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Summary

Pit FT 17 contained the remains of at least 18 sheep aged between 15 and 18 months; the majority were male, but at least three were female. No butchery or gnawing-marks were seen, and there are no missing parts of the skeleton which cannot reasonably be accounted for by a combination of the loss of small bones during excavation and some decay of weaker parts of the skeleton after burial. It seens likely that the sheep were buried in the pit as whole bodies, and that this happened as a single event some time in the summer. It is suggested that this was a group of surplus yearlings which died as a result of some accident, possibly poisoning or epidemic disease.

The Roman sherds in the pitfill provide a terminus post quem; the size of the sheep argues against a post-Mediaeval date. The simplest explanation would associate the pit and its contents with the post-Roman building and craft-working activity on the site, but this must be uncertain unless confirmed by direct dating.

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1. Introduction

The Cannington Cemetery was excavated in 1962 and 1963 under the direction of Philip Rahtz. The excavation revealed about 550 Late Roman and post-Roman burials which were west-east oriented and contained only a few grave goods. There was also some prehistoric, Roman and post-Roman settlement material, industrial waste and traces of structures (Rahtz 1977).

Few animal bones were found in the graves, and there was nothing to indicate that they were anything other than the remains of a few burrowing animals and stray bones accidentally included in the back-fills.

A large pit, FT 17 (Figure 1, on which it is marked as 'animal burial pit'), measuring about 3.10m by 1.55-2.40m and cutting down about 0.35m into the fissured bedrock, produced a large number of animal bones and bone fragments (AML 630978) which are the subject of this report. Photographs taken during excavation show that at least some of the bones appear to have been in articulation. The bones were briefly examined by Harcourt (1969) who reported that they were from at least eight young sheep.

The excavator has provided the following description of the context:

> "Briefly this was a large pit, irregularly dug, and backfilled with what appeared to have been dug out i.e. limestone rubble and soil. Among this fill were Late Roman and prehistoric sherds (common over the whole site); and the sheep etc. bones were at the base of the pit on the very ragged fissured quarried bedrock. Our initial interpretation was that this was the result of the burial of diseased animals by a farmer, in Late Roman or later times, but possibly quite modern i.e. 19th or 20th century. However, local and other people have said that no farmer would go to the trouble of digging a deep hole for this purpose in such intractable material; and in the light of these comments we have put in a proviso that while the disease explanation is the <u>simplest</u> one, a ritual interpretation cannot be ruled out on a site where there is so much mortuary evidence and other religious activity." (Philip Rahtz, pers. comm., February 1991)

The excavator therefore wanted to know a) whether the bones represented whole animals; b) how many animals there were, and of what ages; c) whether they were all sheep, or whether some were goats; and d) whether they appeared to be ancient. To these questions we added e) whether there was any evidence of butchery or gnawing, or other post-mortem alteration that might provide evidence about what had happened to the animals or bones; f) how many of the sheep were male and how many female, and g) whether anything could be said about the size and type of the sheep.

Initial examination confirmed that the vast majority of the bones were of young sheep but that there were a few other bones as well: one equid tooth; two cattle teeth and a cattle astragalus fragment; one sheep/goat tooth

from an older animal; and half a dozen shaft and other bone fragments of cattle/horse size. These are interpreted as accidental inclusions in the pit fill and are not further considered.

2. Methods

The young sheep bones were first sorted into different parts of the skeleton and unidentified fragments (only a small proportion of the total).

Diagnostic zones covering most of the skeleton were defined and counted following Watson (1979) in order to determine how many individuals were represented, and whether the pit contained whole bodies or parts of animals; they are listed in Table 1.

Distinctions between sheep and goat followed the criteria described by Boessneck (1969) for distal humerus, distal metapodia, astragalus and calcaneum, by Kratochvil (1969) for distal tibia, and by Payne (1985) for dP_3 and dP_4.

Age was determined by recording eruption and wear states of the mandibular cheek teeth following Payne (1973 and 1987); epiphysial fusion was recorded treating an epiphysis as unfused when it separated from the diaphysis without bone breakage, fusing when all or part of the 'fusion line' was still open, and fused when the 'fusion line' had closed even if still visible.

Sex was identified on the basis of the size and proportions of the cross-section of the shaft of the pubic bone, which is smaller in females and has a flatter cross-section. Two measurements were taken: SBPu, the diameter of the smallest circle that can contain the shaft of the pubis, and SHPu, the smallest diameter of the shaft of the pubis at the same point.

Butchery and gnawing marks were looked for, especially in positions where such marks are commonly found: thus carpals, tarsals and metapodia were carefully checked for skinning cuts, and long-bones and vertebrae for disarticulation and defleshing marks).

Selected measurements were taken mostly following the definitions of von den Driesch (1976).

The positions of the femoral nutrient foramina were recorded, the scapula index was calculated following Noddle (1978) and skull and horncore fragments were examined to provide further information about the type of sheep represented.

3. Description

The condition of the bones was generally moderate to poor, many of the bones being rather light and brittle with surfaces generally in fairly poor condition. Many of the bones were broken. Most of the breaks were simple transverse breaks across points of weakness, many of which appeared to be recent, indicating that the bones were probably complete when buried; there were few longitudinal splinters or 'spiral' fractures (which would indicate breakage while the bone was still fairly fresh). No butchery or gnawing

marks were seen despite a careful search, even on bones whose surfaces were well-preserved.

a. Number of individuals.

A summary of diagnostic zone counts is given in Table 1 and, in a simplified form, in Figure 2. The highest minimum number of individuals (MNI) is indicated by counts for left upper first and second molars, of each of which there are 18. MNIs for other zones vary widely. High and low MNI counts follow no obvious anatomic pattern (which might indicate that some parts of the body had been removed). Instead, it would appear that the lower counts can best be explained by a combination of loss of smaller bones during excavation (especially affecting incisors, anterior dPs, carpals, patella, smaller tarsals, second and third phalanges, and smaller long-bone epiphyses) and destruction of weaker parts of the skeleton (e.g. lower counts for proximal humerus and proximal tibia), and that, taken together with the lack of any butchery marks, the simplest explanation is that whole bodies were buried in the pit.

We tried to match left and right sides to see whether more than 18 animals might have been present; we felt no confidence in the results, partly because of the condition of the bones and partly because the animals were all very similar in size and development, and the attempt was abandoned.

b. Sheep or goats

The number of bones that could be identified to species was relatively small because of the immaturity and condition of the bones; but, as Table 2 shows, the number of positive identifications of sheep and the absence of any positive identifications of goat indicate that all the animals were sheep.

c. Ageing.

Table 3 gives wear state data for dP_4, M_1 and M_2. As this shows, the M_2s are in early wear (states 2A - 6A), most of the M_1s are in early full wear (state 9A), and most of the dP_4s are in middle wear (states 14L - 19L). Only one M_3 was found, an unerupted crown at an early stage of formation, and there were a few permanent premolar caps at a similar stage of development. If M_2 is taken to erupt at between 9 and 12 months, as it does in sheep today, the Cannington sheep were probably between 15 and 18 months old at the time of death: this estimate is based on wear data for Soays, Scottish Blackface and other breeds (Gillian Jones, pers. comm., April 1991; also SP unpublished data) and on the eruption and wear data given for Angora goats by Deniz and Payne (1982), which are all in close agreement.

The range of wear states recorded is the kind of variation that would be expected in a group of yearlings from a single flock or population with a single birth season; on this basis, the simplest interpretation is that these animals are a group from the same flock or local population, that all died at the same time in the summer of their second year.

Epiphysial fusion data are consistent with this (Table 4). Scapulae, acetabula, proximal radii, distal humeri and proximal second phalanges are all fused or fusing, distal metapodia and the later-fusing epiphyses are all unfused, while some distal tibiae, calcanea and proximal first phalanges are fused or fusing and some are unfused.

d. Sex

Measurements of the pubic shaft (Figure 3) indicate that males and females are both represented, but that males outnumber females. Examination of other pubic bones that could not be measured increases the number of bones that could be sexed (Table 1), and indicates that the assemblage includes at least 10 males and 3 females.

e. Measurements and type.

Measurements are given in Table 5. While some allowance needs to be made for the fact that the animals were not fully grown, it is still clear that they were small light sheep, similar in size to Soays or slightly smaller, slightly smaller on average than Roman and Mediaeval sheep from Exeter, and considerably smaller on average than post-Mediaeval sheep from Exeter (Table 6).

This is the kind of size that might be expected for post-Roman sheep in the Cannington area, but is not of itself evidence of post-Roman date; sheep of similar size are found as early as the Iron Age and as late as the Mediaeval period. It does, however, probably exclude a post-Mediaeval date; sheep of the nineteenth and twentieth centuries would be even larger than sheep from the sixteenth to eighteenth centuries.

A small number of horncore fragments, all in poor condition, indicate that some at least of the sheep were horned, and are of a size that indicates that they were probably male. The shortage of horncore fragments probably simply reflects the condition of the bones, and should not be taken as indicating that some of the sheep were hornless though this cannot be excluded; no hornless frontals were noted.

The positions of nutrient foramina in the shafts of the femora were recorded. Proximal anterior foramina are slightly commoner (6L, 8R) than distal posterior foramina (5L, 6R); distal midshaft foramina (2L, 1R) are scarce. One right femur has two foramina, one proximal anterior and the other distal midshaft. Predominance of proximal anterior foramina is seen in Soays and in breeds such as Clun Forest and Hampshire Down, while in northern breeds such as Manx, Swaledale and Ryeland distal posterior foramina are commoner (Noddle 1978, Figure 40). The frequencies seen in the Cannington sheep are not unexpected in sheep from southern England, and are similar to those reported for Iron Age sheep from South Cadbury and Roman and Mediaeval sheep from Exeter (Noddle, loc. cit.).

The scapula index (distance from the base of the spine to the edge of the glenoid divided by the smallest width of the neck of the scapula) averages 1.08 (n=11, 4L, 7R), varying between 1.00 and 1.13; this is lower than is typical of Soays (Noddle 1978), falls in the middle of the range seen in Roman and in Mediaeval sheep from Exeter (Maltby 1979, Figure 14), but is higher than reported by Noddle (1983, Table 10.9) for Mediaeval Hereford and Loughor Castle.

f. Pathology.

One distal humerus had a series of small grooves on the medial part of the articular surface, parallel to the direction of movement of the joint. These might be signs of osteoarthritis, though unaccompanied in this case by

eburnation, extension of the articular surface or exostoses (Baker and Brothwell 1980: p. 115). The proximal end of this bone is unfused, showing that it is not from an older animal.

4. Discussion and conclusions

The pit contained the remains of at least eighteen sheep aged between 15 and 18 months; the majority were male, but there were at least three females. No butchery or gnawing marks were seen, and there are no missing parts of the skeleton that cannot be accounted for by a combination of loss of small bones during excavation and some decay of weaker parts of the skeleton after burial. It seems likely that the sheep were buried in the pit as whole bodies, and that this happened as a single event some time in the summer.

There is nothing to suggest a ritual interpretation apart from the proximity of the pit to the cemetery; the excavator refers to 'background noise' of settlement material, and industrial waste (Rahtz, 1977), suggesting secular as well as ritual activity. While digging a hole of this size into the bedrock would have required some effort, the hole may already have existed: the site plan shows two or three quarry pits of similar size.

A group of yearlings, most of which are male, suggests animals culled from a flock for eating or for sale. In this case it appears that something must have happened -- some accident of epidemic disease, or poisoning, or drought and resulting shortage of feed, or some incident of civil unrest -- which led to the death and burial, without being butchered and used, of a group of what should have been prime meat animals. Perhaps most likely is that this group of animals died from poisoning, maybe from eating ragwort or yew, or from bloat after getting into a field of green corn. The absence of skinning marks seems a little surprising, though it is possible, with care, to skin an animal without leaving marks; the pit is large enough for eighteen whole young small sheep, especially if they died in the summer when they would have been carrying less fleece than in the winter. It may be that the skins were thought to be contagious, or that the animals were part of a larger group on its way to market and the drover could not manage to carry the skins with him.

The Roman sherds in the pitfill provide a *terminus post quem*; the size of the animals argues against a post-Mediaeval date. The simplest explanation would appear to be to associate the pit with the post-Roman buildings and craft-working, but this association must be regarded as uncertain unless confirmed by direct dating. Samples will be submitted for radiocarbon dating.

5. Material and Archive

The bones will be deposited in Taunton Museum.

6. Acknowledgements

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7. Bibliography

Baker, J. and Brothwell, D., 1980
Animal diseases in archaeology. Academic Press.

Boessneck, J., 1969
Osteological differences between sheep and goat. Pp. 331-358 in: Brothwell, D. and Higgs, E. (eds.), *Science in Archaeology*. Thames and Hudson.

Boessneck, J., Muller, H.-H. and Teichert, M., 1964
Osteologische Unterscheidungsmerkmale zwischen Schaf (*Ovis aries* Linne) und Ziege (*Capra hircus* Linne). *Kuhn-Archiv* 78: 1-129.

von den Driesch, A., 1976
A guide to the measurement of animal bones from archaeological sites. Peabody Museum Bulletin 1, Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge (Mass.).

Deniz, E., and Payne, S., 1982
Eruption and wear in the mandibular dentition as a guide to ageing Turkish Angora goats. Pp. 155-205 in: Wilson, B., Grigson, C. and Payne, S. (eds.), *Ageing and sexing animal bones from archaeological sites*. British Archaeological Reports, British Series 109.

Harcourt, R., 1969
Animal bones from Cannington. Ancient Monuments Laboratory Report 1551.

Kratochvil, Z., 1969
Species criteria on the distal section of the tibia in *Ovis ammon* f. *aries* and *Capra aegagrus* f. *hircus*. *Acta Veterinaria (Brno)* 38: 483-490.

Maltby, M., 1979
Faunal studies on urban sites. The animal bones from Exeter 1971-1975. Exeter Archaeological Reports 2, Dept. of Prehistory and Archaeology, University of Sheffield.

Noddle, B.A., 1978
Some minor skeletal differences in sheep, pp. 133-143 in: Brothwell, D.R., Thomas, K.D. and Clutton-Brock, J. (eds.), *Research problems in zoo-archaeology*. Occasional Publication 3, Institute of Archaeology, London.

Noddle, B.A., 1983
Size and shape, time and place: skeletal variations in cattle and sheep. Pp. 211-238 in: Jones, M. (ed.) *Integrating the subsistence economy*, British Archaeological Reports, International Series 181.

Payne, S., 1973
Kill off patterns in sheep and goats: the mandibles from Asvan Kale. *Anatolian Studies* 23: 281-303

Payne, S., 1985
Morphological distinctions between the mandibular teeth of young sheep, *Ovis*, and goats, *Capra*. *Journal of Archaeological Science* 12: 139-147.

Payne, S., 1987
Reference codes for wear states in the mandibular cheek teeth of sheep and goats. *Journal of Archaeological Science* 14: 609-614.

Payne, S. and Bull G., 1988
Components of variation in measurements of pig bones and teeth, and the use of measurements to distinguish wild from domestic pig remains. *Archaeozoologia* 2: 27-66.

Rahtz, P. 1977
Late Roman cemeteries and beyond. Pp. 53-64 in: Reece, R. (ed.), *Burial in the Roman world*. CBA Research Report 22.

Silver, I.A., 1969
The ageing of domesticated animals. Pp. 283-302 in: Brothwell, D. and Higgs, E.S. (eds.), *Science in Archaeology*. Thames and Hudson.

Smith, R.N., 1956
Fusion of the epiphyses of the limb bones of the sheep. *Veterinary Record* 68: 257-258.

Watson, J.P.N., 1979
The estimation of the relative frequencies of mammalian species: Khirokitia 1972. *Journal of Archaeological Science* 6: 127-137

Figure 1: Plan of Cannington cemetery showing the position of the animal burial pit in relation to the graves and other features (from Rahtz 1977).

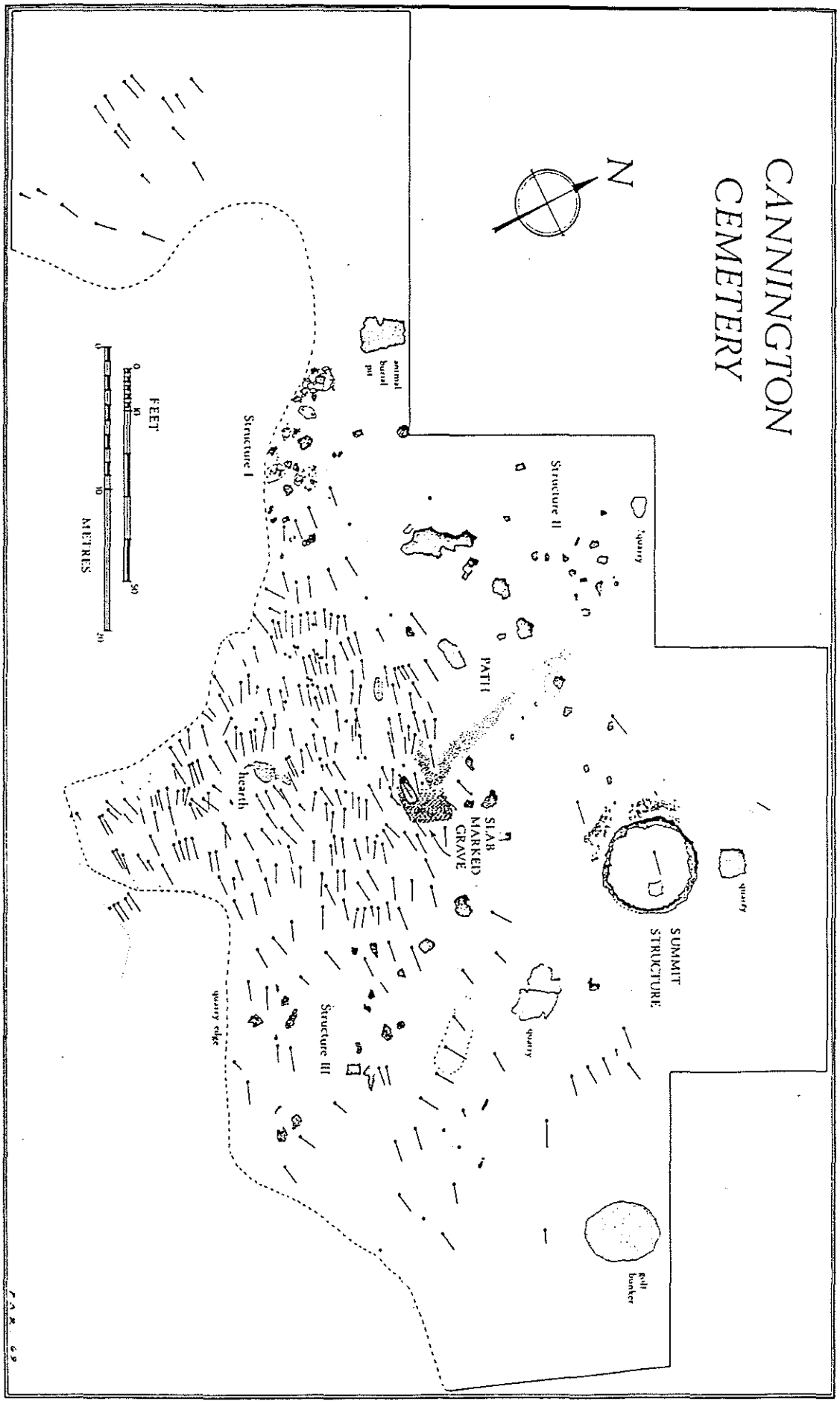

Figure 2: Cannington Cemetery, Pit FT 17, young sheep: MNI estimates for different parts of the skeleton based on diagnostic zone counts.

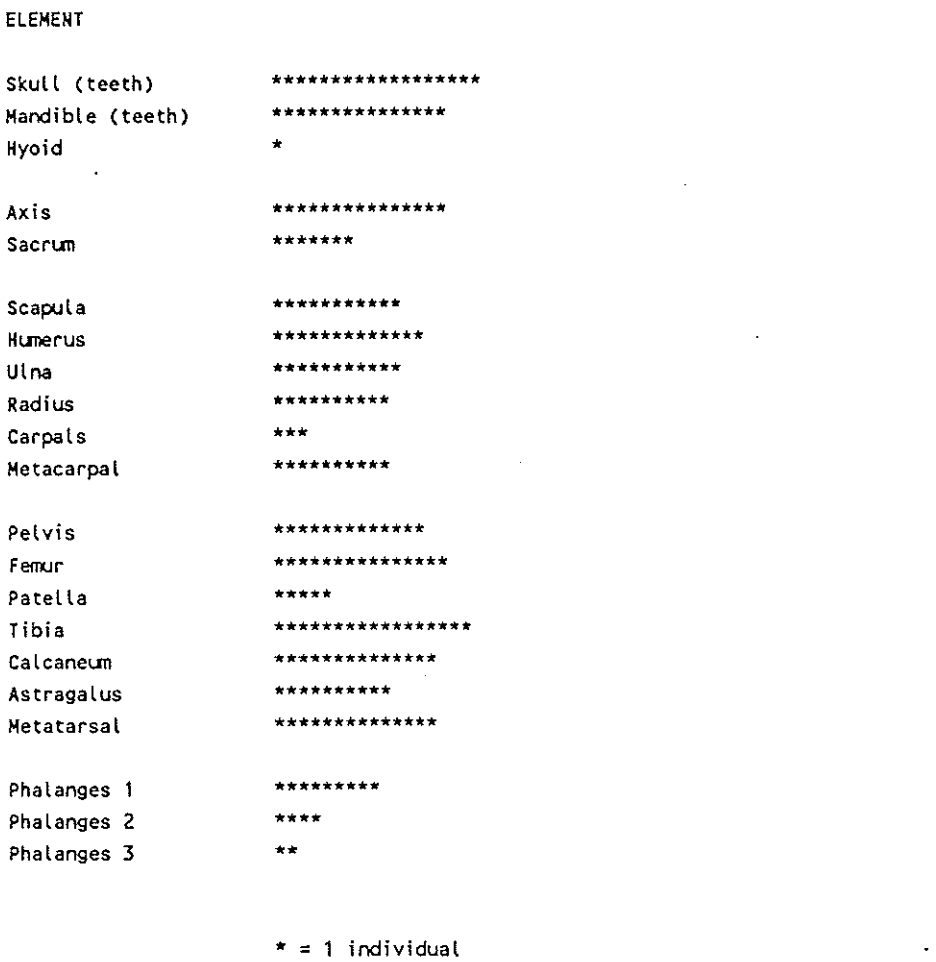

Figure 3: Cannington sheep: identification of male and female pelves, based on pubic shaft measurements.

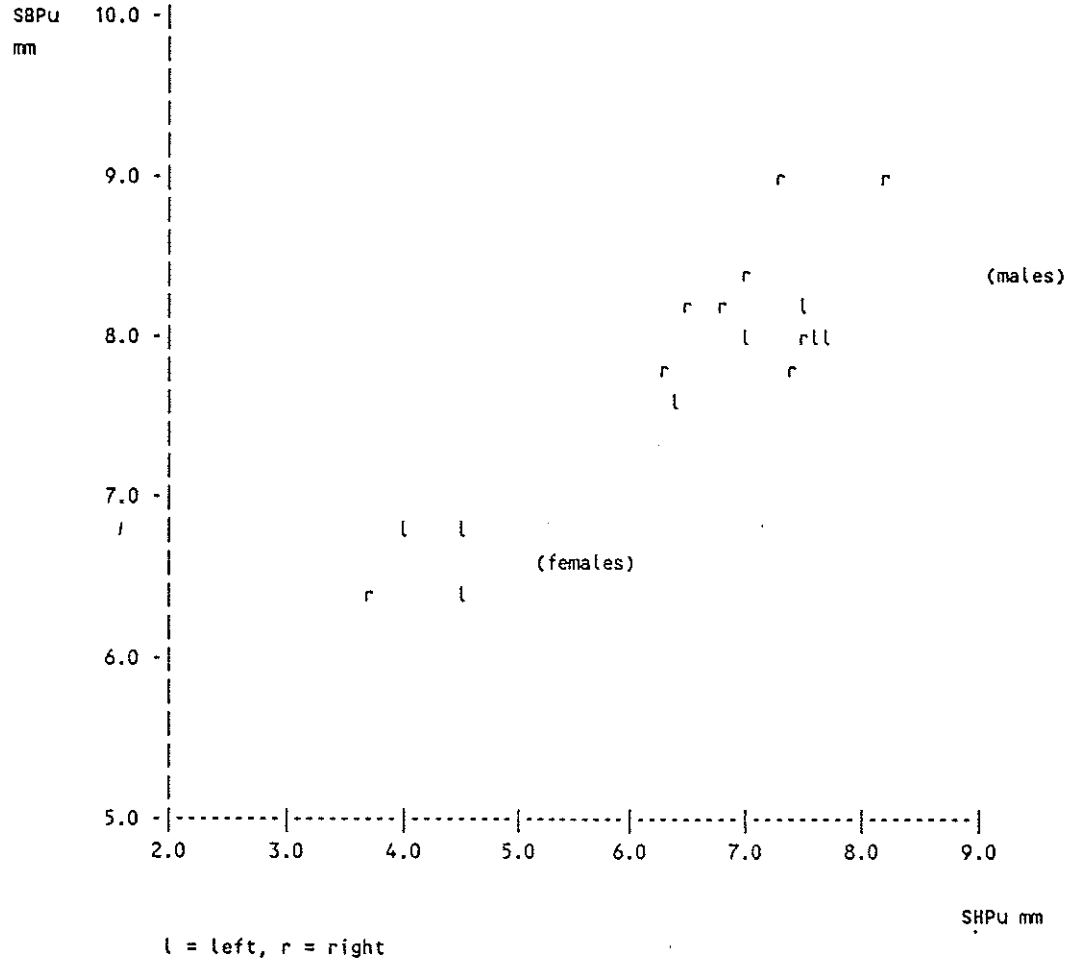

Table 1: Cannington Cemetery, Pit FT 17, young sheep: diagnostic zone counts and MNI estimates.

Element	Diagnostic Zone	MNI estimates Left	Right
Skull	occipital condyle	11	9
	petrous	8	7
Mandible	condylar process	11	11
Teeth	upper M^3	0	0
	M^2	18	17
	M^1	18	14
	p^4	1	0
	p^3	0	1
	dp^4	11	9
	dp^3	6	3
	dp^2	4	1
	lower M_3	0	1
	M_2	15	14
	M_1	12	12
	P_4	1	1
	dp_4	10	10
	dp_3	7	5
	dp_2	3	1
	di_{1-3}, dc (L 0, R 1/4)	0	1
	I_1	3	5
Hyoid	whole hyoid	1	0
Axis	odontoid	15	
Sacrum	anterior centrum	7	
Scapula	glenoid cavity	5	11
Humerus	proximal trochanter epiphysis	1	5
	proximal caput epiphysis	3	4
	proximal unfused metaphysis	7	9
	nutrient foramen	13	9
	distal articulation	10	12
Ulna	proximal epiphysis	0	1
	proximal articulation	9	11
Radius	proximal articulation	10	10
	nutrient foramen	9	9
	proximal end of ulnar groove	10	9
	distal unfused metaphysis	10	9
	distal epiphysis	3	5
Carpals	radial carpal	1	0
	intermediate carpal	3	1
	ulnar carpal	2	0
	2+3 carpal	3	1
	4 carpal	0	0
	accessory carpal	0	0

Table 1, cont.

Element	Diagnostic Zone	MNI estimates Left	Right
Pelvis	iliac segment of acetabulum	13	9
	ischial segment of acetabulum	12	11
	pubic segment of acetabulum	9 (3F+6M)	11 (1F+10M)
Femur	proximal caput epiphysis	12	12
	proximal trochanter epiphysis	6	7
	proximal unfused metaphysis	15	15
	distal unfused metaphysis	13	15
	distal epiphysis medial condyle	11	8
	distal epiphysis lateral condyle	7	9
Patella	whole patella	1	5
Tibia	proximal epiphysis	6	6
	proximal unfused metaphysis	9	8
	nutrient foramen	17	14
	distal metaphysis	14 (5f+9u)	16 (5f+11u)
	distal epiphysis/articulation	11 (5f+6u)	10 (5f+5u)
Tarsals	calcaneum	14	12
	naviculo-cuboid	6	4
	astragalus	8	10
	2+3 tarsal	1	1
Metapodia	proximal metacarpal	7	10
	proximal metatarsal	14	11
	distal metapodial half-shaft metaphysis (52/8)	7	
	distal metapodial half-epiphysis (25/8)	4	
Pr. sesamoid	whole sesamoid	0	
Phalanx 1	proximal epiphysis/articulation (49f+0u=49/8)	7	
	proximal metaphysis (49f+19u=68/8)	9	
Phalanx 2	whole phalanx (26/8)	4	
Di. sesamoid	whole sesamoid	0	
Phalanx 3	whole phalanx (10/8)	2	

Notes: Zones counted only if >50% present. When a zone occurs more than once in the body, raw counts are given and divided by the frequency in the skeleton to give MNI estimates. F = female, M = male; f = fused and fusing, u = unfused.

Table 2: Cannington Cemetery, Pit FT 17, young sheep: sheep/goat distinctions.

Part	Sheep	?Sheep	Unid	?Goat	Goat
dP3 and dP4	4	2	.	.	.
dP3	1	2	3	.	.
dP4	6	7	1	.	.
Humerus distal	.	12	10	.	.
Tibia distal	.	10	11	.	.
Astragalus	12	3	3	.	.
Calcaneum	.	10	16	.	.
Metacarpal distal	2	.	.	.	.
Metatarsal distal	1	.	.	.	.

Note: Distinction not attempted on distal metapodial half epiphyses.

Table 3: Cannington Cemetery, Pit FT 17, young sheep: wear states of dP_4, M_1 and M_2 (after Payne 1987).

dP_4

Wear State Code	Left	Right
14L	2	1
16L	2	3
17L	2	1
17M	(1)	0
18L	2	1
19L	0	1
	0	1
22M	1	2

Note: () = broken, probable wear state

M_1

Wear State Code	Left	Right
8A	0	1
9A	12	11

M_2

Wear State Code	Left	Right
2A	3	3
3A	1	0
4A	1	5
5A	7	6
6A	3	0

Table 4: Cannington Cemetery, Pit FT 17, young sheep: epiphysial fusion data.

Bone	Ossification centre	Fusion age Clun Forest (Silver 1969, after Smith 1956)	Cannington fusion state			
			fused	fusing	unfused	?
Humerus	distal epiphysis	4-6m	18	4	0	0
Radius	proximal epiphysis	4m	20	0	0	0
Scapula	bicipital tuberosity	5m	14	0	0	2
2nd Phalanx	proximal epiphysis	6-8m	23	3	0	0
1st Phalanx	proximal epiphysis	9-10m	27	22	19m,0e	0
Tibia	distal epiphysis	15m	2	8	20m,11e	0
Calcaneum	tuber	15m	0	2	19m,0e	5
Metapodia	distal half epiphysis	15-16m	0	0	52m,25e	0
Femur	proximal epiphysis	17-19m	0	0	30m,24ce,13te	0
Humerus	proximal epiphysis	17-28m	0	0	16m,7ce,6te	0
Femur	distal epiphysis	18-20m	0	0	28m,19e	0
Ulna	olecranon	21m	0	0	15m,1e	4
Radius	distal epiphysis	21m	0	0	19m,8e	0
Tibia	proximal epiphysis	25-30m	0	0	17m,12e	0

Note: Right and left sides counted together; e = epiphysis, m = metaphysis, c = caput, t = trochanter

Table 5: Cannington Cemetery, Pit FT 17, young sheep: measurements.

	Left				Right			
SCAPULA								
	GLP	SLC	AHG	index (AHG/SLC)	GLP	SLC	AHG	index (AHG/SLC)
	-	157	(175)	1.11	292+	166	(184)	1.11
	-	172	(172)	1.00	-	178	(187)	1.05
	-	149	(169)	1.13	270+	160	(171)	1.07
	-	142	(159)	1.12	299+	176	(186)	1.06
					270	155	(159)	1.03
					267+	150	-	
					275+	162	-	
					284+	156	(167)	1.07
					291+	162	(175)	1.08
HUMERUS								
	BT	HT	HTC	SD				
	(259)	162	132	123	261	165	133	126
	(241)	143	119	105	(248)	151+	118	116
	(231)	152	115	113	255	168	135	119
	(251)	168	135	121	(242)	159	120	120
	(254)	157	127	124	-	166	131	123
	-	164+	131	116	(254)	157	125	122
	(252)	153	118	115	-	157+	122	117
	-	156	(117)	-	-	144	118	105
	(256)	162	122	-	-	-	117	-
	-	-	121	-	-	-	121	-
	-	-	-	104	246	154	125	-
	-	-	-	105	-	(169)	132	-
	-	-	-	117	-	-	-	146

Note: All definitely or probably proximally unfused.

Table 5 cont.

	Left			Right		
RADIUS						
	BpP	BFpP	SD	BpP	BFpP	SD
	278+	244+	138+	278+	254+	156
	270+	245+	146+	-	-	141
	248+	227+	128	282+	-	-
	-	-	129	274+	250	-
	244+	222+	119	271+	241	-
	265+	247+	-	256+	237+	-
	276+	253+	-	261+	243+	-
	252	239	-	273	-	-
	265+	242+	-	-	-	152
				-	-	127
				-	-	148
				-	-	143
				-	-	125
				-	-	118
				-	-	145
				-	-	146

Note: All definitely or probably distally unfused.

METACARPUS						
	Bp	Tp	SD	Bp	Tp	SD
	203+	146+	118	196+	136+	-
	-	-	127	-	-	113
	181	133	-	188	137	117
	-	-	119	207+	147+	-
	196	135+	104	198+	149+	113
	210+	143+	118	185+	133+	-
				-	-	116
				203+	145+	-
				197	139+	126

Note: All definitely or probably distally unfused.

Table 5 cont.

PUBIS

Left			Right		
SBPu	SHPu	Sex	SBPu	SHPu	Sex
68	40	F	77	74	M
68	45	F	(63)	37	F
(64)	45	F	81	65	M
76	64	M	90	73	M
80	70	M	79	76	M
80	76	M	81	68	M
82	75	M	77	63	M
79	77	M	83	70	M
			89	82	M

FEMUR

Dc	Dc
179	179
172+	176
167	184
167	172
177	189+
177	181+
186	178
183	
179	

Note: All unfused.

TIBIA

BdP	SD	Fusion	BdP	SD	Fusion
215	-	f	217	91	f
226	-	fg	(245)	104	fg
245	-	fg	-	96	fg
240+	96	fg	247	-	fg
245+	97	fg	211+	-	u
239	-	u	228	-	u
228+	-	u	241	-	u
211	-	u			
242+	-	u			

Note: All definitely or probably proximally unfused.

Table 5 cont.

Left			Right		
ASTRAGALUS					
GLl	GLm	Bd	GLl	GLm	Bd
276+	259	168	259	257	165+
241+	234+	154+	245	241	164
250	244	175	242+	234+	157+
246	240	163	-	226+	-
245	236	-	247	233	161+
265	253	174	269	254	177
269	256	-	245	234+	160+
264	248	172	-	259	168+

Left		Right	
METATARSUS			
Bp	SD		
194	105	179+	-
177+	95	177	-
192+	102	193	-
176+	96	179+	105
184	102	178+	97
184+	103	197+	101
162+	-	187	108
170	-	182+	102
186+	101	181+	104
		166+	85+
		176	96

Note: All definitely or probably distally unfused.

Notes: All measurements are expressed in tenths of a millimetre.
Scapula AHG is the distance from the base of the spine to the edge of the glenoid, following Boessneck, Muller and Teichert (1963).
Humerus HTC is the smallest diameter of the trochlear constriction, following Payne and Bull (1988)
Pubis SBPu and SHPu are defined above (p. 2).
Otherwise measurements follow von den Driesch (1976), with clarification for radius BpP and BFpP and for tibia BdP following Payne and Bull (1988).
f = fused, fg = fusing, u = unfused, + = slighly chipped or abraded, up to 2% too small, () = approximate, within 2%.

Table 6: Cannington Cemetery, Pit FT 17, young sheep: selected measurements compared with measurements of sheep from Exeter (Maltby 1979).

Element	Measurement	Period	n	Range	Average
Scapula	GLP	Exeter, Roman	23	25.9-32.1	28.4
		Exeter, 1000-1500	68	27.3-33.1	29.6
		Exeter, 1500-1600	38	27.3-35.3	31.0
		Exeter, 1600-1800	47	28.7-36.6	32.4
		Cannington	9	26.7-29.9	27.9
Humerus	BT	Exeter, Roman	35	23.0-28.8	25.7
		Exeter, 1000-1500	134	23.3-31.1	26.3
		Exeter, 1500-1600	62	24.0-30.2	26.5
		Exeter, 1600-1800	80	23.0-32.3	27.6
		Cannington	13	23.1-26.1	25.0
Radius	Bp	Exeter, Roman	47	23.5-31.3	27.3
		Exeter, 1000-1500	163	24.4-33.4	28.6
		Exeter, 1500-1600	83	24.6-32.7	29.0
		Exeter, 1600-1800	75	24.9-35.7	30.6
		Cannington	15	24.4-28.2	26.6
Tibia	Bd	Exeter, Roman	66	21.3-29.3	23.4
		Exeter, 1000-1500	127	20.6-28.0	24.2
		Exeter, 1500-1600	39	23.5-31.5	25.6
		Exeter, 1600-1800	41	22.5-30.4	26.3
		Cannington	15	21.1-24.7	23.2
Astragalus	GLl	Exeter, Roman	13	23.6-32.9	26.2
		Exeter, 1000-1500	29	23.5-29.0	26.3
		Exeter, 1500-1600	14	22.1-29.0	26.6
		Exeter, 1600-1800	13	24.5-31.3	28.2
		Cannington	14	24.1-27.6	25.4

Note: Right and left sides both used in calculating Cannington averages.