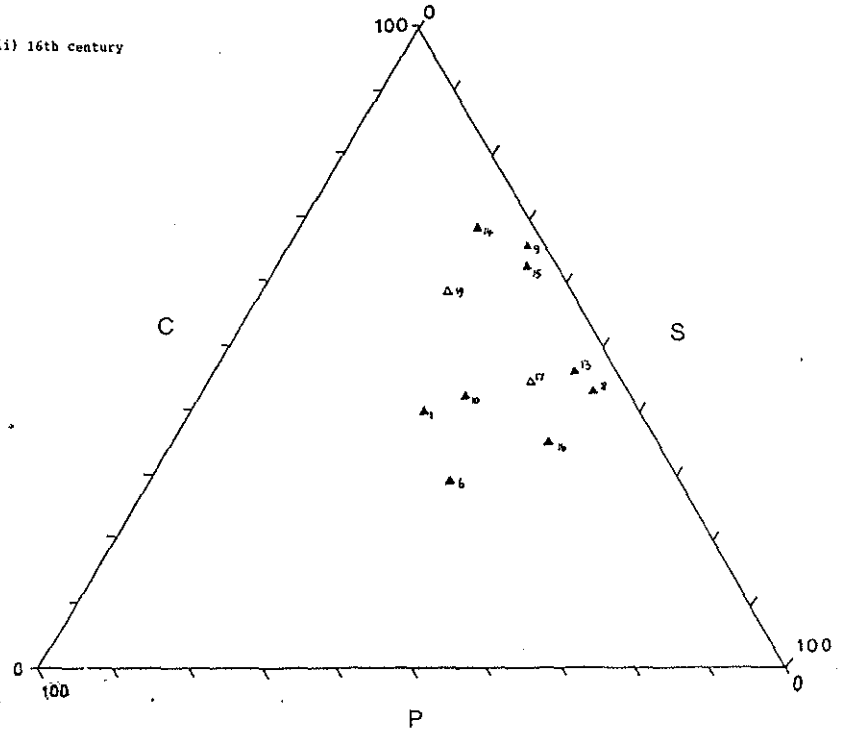
(13-16th century also shown for site 1)



ii) 13-15th century



iii) 16th century



C - cattle

S - sheep/goat

P - pig

Key to sites and sources:

1. Haughmond Abbey
2. Burton Upon Trent Abbey (Harman 1979)
3. Bedford Castle (Grant 1979)
4. Banbury Castle (Wilson 1977)
5. Middleton Stoney (Levitan 1984)
6. Bishop's Palace Witney (Levitan & Wilson nd)
7. Oxford Castle (Marples 1976)
8. Christchurch Oxford (Stallibrass nd)
9. Greyfriars London (Armitage & West 1987)
10. Maison Dieu (Wall 1980)
11. Bristol Castle (Noddle nd)
12. Cheddar Palace (Higgs *et al* 1979)
13. Taunton Priory (Levitan 1984)
14. St. Katherine's Priory Exeter (Levitan nd)
15. St. Nicholas' Priory Exeter (Levitan nd)
16. Okehampton Castle (Maltby 1982)
17. Lincoln (O'Connor 1982)
18. Tamworth (Cole 1968)
19. Shrewsbury (Noddle 1983)
20. Brackley (Levitan & Hocking nd)
21. Hereford (Noddle 1985)

Solid symbols: high status sites;
Open symbols: other sites.

FIGURE 1. SELECTED SITE COMPARISONS FOR PROPORTIONS OF MAJOR TAXA

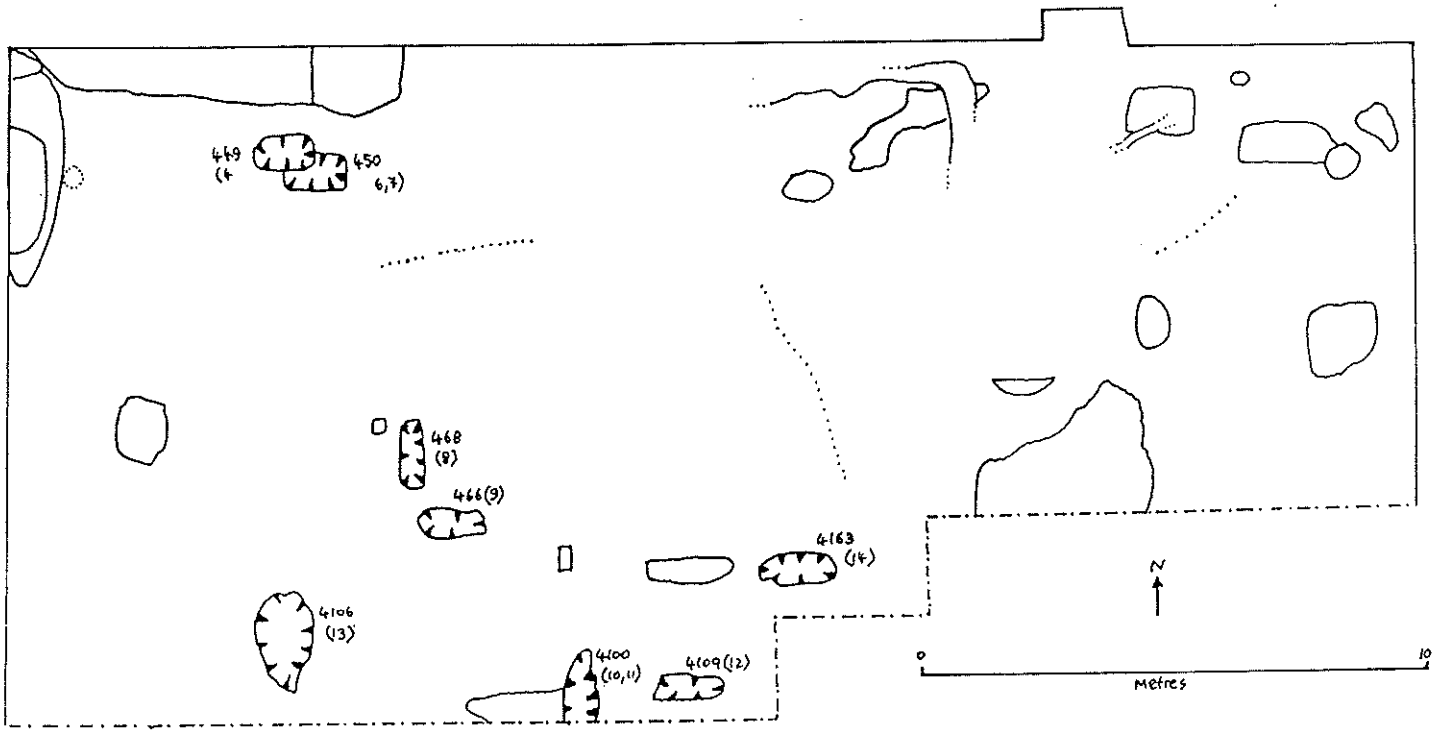


FIGURE 2. PLAN SHOWING FEATURES DATING FROM PHASE 5.
Features containing burials are labelled with feature and (burial) numbers

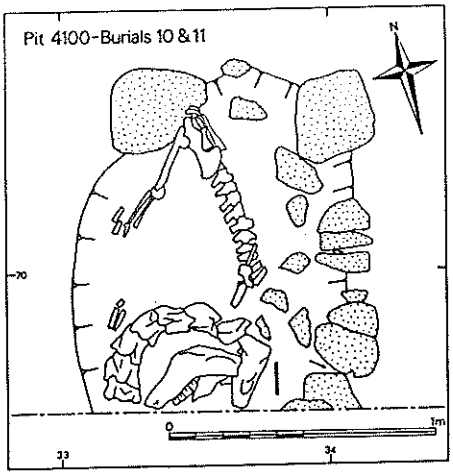


FIGURE 3. F4100: BURIALS 10 (HORSE) AND 11 (PIG)

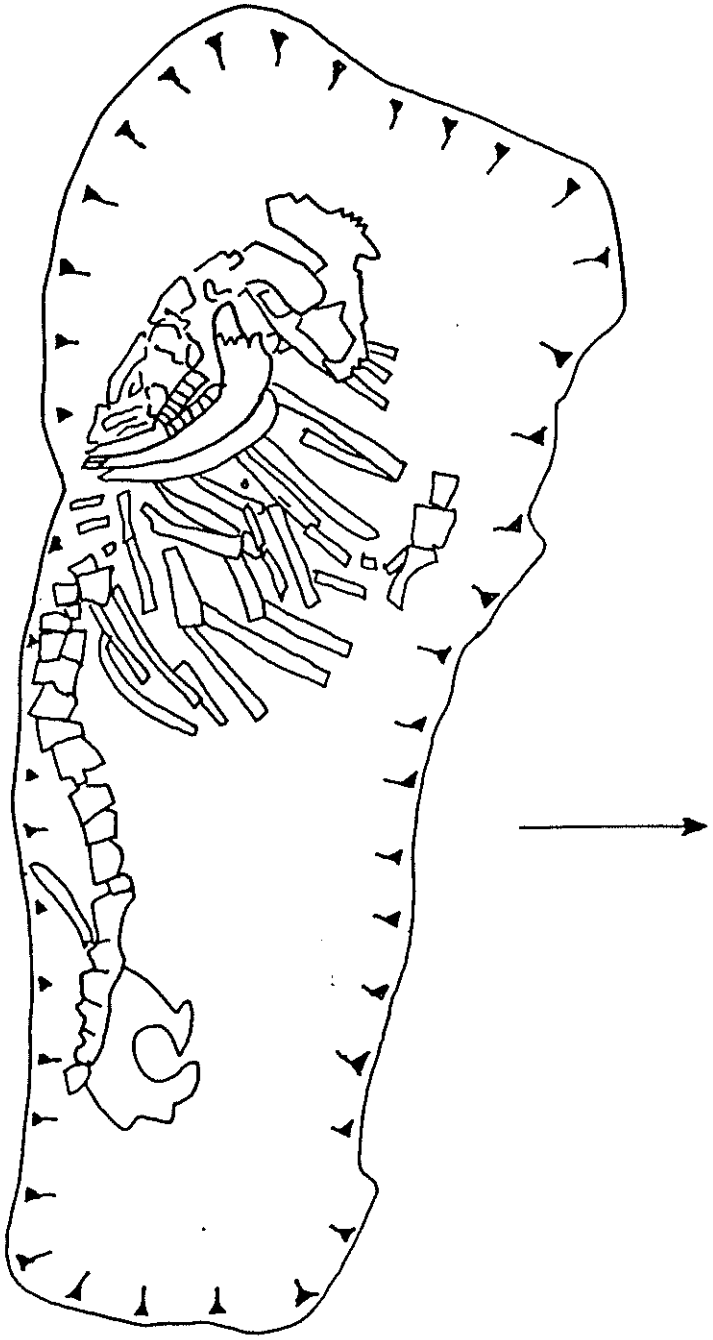


FIGURE 4. F4106: BURIAL 13 (CATTLE)

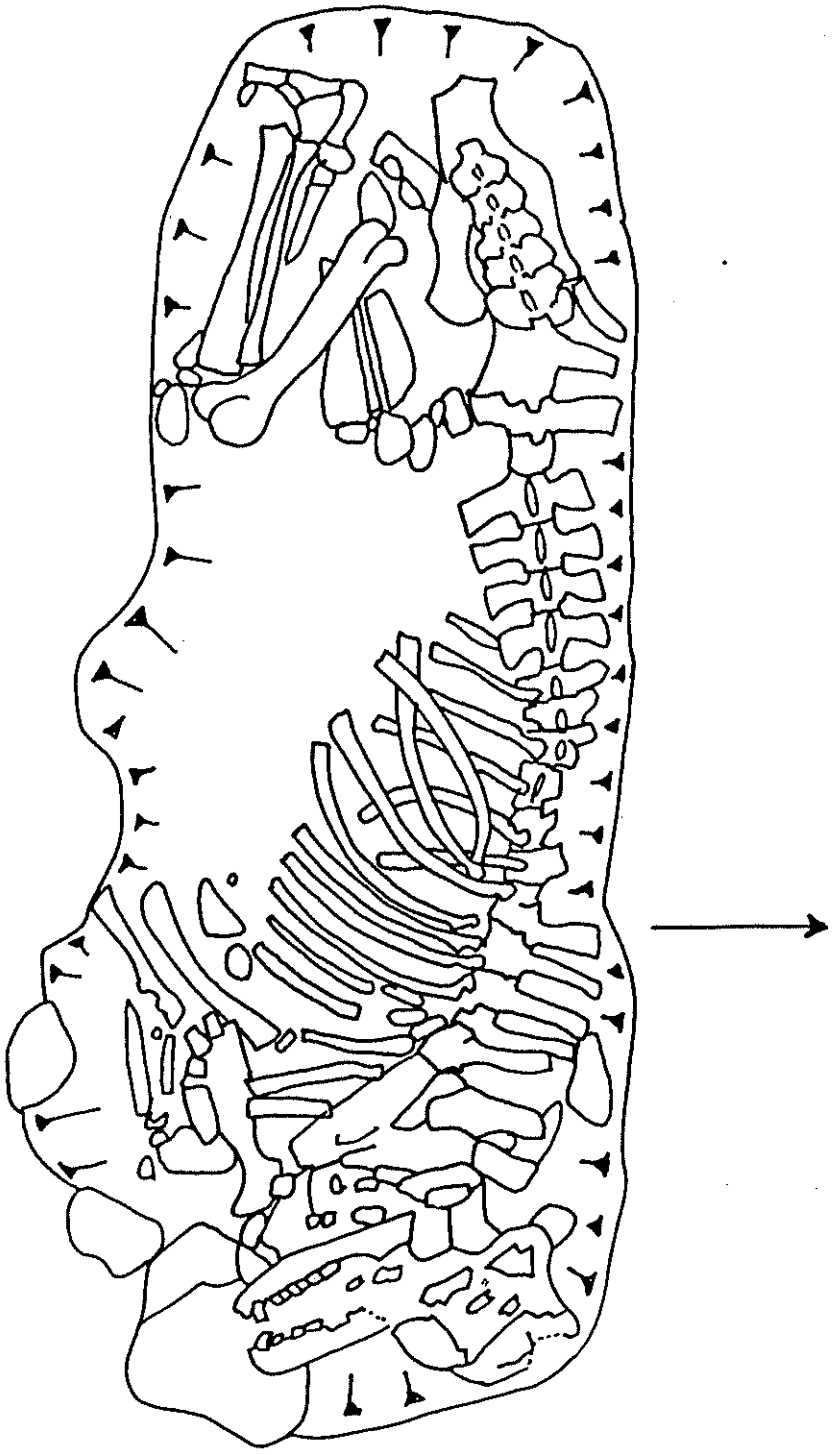


FIGURE 5. F4163: BURIAL 14 (PIG)

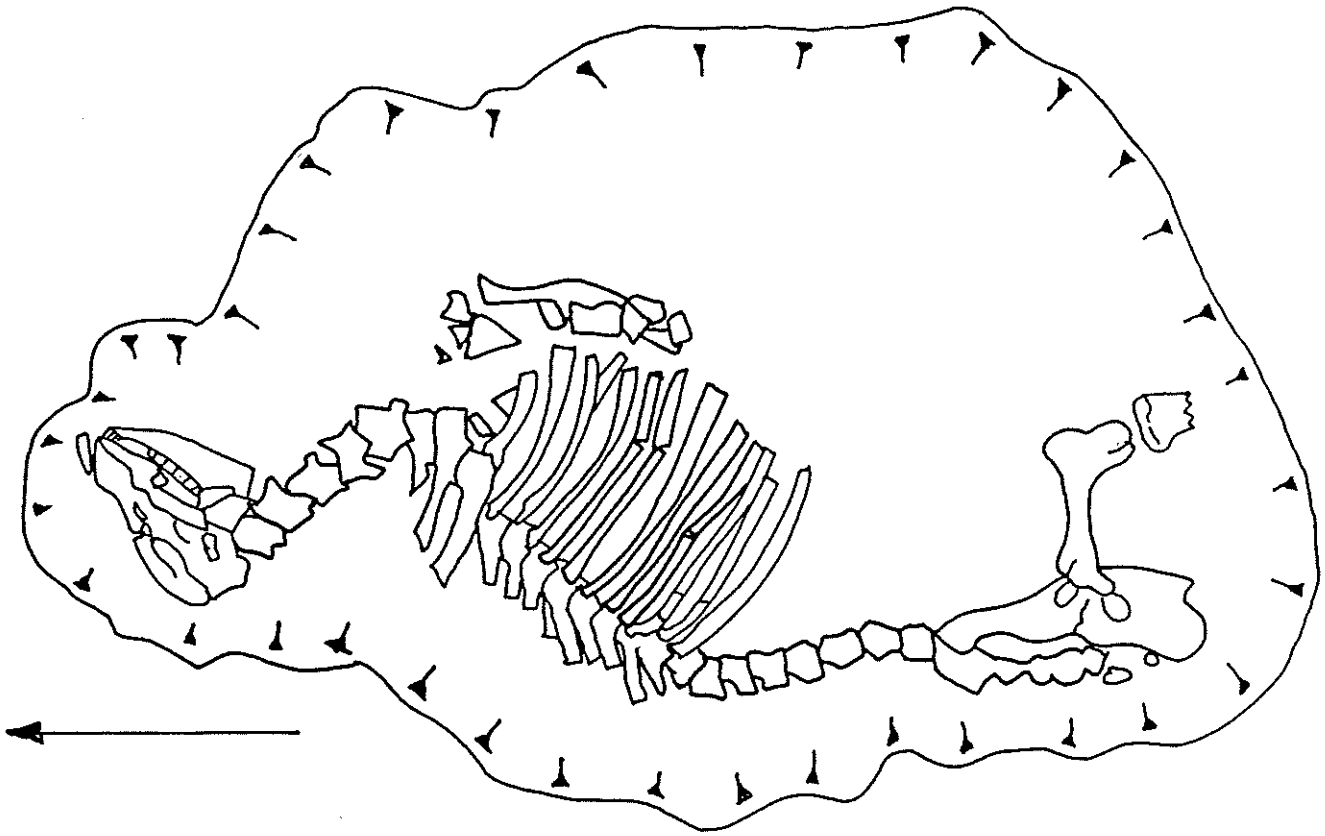


FIGURE 6. F4109: BURIAL 12 (CATTLE)

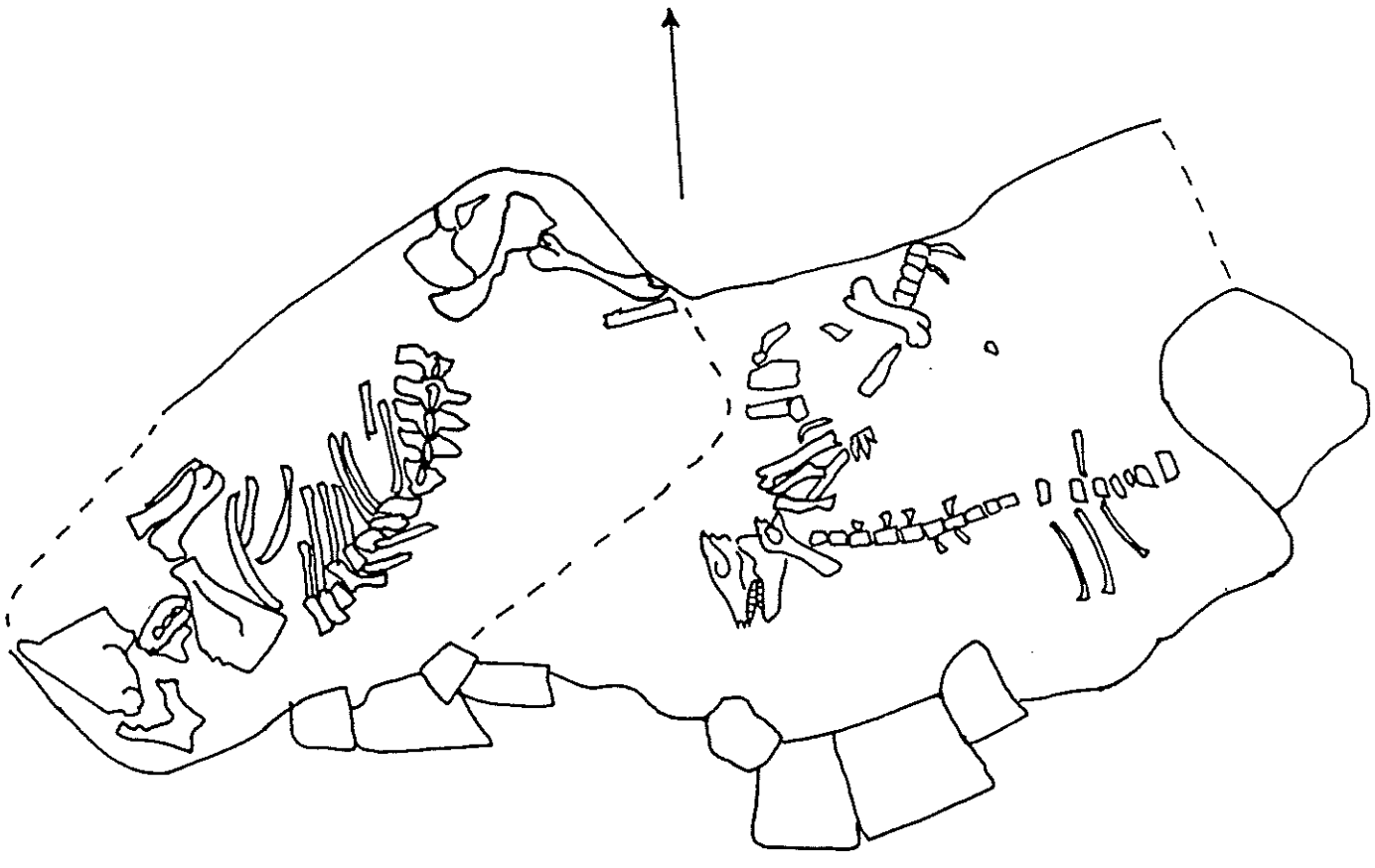


FIGURE 7. F449 AND F450: BURIALS 4, 5, 6 AND 7 (PIG)