GGJ work on sheep age in Farley and Jones 2012.

Jones, G. G. 2012 The animal bone from the ritual deposit, in Farley, M. and Jones, G.G., *Iron Age Ritual, a Hillfort and Evidence for a Minster at Aylesbury, Buckinghamshire*, 29-49. Oxford: Oxbow Books.

This section in the report on the Prebendal, Aylesbury, Bucks, UK, includes new work on estimating age at death in sheep using teeth and long bones. It is sent primarily to make the ageing research available to zooarchaeology colleagues, but the site is a nationally important one, so it is hoped that where possible the book will be bought and recommended to archaeologists interested in Iron Age, and early Saxon, studies. In the early fourth century BC (22 RC dates) a striking ritual area was created. This contained the remains of four children and a young woman; most of them were accompanied by animals. These articulated remains adjoined a substantial deposit of mainly disarticulated animal bone consisting predominantly of sheep.

The pdf here includes introductory pages, the Title pages, Contents, Site Summary, the section on the animal bone from the ritual deposit, and the references mentioned in this section (with permission from the publishers).

For the new work on estimating the age of death in lambs, Stage B (dp4 in wear and M1 not yet in wear) was subdivided and more detailed age estimates are given than was published in the 2006 live sheep work (Jones 2006). See Table 9, Method p.31, Evidence for season p.42-45, Figure 38 and Table 6.

For the new work on epiphysial fusion, a literature search and the early Iron Age sheep skeletons indicate more refined age estimates. See Table 10, Method p. 31-33, Discussion of the articulated animal remains p.36-37, and Evidence for season p. 43-45.

This introductory section includes Figure 38 and Tables 9, 10 and 31.
Table 31 from Appendix 2 gives the individual tooth wear stages.
Note, on the figure, that two rows (both age stage and the central point of the age estimate) are shown on the x axis – this is in fact easy to achieve in Excel.
Erratum, p.45. In the UK, a lamb is up to 12 months old, a hogget is 1 to 2 years, and mutton is over two years. (Try asking a butcher for hogget, though!)
A pdf of Appendix 2 which has the skeleton descriptions and measurements may be requested.

Table 9 Subdivision of Stage B, and other example ages from the reference study

	Central point	Majority of records	All records except outliers	No. of sheep observed
B15	1mo	1mo	1-2mo	20
B6+	2mo	2-3mo	1-4mo	33
Bt	3mo	3mo	2-4mo	35
C12	4 mo	3-5mo	3-7mo	80
D12	12mo	10-13mo	10-14mo	51
E12	23mo	20-30mo	19-36mo	85

B15: dp4 with one to five cusps in wear; B6+: six or more cusps in wear *and* M1 before 'Half up'; Bt: 'terminal', M1 'half up' to 'enamel wear'. The age class, e.g., '2mo' includes sheep seen between 1 month 16 days to 2 months 15 days old (Jones 2006 and the primary records).

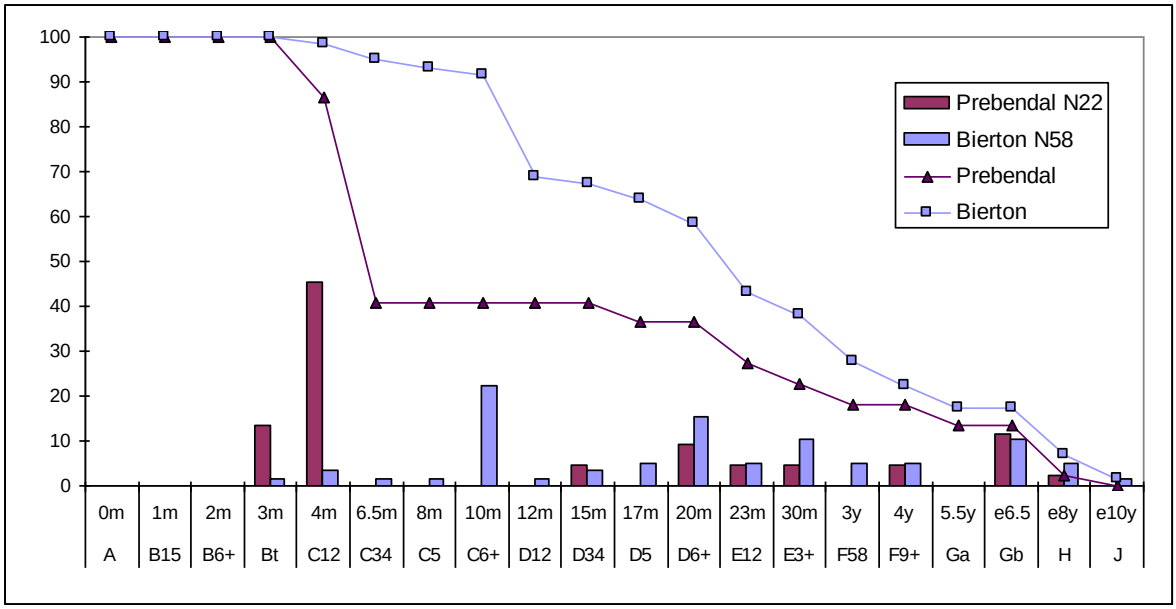

Figure 38 Sheep and goat mandible stages from the ritual area, compared with nearby Late Iron Age Bierton

The mandible categories show the Payne (1973) wear stage, subdivided using wear on the most recently erupted tooth; the age shown is the 'central point' of the live sheep study (Jones 2006, figs. 9 and 17), around which there is variation, see Table 9 and Method. Separation of sheep and goats: sheep - one at Bt, eight at C2; goats - F10 (Animal A9) and one at Gb. For individual tooth wear stages, see Appendix 2, Table 31.

Table 10 Sheep/goat epiphysial fusion

	Age of fusion (months)	% Unfused	% Partially fused	% Fused	Total
Radius proximal	1.5 – 4	*3*	*0*	*97*	38
Humerus distal	2 – 4	*6*	*38*	*55*	47
Scapula coracoid	3 – 5	*31*	*9*	*59*	32
Pelvis acetabulum	est. 3 - 5	*38*	*10*	*51*	35
male		*90*	*0*	*10*	(10)
female		*6*	*6*	*88*	(17)
Second phalanx	5 – 7	*45*	*4*	*51*	93
First phalanx	6 – 8	*46*	*1*	*53*	124
Tibia distal	12 – 24	*50*	*3*	*47*	38
Metacarpal distal	12 – 24	*57*	*0*	*43*	28
Metatarsal distal	12 – 24	*47*	*0*	*53*	36
Calcaneum	15 – 24	*46*	*0*	*54*	35
Ulna olecranon	18 – 30(31)	*60*	*0*	*40*	35
Radius distal	16 – 36(39)	*59*	*0*	*41*	32
Femur distal	16 – 36(48)	*61*	*0*	*39*	33
Tibia proximal	16 – 36(48)	*63*	*13*	*25*	32
Humerus proximal	16 – 42(52)	*65*	*8*	*28*	40
Percentage		*44*	*6*	*50*	
Total number		302	38	342	682

The articulated groups are included. Counts for unfused bones includes only metaphyses, not epiphyses, and, for the pelvis, only the iliac part of the acetabulum. Age of fusion from Lesbre, Tschirvinsky, Smith, Garcia-Gonzales and Hatting, quoted in Moran and O'Connor 1994, and Davis (2000, 375) rams, with Davis'estimate for castrates in parentheses (2000, 381); pelvis estimated from Chaix and Grant (1987)(and see Method).

Table 31 Tooth wear stages of the sheep and goats from the ritual area

Context	Species	(dp4)/P4	molars	Stage
3074	sheep	(12M)	H	Bt
3104 A2	sh/gt	nd	H	Bt
3175	sh/gt	(13L)	H	Bt
3136	sheep	(13L)	2A nd	C12
3070	sheep	(13L)	2A C	C12
3097	sh/gt	(S)	2A nd	C12
3112	sheep	(14L)	2A C	C12
3140	sh/gt	(S)	2A C	C12
3149	sheep	(13L)	2A C	C12
3150	sheep	(13L)	2A C	C12
3158	sheep	(13L)	2A C	C12
3174	sheep	(12M)	2A C	C12
3174	sheep	(13L)	2A C	C12
3089	sheep	(17L)	8A 4B C	D34
3149	goat(?)	(S)	9A 6A H	D6+
3048	sh/gt	(S)	9A 6A nd	D6+
3066	sh/gt	J	9A 6A 2A	E12
3103	sh/gt	S	9A 9A 5A	E3+
3053 A9	goat	14S	12A 9A 10H	F9+
3150	sh/gt	14S	15A 9A 11A	Gb
3131	goat	12S	12A 9A 11G	Gb
3140	sh/gt	12S	15A S nd	G/H

Tooth wear stages: C – perforation in the crypt, H – half up, J – just in wear, enamel only (Ewbank *et al* 1964); other wear stages follow Payne (1985); S – tooth socket present; nd – no data.

Iron Age Ritual

a hillfort and evidence for a minster at Aylesbury, Buckinghamshire

Michael Farley and Gillian Jones

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Contents

Summary

The excavation of an area within the grounds of the Prebendal, Aylesbury, Buckinghamshire, adjacent to the parish church of St Mary's, showed that the town, which lies on a slight spur, is sited within a univallate hillfort.

Use of the area in the earlier prehistoric period was indicated by worked flint and a Beaker sherd. In the early fourth century BC a striking ritual area was created. This contained the burials of four children and a young woman; most were accompanied by animals. Some additional unarticulated human bone was also present. The articulated burials adjoined a substantial deposit of animal bone consisting predominantly of sheep (a minimum of twenty-one), mainly disarticulated although some articulated joints were present. Age at death estimates indicate the season of the activities, and new methodological work is presented using teeth and long bones. Some of the bones from the 'bone mass' were burnt. A few artefacts and some ceramic were included within the deposit. The whole implies a complex ritual sequence. Radiocarbon dates on bone from the deposit suggest that some of the associated ceramic styles, which would conventionally be dated to the 'early' Iron Age, were still in use at the end of that period if not beyond, depending on where the Early-Middle Iron Age transition is placed.

Within a generation or so of the deposit's creation and still within the first half of the fourth century BC, a univallate hillfort was constructed. Immediately after its ditch had been dug, a human skull with attached vertebrae was deposited on the base of the ditch. Radiocarbon dates on the skull provide a sound construction date for the fort. The preceding ritual deposit would have lain just inside the first-phase rampart of this fort. Later in the Iron Age, the ditch was recut. The upcast which formed the new rampart would have sealed most, if not all, of the ritual deposit.

The only other excavated features certainly of Iron Age date were two pits close to the ritual area and a possible post-hole within it. However, Iron Age material contained within features of later date and from elsewhere within the town indicates extensive contemporary occupation within the fort which did not continue into the later Iron Age.

A possible circuit for the hillfort is suggested, based on other observations within Aylesbury, and the fort's relationship to others in the vicinity is discussed. There are reports on animal and human bone, pottery, small finds, molluscs, seeds and charcoal. It is noted that three 'new' hillforts have been discovered in Buckinghamshire during the last thirty years.

During the Roman period there was only slight use of the hillfort's interior, although there is plenty of evidence for occupation locally and the course of Akeman Street runs immediately east of the town.

Aylesbury is first mentioned as a place in the *Anglo-Saxon Chronicle* annal for AD 571, although the precise date and nature of this entry is disputed. Aylesbury's early Saxon origins are considered in relation to Walton, a nearby settlement which flourished in the early Saxon period and whose name may include a 'British' element.

Early in the Middle Saxon period a palisade trench was dug into the hillfort's ditch which by that date had been largely infilled. After an interval, in the early eighth century, the palisade was replaced by a ditch. Both palisade and ditch were almost certainly the boundaries of an early minster church and it is very likely that the former existence of the hillfort influenced its siting here. An unusual piece of Merovingian glass with a moulded cross on its base that was recovered from a later medieval context, is likely to have been one of the minster's possessions. The extensive minster cemetery and later Saxon development of the town is briefly noted.

A significant Saxo-Norman grain deposit which has been radiocarbon dated to the eleventh-twelfth centuries is described.

The site had a complex later history. It was extensively utilised in the medieval period and was later traversed by a Civil War defence before becoming a formal garden in the eighteenth century, probably when the Prebendal House was occupied by John Wilkes, the radical parliamentarian. The later periods are only referred to in outline in this report.

area. Half of the bones occurred sporadically across the central area, from north to south, east of Burials 4, 1 and 2/3/5, but west of the main mass of animal bones. Only one human bone was found within the very dense mass of animal bones in the eastern part of the area.

One group of four human foot bones was found with the pig skeleton (Animal 1, 3098), the most northerly animal skeleton, quite near the human child, Burial 4. A few other human bones were found in this north-western area, including one found with the sheep skeletons A4 and A5.

Summary of human bone from the ritual deposit

To summarise, parts of five articulated individuals were identified, three of them children of about 4 years, 10 years and 12 years, one in the late teens and one an adult, probably female. The unarticulated remains indicate four further individuals, one immature and three adult.

Some human bones belonging to the articulated skeletons have been found in the intrusive medieval pits. For example, in Burial 2, the right proximal femur is from pit 720 and fits the distal femoral shaft from 3002.

The animal bone from the ritual deposit

Gillian Jones

Introduction

Associated with the Human Burials 1 to 5, to the western side of the ritual area, were the partial skeletons of eight sheep, two sheep(goat), that is, probably sheep not goat, one goat and a pig, plus two sheep skulls. To the east of these, there were further scattered animal bones, and in the eastern area there was a deep mass of bones. These included some further groups of articulated bones, but the majority were not articulated. Radiocarbon dates on one sheep skull (and six of the human bones) from the western area, and from eight sheep/goat bones from the bone mass, place the deposit as a whole in the early 4th century BC (see Radiocarbon Dating Report).

The bones were well preserved, many being complete. There was good survival and recovery of small bones, for example, carpals, tarsals, loose vertebral epiphyses and phalangeal epiphyses, although almost all were hand-collected. The surface of the bones was hard and little eroded. Only a handful bore chopmarks, and none showed gnawing marks. Burnt bones were fairly common, occurring mostly in the eastern mass of bones.

The location of the deposit is shown on Figure 8 (975), the overall distribution of bone within it on Figure 22, the animal partial skeletons on Figure 30 and the sequence of lifting and collection numbers on Figure 41. The bones found are summarized on Table 4 and illustrated on Figures 24–28 and 31–36.

Method

This section describes the methods used for identifying and recording the bones and classifying the partial skeletons. It gives some details and references regarding the age estimates for the sheep, which are used to interpret season of death from tooth wear. A re-interpretation of published sources, combined with the unusual collection of young sheep at the site, has also provided new information about the age of epiphysial fusion in young sheep.

Bone groups were classed as articulated on the basis of at

Table 4. Animal bone from the ritual deposit.

	Total BN	***BNZ***	***Min. No. Ind.***	***BN articulated, assoc. with Humans 1–5***	***BN eastern mass articulated***	***BN excluding articulated***
Cattle	207	136	5		19	188
Sheep/goat	2055+15s	1877+14s	28	414	80	1561+15s
Pig	65	61	3	55		10
Horse	2	2	1			2
Deer, probably red	3wkd		1			3
Total, main species	2332+15s	2076+14s	38	469	99	1764+15s
Cf. field vole	1					
Water vole	1					
Common toad	5					
Total identified	2339+15s					
Unidentified						
cattle-size	140					
sheep-size	684					
small mammal	5s					
Total	3163+20s					

S: sieved; wkd: worked; BN: number of bones; BNZ: the more complete bones, where at least one zone is more than half present, see Method; Min. No. Ind.: the minimum number of individuals. The final three columns show: the articulated remains associated with the human burials; articulated groups and skulls in the eastern mass of bones; and other bones found. The deer bones are all worked antler combs.

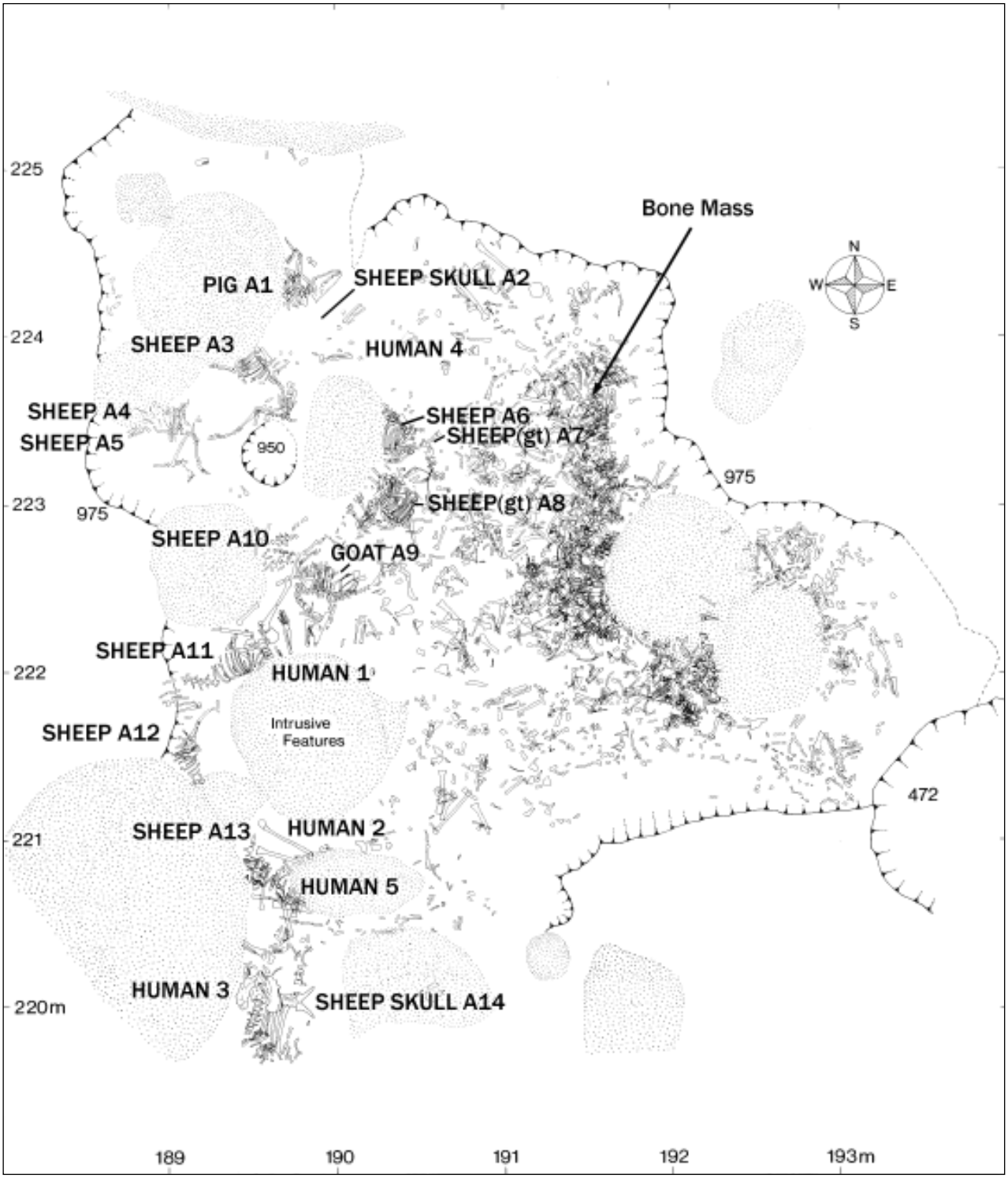

Figure 30. Plan showing human burials 1–5 and their associated animal burials 1–14, lying west of the 'bone mass'.

least two sources of information: the excavation notes, plans and photographs, and the bones themselves.

Articulated groups were classified following Grant (1984b), as:

a) skeletons: articulated skeletons with at least some of the axial skeleton and at least some limb bones;
b) articulated remains: less complete groups (*e.g.*, sets of vertebrae, or related groups of long bones) but recognized as articulated on excavation;
c) skulls.

The animal bones from the site were recorded on paper in

Figure 31. Goat A9 after excavation of Human 1, looking south.

1988 on two lists, one for the more complete bones (the 'zone' list), and the other for fragments. On the zone list (BNZ), were recorded:

- substantial pieces of skull; jaw-bones with at least one tooth.
- the following when more-than-half complete: tooth, vertebra, distal scapula, acetabulum of the pelvis, calcaneum, astragalus and phalanges.
- for the long bones the following parts (zones) of bones when more-than-half complete: proximal epiphysis, proximal metaphysis, upper and lower shaft, distal metaphysis and epiphysis; the main long bones have six zones and the metapodials have five (only one zone for the proximal end) (Jones 1994, Fig. 22).

The minimum number of individuals for the deposit as a whole was calculated from the most frequent more-than-half complete zone, which for cattle was five (right tibia distal metaphysis), for sheep/goat was 28 (right humerus lower half of the shaft) and for pig was three (right squamous temporal bone of the skull).

Identifications (including sexing pelves) were made using reference collections of the author and the Environmental Archaeology Unit, University of York, and published work by Lawrence (1980), Boessneck, Müller and Teichert (1964) and Payne (1987). Adult criteria were used for sexing immature pelves.

The method for recording mandibles and teeth followed Payne (1973) for sheep and goat and Grant (1982) for cattle and pig. The sheep and goat mandibles were summarized using Payne's wear stages, subdivided using wear on the most recently erupted tooth. Age at death estimates for sheep are based on observations of live sheep including traditional and rare breeds (Jones 2006). Summary statistics are shown on Table 6, column 3 – the central point, majority and range excluding outliers (based on Jones 2006, Figs 9 and 17). In Figure 38, the central point only is shown, for economy of space. Variation around the central point is of a few weeks at birth, months during the first year, but increases to years at later ages. In order to show more detail for lambs, Payne's stage B was also subdivided, with age estimates based on Figure 3 (Jones 2006) and the primary records, into B15 (one to five cusps in wear), B6+ (6 or more in wear and M1 before half up), and Bt (B terminal, M1 half up to enamel wear only, judged to be visible in the live animal), see Table 9.

As an example to show the method used to suggest season at death, see Table 6, there were three cases at stage Bt (skull A2 and two others). In the live sheep study, the majority of lambs at stage Bt were in the 3 months age class, which included sheep aged 2 months 16 days to 3 months 15 days. The likely season at death is thus 2½ to 3½ months plus the likely birth season (see *ibid*., 156–7, 168–9). The underlined area uses the central point (also 3 months, for Stage Bt), plus the central five weeks of the birth season. Measurements followed von den Driesch (1976), with additional measurements defined by Davis (1996).

Age at death estimates for epiphysial fusion in sheep

Table 5. Animal bone groups associated with human remains.

Context	***A1***	***A2***	***A3***	***A4***	***A5***	***A6***	***A7***	***A8***	***A9***	***A10***	***A11***	***A12***	***A13***	***A14****
	3098	3104	3128/	3045	3045	3144/	3143	3142/	3053/	3059	3039	3038	3008/	3018
			3078			3143		3126	3059/				3010/	
									3141				3012	
Species	Pig	Sheep	Sheep	Sheep	Sheep	Sheep	Sh(gt)	Sh(gt)	Goat	Sheep	Sh(gt)	Sheep	Sheep	Sheep
Class	skel.	skull	skel.	skel.	artic.	skel.	artic.	skel.	skel.	skel.	skel.	skel.	skel.	skull
Figure	30, 35	30	30, 33	30, 33	30, 33	33, 34	33, 34	33, 34	24, 26	33	24, 32	33	27, 28	27, 28
Plan	120	120	120,127	120	120	129	129	127,129	119,129	119	118	118	117,118	117
Assoc. Human	4	4	4	4	4	1	1	1	1	1	1	1	2	3
	L R	L R							L R				L R	L R
Skull	+	+							+				+	+
horncore		+ +							+ +					+ +
maxilla	+ +								+ +					+ +
mandible	+ +	+							+ +					
Axial														
cervical v	7	2		2		6	5	7	6		2		4	
thoracic v	4		12	7		12		12	13	9	12		8	
lumbar v			6					1	6	6	6	2		
sacrum			1						1	1	1			
caudal v			1								7			
rib p	7		24	4		15		20	20	11	12			
sternal v	2		5	4		6		7		6	7	3	19	
Fore limb	L R		L R	L R		L R		L R	L R	L R	L R	L R	L R	
scapula d	u u		u u	u +		u u		f f	f f	u	+ f		y +	
humerus p	u u		u	u u		u u		y y	f f	u	u u		u	
d	u u		u	y y		y y		f f	f f	u	y y	f		
radius p	u u		u	f f		f f		f f	f f		f f	f	f	
d	u u		u	u u		u u		f	f f		u u	f	u	
ulna p	u u		u	u u		u u		f f	f f		u u	f		
carpal	12		5	11		3		1	6		5	4		
metacarpal	uuuu		u	u u	u	u			f f		+	f	+	
Hind limb			L R	L R	L R				L R	L R	L R	L R		
pelvis acet.			u u							u u	y y	f		
femur p			u u							u		f		
d			u u							u	u u	f f		
tibia p			u u		u					u u	u u	y y		
d			u u		u					u u		f		
tarsal			6	6					10	6				
metatarsal			u u	u	u				f f	u u	u			
Phalanx 1st	4u		4u	13	u	2u			8f	3u				
2nd	3u		5u	12	u	2u			8f	2u				
3rd	1		3	10		2			8	1				
Sex			M						F	?M	-	F		F
Side on which														
buried	R		R	L		L		L	L	L	R	L	L	
Age estimate	6m	3m	1–3m	2–4m	2–4m	2–4m	-	29–42m	4½–6½yr	1–3m	3–5m	26–36m	3–5m	4–5yr

skel. skeleton; artic. articulated remains; + present; v vertebra; acet. acetabulum; p proximal; d distal; u not fused; y partially fused; f fused.

* radiocarbon date. Carpals, tarsals and phalanges from A4 and A5 were not separated. For age estimates, see Method, Appendix 2 and Table 9.

follow the combined ranges, quoted in Moran and O'Connor (1994), found by Lesbre, Tschirvinsky, Smith, Garcia-Gonzales and Hatting for the early-fusing elements, that is, the scapula (coracoid), distal humerus and proximal radius. It is known that these authors present original work, and the information is therefore likely to be more reliable than the much later figures given by Silver in 1969. The source of Silver's 1969 figures for sheep appears to be unknown. Additional information and useful discussion is available for the mid- and late-fusing elements, in Davis (2000) and Clutton-Brock *et al.* (1990). For the mid- and late- fusing elements, the ranges shown by Tschirvinsky, Smith, Garcia-Gonzales and Hatting, plus those found by Davis, are used (Table 5). Most of the ranges for rams in Davis' study (2000, 375) are within those shown by the other authors. The estimated age of fusion for castrates (*ibid*., 381) may be very much delayed, and these are shown in parentheses. Lesbre's figures for mid- and late-fusing elements have a higher upper range for most elements compared with Tschirvinsky, Smith, Garcia-Gonzales and Hatting. These upper ranges are within Davis' estimates for castrates for the proximal humerus, distal femur and proximal tibia, and outside them for the proximal ulna (olecranon), distal radius, proximal femur and calcaneum. The work of Chaix and Grant (1987) on 55 prehistoric sheep skeletons from the Sudan was helpful in comparing the order of fusion. In Garcia-Gonzales' work (1981), the 'partially fused' category is combined with the 'fused'. In the current work, bones were defined as partially fused when the shaft and epiphysis were joined but there remained an area not yet filled with bone.

For the sheep skeletons, comparison of which elements

Figure 32. Sheep A11 after excavation of Human 1, looking south.

were unfused, partly fused or fused has allowed a closer age estimate than can be made from single long bone elements. For example, using the estimates shown on Table 10, in sheep A8, the proximal humerus was partly fused, indicating that it is between 16 and 42 months old, but the distal radius and olecranon were both fused, suggesting that the sheep is older than 16–36 months. It is more likely, therefore, that the age at death is in the upper half of the proximal humerus range (29–42 months), and this was used as the age estimate. A similar method was used for sheep A12.

Articulated groups associated with Human Burials 1 to 5

The bone groups associated with the human burials are shown on Figure 30, as animals A1 to A14, numbered from north to south. They are described individually in the Catalogue (Appendix 2) and are cross-referenced to figures and plans (Fig. 41) on Table 5.

Animals associated with Human Burial 1

The largest group of partial skeletons, a total of seven sheep or goats, is related to the child, Human Burial I (Figs 24, 26, 31, 32, 33, 34). To the child's left, the skeleton of a young sheep (very probably sheep not goat) – A11, 3039 (Fig. 32) – lay on its right side facing the child skeleton, with the anterior rib-cage and fore legs underneath the left femur, sacral and pelvic region of the child. The skull is missing but this area was disturbed by two later pits. The pelvis and upper hind limbs lay awkwardly, bent up and over the spine. On the right hand side of the child lay the skeleton of an adult female goat (A9, 3053/3059). It lay on its left side with the neck bent back and the proximal humerus a few centimetres from the knee of the child. When deposited the knee appears to have been resting on top of the front of the animal (the sterno-cephalicus muscles). The head is on its left side, near the child's right fore arm. The burial may have been done very soon after slaughter, while the neck was still easily flexed. The toe bones of the left fore leg are curled back against a large stone. No marks were observed on the bones. On top of the fore feet of the goat was another young sheep (A10, 3059). The poorly-preserved rib-cage lay just north of the right knee of the child. The better preserved lower spine and hind legs were close to the large stone. In relation to the child skeleton, it lay with its back parallel to the child's right shin. There is no evidence about either the child's lower right leg or the sheep's head and neck region, due to disturbance by the later pit.

North-east of the main part of the goat skeleton (A9) there was a pair of goat lower hind limbs (3141), visible to the lower right on Figure 34. They were not recognized on excavation as belonging to the goat, but photographs and sketches of their position, and the maturity of the bones, make it certain beyond reasonable doubt that they do belong. This links the group of animals associated with Human Burial 1 to a further group of articulated remains, A8, A6 and A7 (Fig. 33). The hind limbs of goat A9 lay

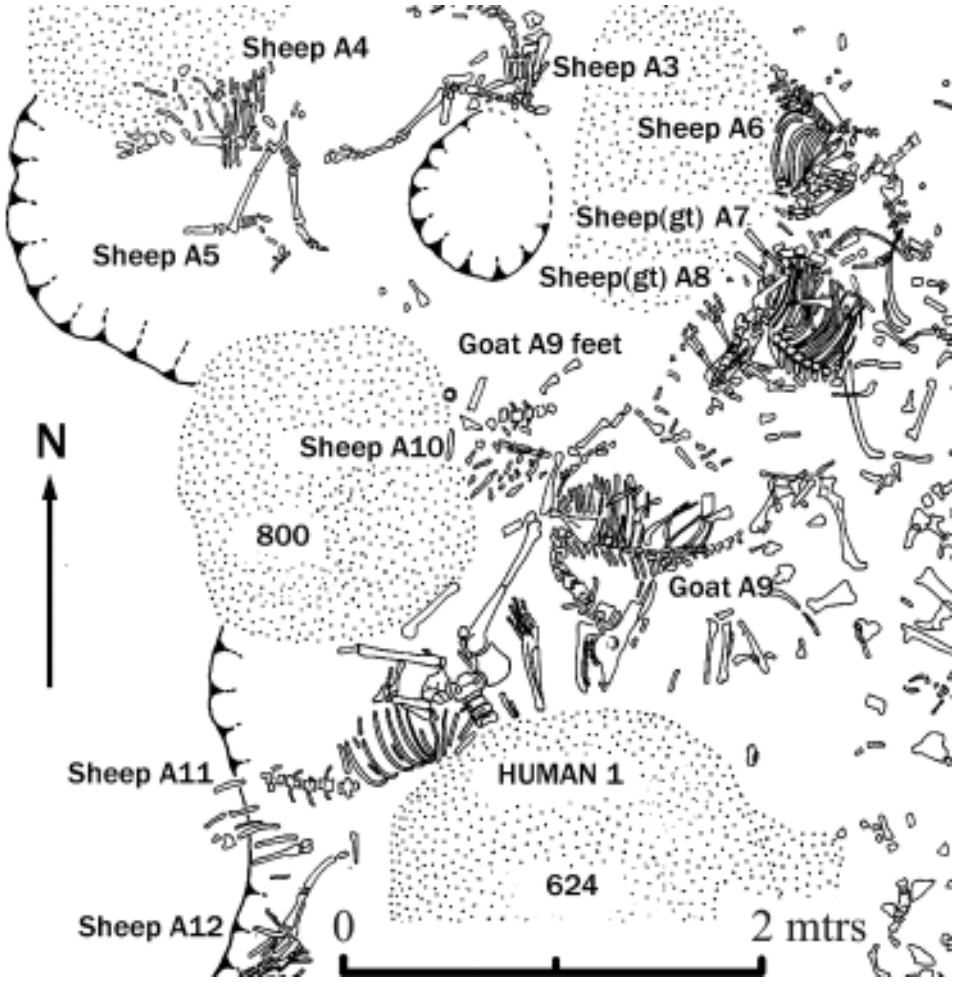

Figure 33. Plan of Human 1 and immediately associated animals (A6 to A12), with A4 and A5 to the north-west

underneath the bent-back neck of a sub-adult sheep(goat), A8 (3142/3126). The rest of this partial skeleton lay on its left side and with a similar orientation to the goat, and to the previously noted sheep A10 (3059). No skull was found, but this area seems to have been disturbed, as is seen in the absence of the upper hind limb bones of the goat. Only 5cm away from sheep(goat) A8 was the partial skeleton of another young sheep, A6 (3144/3143), and associated with this was a row of neck vertebrae from an adult sheep(goat) A7 (3143). The skull was missing from both of these (A6 and A7), but the bones which did survive were well preserved and the area where the skull would be expected was not disturbed by later pits. It may be that the skulls had been removed before deposition. The young sheep A6 was, again, on its left side, but with a different orientation.

To the south-western side of the child (Human 1), beyond the sheep A11 previously noted which lay partly beneath the child, was a further sheep skeleton, A12 (3038). Its fore leg was only 7cm from the tibia of sheep A11, and the burial therefore probably occurred at the same time. The shape of the pelvis and the maturity of the bones suggest a young adult ewe, which might have indicated the loss of a valuable animal. However, this sheep was extremely small (see below) and may have been chosen because of its small size.

There is thus a group of seven partial animal skeletons which form part of the same event as the burial of this child (Human 1). The two animals on either side of the child were buried first. Two have the neck bent back, which may intentionally mimic the position of the animal at the moment of slaughter. Sheep A10 overlaid the feet of the goat, and must therefore have been deposited at the same time or a short time afterwards. No butchery marks were observed, and it is thought that the meat was not removed. For example, sheep A6 was found with the forelegs bent up close to the rib-cage, all the bones being in their correct anatomical position.

Articulated animal bones were found also with the human Burials 2 and 3 (see below). Although intrusive later pits prevent a direct link being made between these animals and those associated with Human 1, they were only 40cm distant.

Figure 34. Sheep A6, Sheep/goat A7 and A8 and the feet of goat A9, looking east towards the eastern mass.

Animals associated with Human Burial 2

Associated with the Human 2, another child, was a sheep skeleton, A13 (3008/3010/3012) (Fig. 27), which was more fragmented, incomplete and disturbed than the previously-described animal skeletons. The rib-cage lay on top of the right humerus of this child (3007), and the left radius and metacarpal lay very close to, and at a slightly higher level than, the distal end of the child's left radius, which indicates that the sheep was buried after or at the same time as Human 2. The neck bones of the sheep (3012) were not found in a continuous line with the thoracic vertebrae, but it is thought they do belong, given their position and similar immaturity. The neck bones were underneath the right foot bones thought to belong to Human 3 (3006). The sheep skeleton was on its left side, with its neck bent back.

The sheep A13, therefore, confirms the link between Human 2 and the human lower limbs that probably belong to Human 3, and suggests that the order of deposition was, first, Human 2, then the sheep, then Human 3.

Animals associated with Human Burial 3

The skull of an adult ewe (A14, 3018) was placed at right angles to, and partly under, the right pelvis of Human 3 (3017, Figs 25, 27, 28). The absence of the lower jaws and any neck vertebrae seems to be significant, as they would certainly have been recovered had they been present, and are unlikely to have decayed given the survival of the much more fragile maxillae. No butchery marks were seen. Either the mandibles were removed when the skull was fresh, or the skull was deposited after decay of the soft tissues. The latter seems the more likely judging from the bones as found, although the rest of the bones considered so far are thought to have been deposited when fresh. Lying in the pelvic area of Burial 3 lay a single immature sheep metatarsal bone.

Animals probably associated with Human Burial 4

In the north-western part of the area, north of Human 1, were three partial animal skeletons, a pig and two sheep, plus a fragmentary sheep skull and other articulated sheep bones (Figs 30 and 35). The association of the pig, A1 (3098), and the sheep, A3 (3128/3078), with the Human 4, an infant, has been described above in the section on human remains. From the same context as the Human 4 metatarsals, were skull fragments, a lower jaw and two neck vertebrae from a young sheep (A2, 3104). The western part of this context was adjacent to the thoracic area (3128) of the sheep A3. Other than this, there was no stratigraphical relationship between the animal skeletons, so the association is inferred from their proximity and the

Figure 35. Pig A1 looking SE, with right tibia and fibula of Human 4 top right.

good state of preservation, indicating that the material must have been covered soon after deposition. The pig A1 and sheep A3 are cut into by a later pit (489), but the orientation of the skeletons suggests that the head of the sheep must have been quite near the tail end of the pig. Both the pig A1 and the sheep A3 lay on their right side, the pig oriented roughly E/W and the sheep NW/SE.

The pig skull and upper body (A1) were well-preserved. There was certainly no use of the meat, as both shoulder blades were intact and in place either side of the rib-cage. Survival, for example, of the tiny epiphyses of abaxial phalanges, suggests that the skeleton was covered moderately quickly and was not disturbed (other than by the later pit). The pig died at about six months old. Taking an expected season of birth as late March or early April, the pig was probably slaughtered in September or October (for method see Appendix 2).

The sheep A3 (3128/3078) was more complete, though the skull region was cut into by the later pit. It appears to have been buried whole, with no use of the carcass, although in theory the skin could have been removed. No marks were observed and the feet were found intact. As with some of the other skeletons, its position was somewhat awkward. The right hind leg lay normally, but the left one was bent up to lie close to the pelvis.

The other sheep in this group, A4 (3045), was 10cm to the west of the right hind foot of sheep A3 (3078). The left side of its rib-cage and both fore-limbs were very well-preserved. The lower hind limbs were present but the pelvic region was disturbed by the later pit, and the right side of the rib-cage was rather broken and disturbed, showing perhaps some erosion of the upper part of the burial. The sheep A4 lay E/W and on its left. Also in this area were two articulated limbs from another young sheep, A5 (also context 3045).

The A3 to A5 skeletons were separated by three pits (950, 626 and 800) from animals A6 to A10, which were associated with Human Group 1. There is therefore no direct link with this human burial but they are at the same level and within a metre of each other, and are possibly part of the same event.

Animals associated with Human Burial 5

There were no articulated animal groups directly linked to Human Burial 5, although some bones probably belonging to this child were spread over a wider area where animal bones do occur.

Discussion of the articulated animal remains associated with humans

Nine of the fourteen articulated animal bone groups or skulls died at less than one year old, and an estimate has

Table 6. Likely age and season at death of the young animals.

	Assoc. Human	*Age estimate (months)*	*The months, to ¼ of a month, beginning in March*
			M---A---M---J---J---A---S---O---N---D---J---F---M---
Likely farrowing time			--A-
Likely lambing time			- A---M-
			Likely season at death (birth season plus age estimate)
Pig A1	4	*c.* 6	S---O---
Sheep skull A2, stage Bt	4	3; 3; (2–4)*	---J---A---
Sheep skeleton A3	4	1–3	-M---J---J---A-
Sheep skeleton A4	4	2–4	-J---J---A---S-
Sheep artic. A5	4	2–4	-J---J---A---S-
Sheep skeleton A6	1	2–4	-J---J---A---S-
Sheep skeleton A10	1	1–3	-M---J---J---A-
Sheep(goat) skel. A11	1	3–5	-J---A---S---O-
Sheep skeleton A13	2	3–5	-J---A---S---O-
Eastern area mandibles			
2 at Bt (+ see A2, above)		3; 3; (2–4)*	---J---A---
10 at C1–2		4; 3–5; (3–7)*	---J---A---S---O---

For general method, see Method. Bt: see Table 9. *The three figures show the central point, majority and (in parentheses) the range excluding outliers found in the live sheep study (Jones 2006, figs 9 and 17). The dotted line uses the 'majority' figure plus the lambing season; the underlined area shows the 'central' figure plus the central five weeks of the lambing season; months: *e.g.*, 3 months includes from 2.5 to 3.49 months. For pig, see Appendix 2.

been made of the season in which the immature animals are likely to have died, see Table 6. More detail is given in the Method section, in Appendix 2 for each animal, and in the section below, 'Evidence for season, from the age at death of the sheep'. In only two of the articulated groups, the pig A1 and the lamb skull A2, were the teeth present, and therefore most of the estimates are based on epiphysial fusion.

Of the sheep buried with Human 1, three were immature, A10, A11 and A6. They are estimated to have died at 1–3, 3–5 and 2–4 months, respectively. There are stratigraphical links between A11, the child, A9 and A10, which show that the older lamb A11 (3–5 months) was deposited before the younger one (1–3 months). Making the assumption that all were deposited as one event, the overlap in age estimates is at 3 months. This is still consistent with both being born in the same year and within the normal lambing season, one being born early and the other late in the lambing season. The overlap in the season at death estimates is in late June to early August, which thus gives an estimate of the season during which the burial of the child and animals occurred.

In addition to these three (A10, A11 and A6) all the other young animals, A2, A3, A4, A5 and A13, could have died at the same time, using the seasonal evidence shown on Table 6, apart from the pig A1. Breeding in pigs is more variable than in sheep, so the season estimate is much less certain than for sheep where breeding is more strongly seasonal.

Of the young sheep, the pelvis was generally absent and only two could be sexed, one being male and one probably male (A3 and A10). It is the young ram lambs which are mostly surplus to breeding requirements and may most easily be spared. Three of the five adult animals could be sexed and they were all female, viz., the goat and two sheep. The goat was estimated to have died at 4½-6½ years (Deniz and Payne 1982). Two of the sheep, the ewe A12 and the unsexed sheep (goat) A8, were young adults, which probably represent the loss of valuable, breeding animals. A12, however, was an exceptionally small sheep (see below) and may have been chosen because of it diminutive size. The sheep A7 and A14 were both adults, the latter a ewe, four to five years old at death.

To summarize the age evidence; the animals associated with humans consisted of eight lambs of about three months old, a pig about six months, a sub-adult sheep, a sub-adult sheep(goat), two adult sheep and an adult goat.

Some general comments may be made on the articulated bones. The very good preservation can be seen by the recovery of different long bones zones. Each long bone was divided into six zones (five for the metapodials), see Method. For these articulated groups, on average 5.3, 5.8, 4.9, and 4.6 of the 6 zones were present (for the humerus, radius, femur and tibia, respectively), and for the metacarpal and metatarsal, 4.5 and 4.8 of the five zones were present (Table 7). A high number of vertebrae and phalanges were present. It can be said, therefore, that there was little bone loss after the bones had been fully covered, *e.g.*, by erosion or recovery, with the exception of the late intrusive pits. They were probably covered by a considerable depth of soil, for the preservation to be so good (see previous discussion of possible rampart cover).

It was striking that two skulls, both sheep, were found without postcranial bones, and that no skull was found with any of the sheep and sheep(goat) partial skeletons. Only in the cases of the pig and the goat was the skull present. Of the eight sheep groups without skulls, four provide no data due to intrusive later pits. For three of the remaining four animals (A6, A7 and A8) where skulls might be expected to survive it appears that the skull had been removed before deposition. (Evidence for the group A10 is uncertain).

In conclusion, most of the animals associated with

Table 7. Anatomical analysis of the sheep/goat bones.

	Articulated remains assoc. with humans			***Artic. remains in eastern area***			***Other bones, almost all from eastern area***			
	BNZ	Zone L+R	Average z/bone	BNZ	Zone L+R	Average z/bone	BN	BNZ	Zone L+R	Average z/bone
skull	4						162	110		
horncore	(6)						9	7		
maxilla	(4)						25	23		
mandible	3						42	20		
loose teeth							35	33		
vertebra	158				40		452	449		
scapula	14						51	24		
humerus	14	12	5.3/6	3	3	6.0/6	49	46	18	3.7/6
		11			3				28	
		12			3				30	
		13*			3*				33*	
		13			3				31	
		13			3				31	
radius	13	13	5.8/6	4	3	4.8/6	38	35	23	3.3/6
		13			3				23	
		13			3				21	
		13			3				20	
		12			4				16	
		11			3				12	
ulna	12			3			35	23		
pelvis	7						44	38		
femur	7	4	4.9/6				61	59	28	2.8/6
		4							30	
		5							25	
		7							28	
		7							26	
		7							27	
patella	4						20	20		
tibia	9	8	4.6/6				83	63	24	2.7/6
		8							24	
		8							34	
		7							30	
		6							32	
		5							27	
carp/tars	63			7			159	159		
metacarpal	10	10	4.5/5	4	4	5.0/5	29	20	17	3.8/5
		10			4				15	
		9			4				16	
		8			4				16	
		8			4				11	
metatarsal	9	8	4.8/5	2	2	5.0/5	50	38	26	3.1/5
		8			2				23	
		9			2				26	
		9			2				24	
		9			2				19	
metapodial							15	15		
1st phal	31			9			91	90		
2nd phal	30			6			57	57		
3rd phal	26			2			54	54		
Head	7			0			273	193		
Body	238			50			833	757		
Foot	169			30			455	433		
Total 2055	414			80			1561	1383		
*MNI 28:	7			2				19		

BN: number of bones; BNZ: more-complete bones (at least one zone more than half complete); zones: proximal epiphysis, proximal metaphysis, upper and lower shaft, distal metaphysis and epiphysis, see Method; average z/bone: average number of zones present.

* MNI: minimum number of individual (right humerus distal shaft).

Human 1 appear to have been deposited when fresh. For the goat A9 the whole animal was buried, although there was some disturbance after burial, *e.g.*, the pelvic region and upper hind legs were missing. For the sheep A11 again the whole animal appears to have been buried, although the hind legs lay awkwardly. For the other animals associated with Human 1, A6, A8, A10 and A12 were in articulation and their missing parts can be explained by later pits and post-depositional disturbance, apart from the absence of skulls referred to above. The final animal group associated with Human 1, A7, was a set of neck vertebrae. The most disturbed animal was A13 near Human 2, where the degree

Figure 36. Vertical view of part of the eastern bone mass cut by pit 544 at the top of photo: north on left.

of disarticulation was considerable and comparable with the disturbed condition of the human bones in this area. The disarticulation seems to have occurred either fairly soon before or after deposition, or as part of the actual process of deposition since the bones which have survived are uneroded, and small bones and loose epiphyses have survived.

Some thought and purpose seems to have gone into the positioning of the animals. The sheep and goat were on either side of, and facing, the Human 1 child. The four animals most closely associated with the child, *i.e*., linked stratigraphically, all have the spine nearer the child and their feet further away (A8, A9, A10 and A11). The head of the goat A9 was placed to the right of the hip of Human 1. This is similar to the placing of the sheep skull A14 from 3018, which was tucked under the right hip of Human 3.

The bending-back of the neck of buried animals has previously been referred to. Some element of careful positioning in relation to human burials seems evident in the case of the goat A9, and, probably, the sheep (goat) A8. However, other aspects of the positioning suggests rather less care, viz., the position of the hind limbs of the sheep A11 and A3.

A few miscellaneous animal bones were found in the same area as the articulated groups. Of these most were sheep/goat (67 bones, the majority of which were considered probably to belong to the articulated groups), a few (eight bones) were cattle, none were pig and one was horse. There were a few unidentified bones, seven of cattle-size, and 46 of medium-sized which may or may not belong to the articulated bone groups. Two were small mammals: one a water vole (*Arvicola terrestris*), found with sheep A4 and A5, and one a (?field) vole (*Microtus* species), found near Human Burial 2.

Only a few burnt fragments were found near the articulated groups, in contrast with the bone mass shortly to be described. There were five burnt bones (from 3026 and 3012, one sheep and four sheep-size), all from the area of Human Groups 2 and 3, where the human bones and the sheep bones from A13 were partly disarticulated.

Description of the eastern bone mass

The animal skeletons and articulated remains described so far formed 20% of the total identified animal bone from the ritual area (469, of 2359 bones). All were to the western side of the area. At the eastern edge of the deposit, there was a deep mass of bones. Here the bones were much more scattered, and were mostly disarticulated (Fig. 36). An example of the relationship of the skeletons with the rest of the bone is shown on Figure 34 where a group of disarticulated bones to the upper right may also be seen to the lower-middle of Figure 36. The bone as a whole is shown on Figure 30, and the relationships of contexts on Figure 41. A more detailed description is given in Appendix 2. Only one human bone was found in the eastern mass of bones.

Various aspects of the bones are relevant in attempting to interpret the origin of the deposit as a whole. There are points of similarity and of contrast between the western largely articulated groups and the rest of the bone. In the field, the eastern deposit seemed to be in part characterized by having a darker soil matrix (discussed above) which was due to charcoal and the occasional burnt bone, but it was not possible to separate these characteristics during the excavation process.

The bones from the eastern area do not appear to be ordinary butchery waste. Many were in a similar state of preservation to the western groups, and seem to be from a limited number of individuals. Few bore butchery marks and they have not been broken for use of the marrow. The most plausible explanations is that the animals have been slaughtered, the meat used, or the animals used in some form of ceremony, with little breakage of bones and the bones then deposited largely undamaged and still partially articulated. That is, the activity which preceded the eastern mass deposition was different from the activities involved in the western area.

Most of the bones (88%) were from sheep/goat, some were cattle, a few pig, two horse, and five common toad (*Bufo bufo*). Cattle bones were much more common than in the western area, where only eight bones were found. They mostly occurred as scattered, unrelated bones, and were less complete than the sheep/goat bones. Only in one case were cattle bones in articulation. This was a calf skull, with mandibles, neck, partial rib-cage and right scapula (from 3060/3070). It was on the south-eastern edge of the ritual deposit (the lower jaws are visible on Figure 22 just west of Pit 472). This articulated group was, like the western skeletons, at an upper level. The age at death of the calf, which was at Mandible Stage JS Bd+, is estimated at 2 to 3 months (Jones and Sadler in press, and see Appendix 2).

Apart from this calf, there were fourteen other articulated groups of bones, all from sheep or goat (totalling 80 bones, see Table 4, 7 and Appendix 2), for example see a group of lumbar vertebrae (Fig. 36, top left).They consisted of short sections of articulated vertebrae, or incomplete fore limbs, or lower limbs. Nearly all the bones were complete and undamaged, and their state of preservation was similar to bones from the western groups. Presumably the deposit itself was not disturbed after the point of decay of the soft tissue holding the bones together. If the mass of bones originates from redeposition of skeletons, it must have occurred soon after the animal's death, otherwise these groups of bones would not have been found articulated.

The non-articulated bones were also often in groups which were probably from very few individuals. For example, in context 3054 there was a group of articulated lumbar vertebrae, a pelvis which may be in articulation with them, some ribs and thoracic vertebrae described in field notes as 'stray', and several long bones, all of similar preservation and maturity and all probably one individual, but certainly not found in articulation. Similarly, 118 bones, grouped as context 3158, came from a lower level of the deposit and clearly were mostly disarticulated, but they appear to be from only three individuals; they included five groups of bones found still articulated (two groups of vertebrae, and three metapodials with their tarsal bones and/or phalanges). No butchery marks were observed. For many other contexts there were very well preserved but disarticulated groups that probably belonged to one animal, (*e.g.*, contexts 3131, 3132, 3148, 3149, 3179, 3182). This suggests that bones in the bone mass were in an environment protected from scavenging or much erosion. In some cases bones from contexts above and below were found to match, *e.g.* 3164 and 3174 (a probable pair of tibiae), but in most cases no probable match was found, *e.g.*, contexts 3094, 3149, 3161.

It would be of interest to determine to what extent the bones are from very few individuals whose bones have been jumbled. The extreme of this position would be that all the 1656 sheep/goat bones from the eastern mass are from the 21 individuals represented by the right distal shaft of the humerus. However, the general lack of probable matching between contexts suggests that the mass of bones is not from so few individuals.

The character of the sheep/goat bones from the bone mass can be seen on Table 7. As with the western groups, there was a high survival and recovery rate for all bones in the skeleton, see, for example, the large number of vertebrae, carpal and hock bones, and phalanges. The number of first phalanges was close to the number which would be predicted from the metapodials. There were at least 17 metacarpals and 26 metatarsals, which gives an expected full complement of first phalanges of 86. In fact, ninety were found. Recovery of as many as 57 second and 54 third phalanges is also of note, and indicates that the deposit is a primary one, and that the standard of bone recovery, for hand-collected material, was high.

The number of bones from the head, body and feet are shown on Table 7 (see the lowest section for bone totals, and the individual zones for minimum number of individuals). It can be seen that all parts of the body are represented. There is not an over-abundance of bones from the head,

Table 8. Burnt bones from the ritual deposit.

	Total	***Black***	***bl/calc.***	***Calcined***
cattle	2	2	0	0
sheep/goat	108	70	19	19
cattle-sized unidentified	5	3	1	1
sheep-sized unidentified	151	76	49	26
	266			

Totals include 5 burnt bones, all black, from the area of human burials. Of the sheep/goat bones, 36 were fragments (not on the zone list). From the sieved samples, there were 3 additional burnt bones, from sheep/goat.

Figure 37. The ritual area towards the close of the excavation, looking south-west. Iron Age pit 472 in foreground.

as might be expected given the absence of skulls in some of the western groups.

Many of the long bones were in a fairly complete state. Of the sheep/goat long bones, 84% had at least one zone more-than-half complete, and of these, on average more than half the zones were present (Table 7). This is much higher than for sites where the bone is general butchery waste, and can be contrasted with the sheep/goat long bones from the Iron Age hillfort ditch (64% with at least one zone more-than-half complete, and of these an average 20% of the bone present). But the state of completeness is noticeably lower than for the western group. Taking the humerus as an example, for the western articulated groups, on average 5.3 of the six zones were present, but for the rest of the bone deposit, 3.7 zones were present. There was certainly some loss of the more fragile parts of the bones, but much less than might be expected. This can be seen by comparing the proximal and distal metaphyses (zones 2 and 5) for the humerus, radius and tibia, where one end of the bone, due to its much less dense structure, is more subject to decay than the other. There are only marginally fewer proximal than distal metaphyses for the humerus and tibia. For the radius, loss of the distal end is somewhat greater. For the femur, survival of both of the fragile, cancellous metaphyses was as high as for the stronger shaft.

Some bones were rather fewer than would be expected. Only nine horncores were found (and there is no evidence that any sheep were hornless), and there were fewer ulnae and metacarpi than other long bones. These may have been removed for bone and horn working.

While most contexts produced certainly – or probably – related bones, there were also some fragmentary ones. Of the sheep or goat bones 11% were fragmentary (no zone more-than-half present), consisting mostly of pieces of skull, scapula, ulna, tibia and metatarsal. A third (34%) of the cattle bones was fragmentary. In addition, 26% of the bones from the area consisted of unidentified fragments, most of them probably from sheep/goat. Fragmentation

tended to be greater where bones were few and scattered, *e.g.*, contexts 3181, 3183, in the south of the area. Many, but probably not all, of the fragments appeared to be pieces originally belonging to the more complete bones. There were few modern breaks.

The bones were studied carefully for signs of butchery but extremely few were found. Such marks as there were consisted of light cuts which did not break through the bone, as follows: three sheep/goat bones (a radius, a femur fragment and a sternal vertebra); two probable sheep ribs and one vertebra; four cattle bones (malar bone of the skull, horncore, pelvis and tibia); and one pig atlas vertebra. All were from the eastern mass of bone, with two exceptions, the sheep/goat radius and sternal vertebra, which were near Human Burial 2.

Burnt bones were fairly common in the eastern area (Table 8). Most were black in colour, with a smaller proportion calcined, or mixed black/calcined. Most were within the eastern mass of bones, with a spread towards the centre and the south, and a few in the extreme east of the area. As referred to above, just five were in the area of human and animal burials. Of the identified bones (excluding those from articulated animals A1 to A14), 5.9% were burnt, most of them being disarticulated sheep(goat) bones, though one group of metatarsals and phalanges are likely to be from one sheep (3117). These could be interpreted to be remains from roasting. The proportion of burnt bone amongst the unidentified bone was much higher, at 18.9%. Most of these were sheep-sized fragments (151 of them), half of them calcined or mixed black/calcined, which, as with the charcoal evidence, suggests a fire of some intensity. (Percentages are based on the bones as a whole, *i.e.*, they include the few bones from the western area not definitely part of animals A1 to A14).

There were a few bones from sieving (context 493), all from the eastern area, consisting of sheep/goat bone fragments and five unidentified small mammal bones (Table 4). Of these, two sheep phalanges and a sheep/goat carpal bone were burnt.

The identification of sheep and goat

In Table 4, the sheep and goat bones are combined. Other than the goat skeleton, Animal A9, there were no certain identifications of goat, that is, of horncores, lacrimal bones of the skull, metapodials or third phalanges. There were just seven other bones which are probably goat, from at least three individuals: a mandible (context 3131) where the shape of the condyle and the angle of the jaw, and the shallowness of the bone below the cheek teeth, were goat-like; a humerus, radius and pelvis also from 3131 and probably from the same, fully adult individual; and a scapula and two left sub-adult humeri. On the other hand, many bones were identified as sheep: eight horncores, seven lacrimal bones, 37 metapodials and 51 third phalanges. Eight stage C mandibles bore either three or four characteristics typical of sheep and one at stage B bore six (Payne 1985). In one mandible, an identification as sheep could be on the basis of the order of eruption of M_3 and P_4. M_3 was in recent wear (2A) and P_4 showed enamel-wear only, that is, M_3 was in advance of P_4. This is a characteristic of sheep (Jones 2006) as in goats, P_4 comes into wear before M_3 (Deniz and Payne 1982). Less certain identifications as sheep were made on 100 other bones, using comparative material, Lawrence (1980) and Boessneck *et al* (1964). Where there was an articulated group, the identification, for example, of a metacarpal as sheep permitted the identification of the rest of the skeleton as sheep, which is most useful for study of measurements.

Evidence for season, from the age at death of the sheep(goat)

The maturity of the sheep(goat) bones is shown on Figure 38 and Tables 9 and 10, with the individual tooth wear information shown in Appendix 2, Table 31. Of note were thirteen lower jaws, three with the first molar half up (stage Bt) and ten with just the anterior pair of cusps of M1in wear (stage C12). More than half of the mandibles found were at this very restricted state of dental development, with no cases younger, and none older until the much later Stage D34. Since age at death can be estimated quite closely from the teeth in young sheep (Jones 2006), this can be used to suggest the season during which the events occurred.

The season at death estimates for the young animals are shown on Table 6, which has previously been referred to under the Method section. There are two aspects which present new research, viz., the subdivision of Mandible Stage B (Table 9), and the literature search regarding long bone fusion (Table 10, second column). Using, first, the information from mandibles, an estimate of season can be made for the skull A2 and the twelve mandibles from the eastern area. Assuming a birth season from the last week of March to the second week of May, it can be seen that the greatest likelihood is that, if all died at one time, this was in July or August. If the age of slaughter was spread over a longer time, this is likely to have been from June to September. No mandibles were found with M1 before the stage 'half up', and it is therefore unlikely that any died during May: in the reference study (Jones 2006 and primary records), the earliest case of M1 being visible in the mouth was at 2.27 months, based on 62 lambs seen aged from birth to 2.27 months. (Note that 'erupted' in the live sheep is equivalent to 'half up to unworn' in archaeological material). At the later end of the season, the restricted range of stages found in the mandibles is useful. Although the range for the mandibles at C12 does include October, C12 is unusual by six months of age, where the normal stage is C34 (M1 with three or four cusps in wear with no dentine joins), and none at this stage were found.

The single mandible from the area of human and animal burials, the sheep A2, at Bt, can be aged with some certainty to three months. It is of a similar age to the mandibles

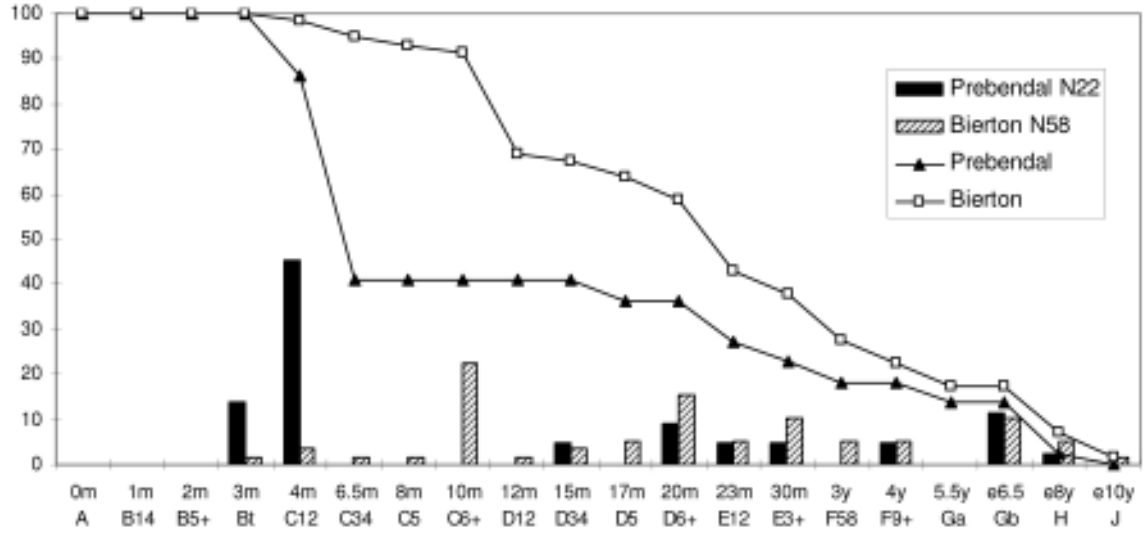

Figure 38. Sheep and goat mandible stages from the ritual area, compared with nearby Late Iron Age Bierton. The mandible categories show the Payne (1973) wear stage, subdivided using wear on the most recently erupted tooth; the age shown is the 'central point' of the live sheep study (Jones 2006, figs 9 and 17), around which there is variation, see Table 9 and Method. Separation of sheep and goats: sheep – one at Bt, eight at C2; goats – F10 (Animal A9) and one at Gb. For individual tooth wear stages, see Appendix 2, Table 31.

in the eastern bone mass, being at the same stage as the two at Bt, and very close in age to the ten at the adjacent stage C12. In the area of human and animal burials, there were seven sheep(goat) which were less than a year old, and where an age at death could be estimated from the long bones. These are shown individually on Table 5, and their estimated season of death is shown on Table 6, based on work which has been discussed in the Method section (and see below), and the ages of fusion suggested on Table 10. It can be seen that all could have died at the same time, in which case this was from the end of June to early August. Or they may have died over a longer season. Both possibilities are consistent with the mandibles from the eastern bone mass.

For the sheep skeletons A10 and A11, estimated to be 1–3 and 3–5 months old respectively (from the maturity of the long bones), there is additional information, as they are linked stratigraphically. The evidence from the positions in which the skeletons were found – the two lambs, the goat and the child Human 1 – is that their burial occurred as one event and that all are contemporary. The overlap, at three months, makes it unlikely that A10 died during May, or that A11 died later than mid-August.

The few mandibles at later stages (9 of 22, 41%) show that animals from their second year (stage D) and older are present but not numerous. They are fewer than found in the typical late Iron Age domestic site at nearby Bierton (Jones 1986: 40 of 58, 69%, at Stage D and older), also shown on Figure 38. Note that at Bierton mandibles at Bt and C12 were present but there was a spread of slaughter occurring during the first two years, with the mode at C6+ (aged 8 to 12 months, using Jones 2006, Fig.17, majority of records). Hambleton's study of Iron Age sites also found two contrasting patterns in the proportion of mandibles found beyond Stage C (Hambleton 1999). In both 'Wessex and Central Southern England' and the 'Upper Thames Valley and Surrounds', the sites formed two groups, one similar to the Prebendal, with only 40–55% of mandibles beyond Stage C, the other similar to Bierton, with 60–80% surviving beyond Stage C.

At an earlier stage of analysis, Silver's figures for long bone fusion for sheep were used (Silver 1969), and it appeared that the long bones found were not from the same individuals as the mandibles, which ran counter to the excavation evidence where it appeared certain that the bones and mandibles were from a limited number of individuals. This raised doubt over the reliability of Silver's figures. Several sources of original research on epiphysial

Table 9. Results from the live sheep reference study for the subdivision of Stage B, and other example ages.

	Central point	*Majority of records*	*All records except outliers*	*No. of sheep observed*
B15	1 mos	1 mos	1–2 mos	20
B6+	2 mos	2–3 mos	1–4 mos	33
Bt	3 mos	3 mos	2–4 mos	35
C12	4 mos	3–5 mos	3–7 mos	80
D12	12 mos	10–13 mos	10–14 mos	51
E12	23 mos	20–30 mos	19–36 mos	85

B15: dp4 with one to five cusps in wear; B6+: all cusps in wear *and* M1 before 'Half up'; Bt: 'terminal', M1 'half up' to 'enamel wear'. The age class, *e.g.*, '2mo', includes sheep 1 month 16 days to 2 months 15 days old (Jones 2006 and the primary records).

Table 10. Sheep/goat epiphysial fusion.

	Age of fusion (months)	***% Unfused***	***% Partially fused***	***% Fused***	***Total***
Radius proximal	1.5–4	*3*	*0*	*97*	38
Humerus distal	2–4	*6*	*38*	*55*	47
Scapula coracoid	3–5	*31*	*9*	*59*	32
Pelvis acetabulum	est. 3–5	*38*	*10*	*51*	35
male		*90*	*0*	*10*	(10)
female		*6*	*6*	*88*	(17)
Second phalanx	5–7	*45*	*4*	*51*	93
First phalanx	6–8	*46*	*1*	*53*	124
Tibia distal	12–24	*50*	*3*	*47*	38
Metacarpal distal	12–24	*57*	*0*	*43*	28
Metatarsal distal	12–24	*47*	*0*	*53*	36
Calcaneum	15–24	*46*	*0*	*54*	35
Ulna olecranon	18–30(31)	*60*	*0*	*40*	35
Radius distal	16–36(39)	*59*	*0*	*41*	32
Femur distal	16–36(48)	*61*	*0*	*39*	33
Tibia proximal	16–36(48)	*63*	*13*	*25*	32
Humerus proximal	16–42(52)	*65*	*8*	*28*	40
Percentage		*44*	*6*	*50*	
Total number		302	38	342	682

The articulated groups are included. Counts for unfused bones includes only metaphyses, not epiphyses, and, for the pelvis, only the iliac part of the acetabulum. Age of fusion from Lesbre, Tschirvinsky, Smith, Garcia-Gonzales and Hatting, quoted in Moran and O'Connor 1994, and Davis (2000, 375) rams, with Davis'estimate for castrates in parentheses (2000, 381); pelvis estimated from Chaix and Grant (1987) (and see Method).

fusion in sheep are quoted by Moran and O'Connor (1994 and see Method, above), and their results have been useful in interpreting the long bones found. Some aspects of the long bone evidence are of interest. If the figures for proximal radius and distal humerus are compared (Table 10), it can be seen that nearly half of the humeri were in the process of fusing, while the radii were almost all fused. That is, the proximal radius is in advance, developmentally, of the distal humerus, which confirms the earlier figures for fusion of the proximal radius found by Garcia-Gonzales, a difference which is not given by Lesbre, Tschirvinsky, Smith, or Hatting. In Garcia-Gonzales' study, 'partially fused' bones were included with 'fused'. It is likely that the proximal radius completes fusion before the distal humerus, and the distal humerus category 'partially fused' occurs for a longer period of time. Fusion of the acetabulum of the pelvis appears to occur somewhat later than the distal humerus and at a similar time to the coracoid of the scapula, see the higher proportion of coracoid and acetabulum unfused, rather than partially fused, compared with the distal humerus (Table 10). The same order of fusion in young sheep was found by Chaix and Grant (1987) in their study of prehistoric sheep from the Sudan, that is, proximal radius, distal humerus, scapula, pelvis, 2nd phalanx and 1st phalanx. Where the sex of the pelves could be identified, almost all the immature ones were male, and almost all the mature ones were female, see Table 10. Of the three skeletons where the distal humerus was partially fused (animals A4, A6 and A11), the proximal radius was fused in all, and the coracoid of the scapula was fused in two and unfused in one. Only A11 included the pelvis, which was partially fused.

The long bones are shown on Table 10 in the order in which they fuse, and it can be seen that there are two points at which some bones are partially fused, firstly for bones which fuse during the first year, already discussed, and secondly for the proximal humerus and tibia, which are the latest to fuse. The percentage fused remains at about 50% for the mid-fusing elements, and decreases as expected for the late-fusing elements, reflecting the number killed at mandible stages D and E, *i.e.*, during their second or third year. For the latest-fusing elements, a quarter were fused, which is higher than the proportion of mandibles at late stages, where only three (14%) were at stages G or H. Some adult skulls may therefore have been removed and deposited elsewhere.

The proportion of adults is quite low, even using the long bone evidence, and suggests selection of animals from a larger flock or from several flocks belonging to, or under the control of, the community responsible for the deposit. Animals may, for example, have been supplied as tribute from dependent communities (Serjeantson 2007, 90), or they may have been supplied as part of a wider communal gathering.

In summary, all the animals from the ritual deposit could have been slaughtered as one event, occurring probably in July or early August, and involving at least 28 sheep/goats. The high number of young lambs follows the same pattern found at Late Bronze Age/ Early Iron Age Runnymede (Serjeantson 2007, 84–85), where half of all mandibles were at stages B and C, and of those at stage C, half were very early within the stage. Serjeantson discusses several other sites with similar age profiles, which are thought to indicate the keeping of sheep for milk and milk products, with the surplus ram lambs killed before their first winter. The same interpretation was made for Danebury in 1984

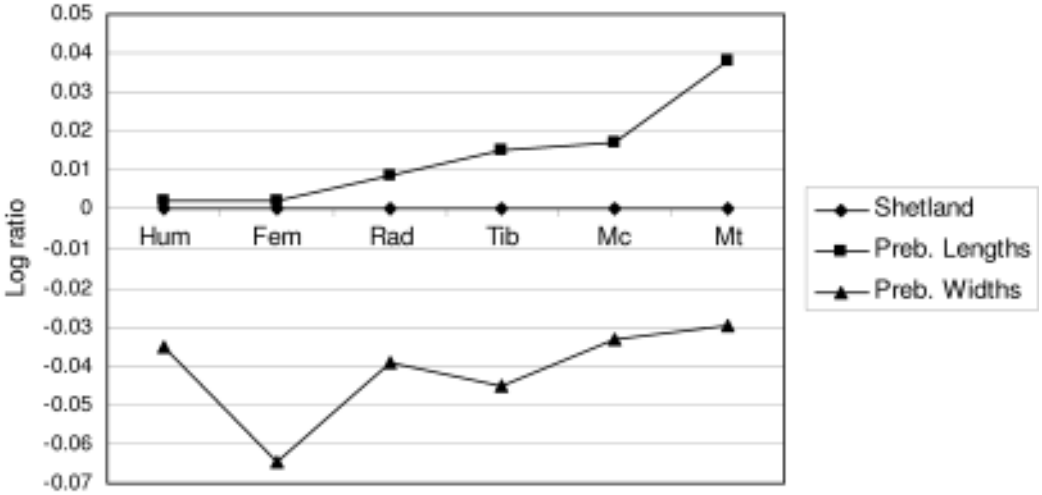

Figure 39. Comparison of average lengths and widths of the Prebendal sheep with the Shetland Standard. Measurements are combined, in the log ratio method, and compared with a Standard based on a group of modern Shetland sheep, shown as zero in the figure, see Davis 1996. Lengths: GLC for humerus and femur, GL for others; Widths: humerus BT, radius Bp, metacarpal BFd, femur SD, tibia Bd, metatarsal BFd. For measurements see Appendix 2, Table 32.

(Grant 1984a, 107), and the use of sheep milk, as distinct from ruminant milk (cow, sheep or goat), is now known from lipid residue work (Copley *et al.* 2003, Serjeantson 2007).

It is a general pattern at Iron Age sites (Hambleton 1999) that many young sheep are slaughtered or die from natural causes during their first year, with relatively fewer dying during their second or third year as is common in later periods. The identification from lipid residue studies of the milking of sheep is important in considering this pattern, because cheese would then become available as a stored food source. It has also been suggested that the difficulty of providing winter provisions may have meant that only those animals needed for the flock were kept through the winter (*e.g.*, Maltby 1981). Another consideration, which is rarely discussed, is whether castration of sheep was known and in general use in the Iron Age. As ram lambs become active by their first autumn (Jewell 1974) they may have been culled early so that the flock was easier to manage. This would also allow selection of males for breeding. Once castration is available, the surplus males can be kept into their second or third year, where the carcase size is much greater. There is a modern parallel here, where the modern Welsh Mountain breed has recently been managed specifically to provide mutton, defined as meat from sheep over 12 months old. The carcase size is then, in this fairly small traditional breed, of a more suitable size for the butcher.

The size of the sheep

The sheep bone collection was an unusual one, in that most bones were complete or substantially so. They produced a useful dataset of long bone lengths and widths, with several bone groups certainly, or very probably, from single individuals. The individual measurements and summaries are presented in Appendix 2 (102 bones, 339 measurements). In Figure 39, some of the length and width measurements are combined, using the log ratio method, and compared with a Standard based on a group of modern unimproved Shetland sheep (Davis 1996), shown as zero in the figure. Compared with the Shetlands, the Iron Age sheep were of similar height or rather taller, but considerably less robust. It was found that the upper limb bones, the humerus and femur, were of similar length to the average for the Shetlands. The radius and tibia were slightly longer, and the lower leg bones, the metacarpal and metatarsals were longer still. That is, the physical proportions of the sheep were different, and the sheep would have stood somewhat taller than a typical Shetland ewe. For each long bone length, one width measurement is also shown, and it can be seen that for all bones, especially the femur, the Early Iron Age sheep were more slender.

Figure 40 shows again the Shetland Standard, at zero, and the Early Iron Age means for lengths, with the fore limb to the left and the hind limb to the right. It also shows individual animals A8 and A12 from the western group of human and animal burials, and other individuals where at least three limb bones were present. Every individual shows the same general pattern of relatively greater length in the lower than the adjacent upper limb bone, with one exception, the femur and tibia from sheep 3164. This context included more than one individual, so it is likely that this femur and tibia are from different individuals; the tibia and metatarsal were linked by tarsal bones which refitted well, and these two bones show the expected pattern. The sheep A12 was exceptionally

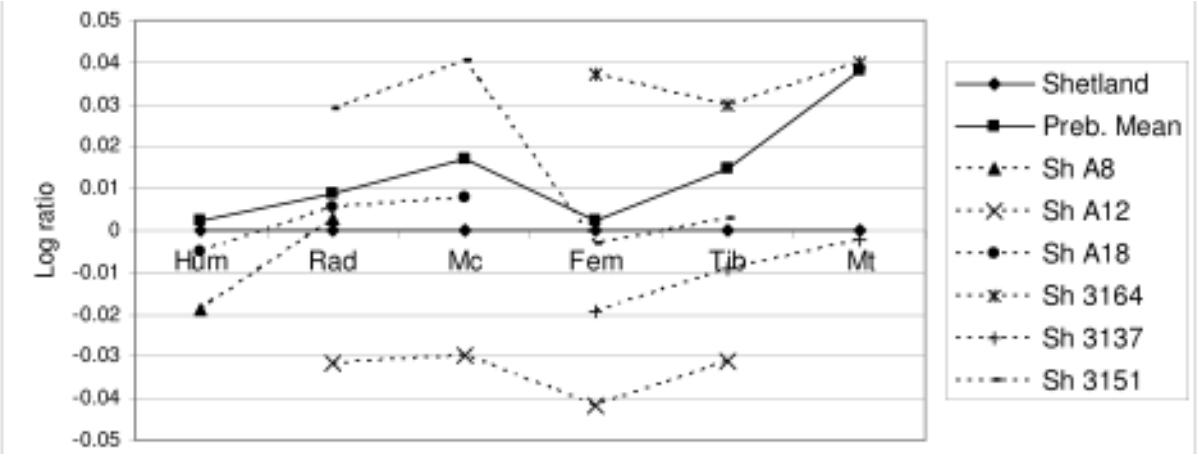

Figure 40. Comparison of long bone lengths of individual sheep with the Shetland Standard. Lengths only are shown (GLC for humerus and femur, GL for others). For measurements see Appendix 2. Those with four-figure numbers are probable-individuals from the bone mass.

small, all its bones being smaller in length and many in width also, compared with others found. Its tibia length (GL), for example, was only 172.0mm, compared with the Prebendal average of 191.25mm, and the Shetland standard of 184.8mm. Its relative proportions, however, follow nearly exactly the same pattern as the averages.

Some males may be present among the Prebendal measured bones. The metacarpal is the bone which shows sexual dimorphism the most clearly (Davis 2000, fig. 3). At the Prebendal, it may be that the three longest bones (Greatest Length 120.3, 122.4 and 122.7mm) are from males (Table 32 in Appendix 2). They are longer than any of the Shetland ewes in Davis' study (Davis 1996), but are within the range for the rams studied (Davis 2000). The evidence from pelves found at the Prebendal is that the immature bones are nearly all from male lambs, and the mature bones nearly all are from ewes, see Table 10, so it could be that the longer metacarpals (and other bones) are from long-legged ewes rather than from males. However, the latter is the more likely, as the measurements are towards the upper end of the range of measurements in the larger collection of Iron Age sheep in the Animal Bone Metrical Archive Project (ABMAP), *e.g.*, metacarpal GL 108.5 to 123.0 (mean 116.1, N18).

The estimated average shoulder height of the sheep is 58cm (using Teichert's factors quoted in von den Driesch and Boessneck 1974).

Other species from the ritual deposit

The 207 cattle bones from at least five animals, found in the ritual deposit, formed 9% of the identified bones. In comparison with the sheep/goat bones, they were more fragmentary and there were fewer groups of probably-related bones. The skull and neck from 3060 has been referred to above, and there were several other small groups of bones which probably belong, *e.g.*, a group of caudal vertebrae (3090), and skull and mandible fragments with two cut-marks (3174) from the base of the eastern mass, which are probably from one calf. But in general the cattle bones were scattered, occurring in 55 different excavation collection groups. As with the sheep/goat, they were well preserved, with vertebrae and cancellous bone ends (*e.g.*, the proximal tibia) well represented. There was a surprising absence of bones from the elbow joint, with no proximal radius or ulna and only one distal humerus (compared with 7 proximal humeri), and there were few metapodial bones, with only three metatarsal bones (compared to 21 from the tibia) (Appendix 2). Ribs were not identified to species-level, but large ribs were doubtless almost all from cattle, and were less numerous than expected, 26 being found, only four of which retained the articulation, which compares to 60 cattle vertebrae, 47 of which bore at least one zone (centrum and/or spine). With such a small sample, differences can be the result of chance, but it is possible that only certain parts of the carcase were brought to the site, and that metapodials were removed for bone working.

Many of the cattle bones were from immature animals, and these included fairly frequent bones from calves. There was epiphysial fusion information from 55 long bones, of which nine were calves (from eight context numbers, so probably from several individuals). Only 16% of long bone elements were fused, indicating a greater proportion of immature cattle than is typical for Iron Age sites, cf. late Iron Age Bierton (Jones 1986), where 28% were fused (N 46). The commonest element was the distal tibia (which fuses at 2–2½ years) where six were unfused, two were fusing and one was fused. Four cattle bones bore butchery marks, consisting of light cut-marks. One of these was on the inside of the malar bone of the calf skull 3174, indicating that the skull meat was made use of. A single complete metatarsal gives a shoulder height estimate of 1.07m.

There appears to have been selection of young cattle, and it is likely that butchery occurred largely without

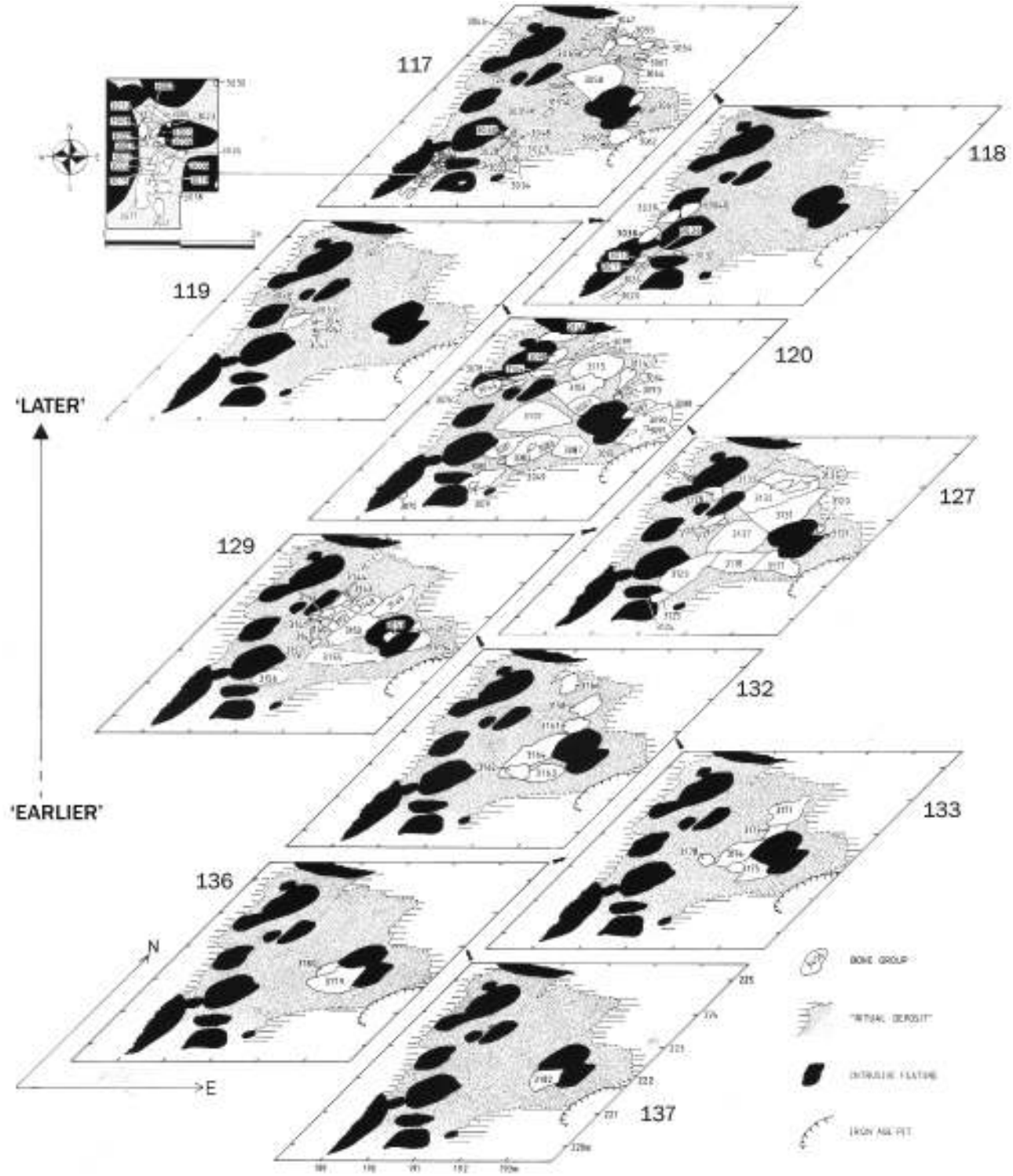

Figure 41. Exploded view of the lifting sequence of numbered bone groups within the ritual deposit. Original plan numbers shown. Inset top left shows detail from three plans.

marking the bones, and that some parts of the carcase (ribs, the elbow joint, metapodials) were deposited elsewhere. However, part of the deposit was destroyed by medieval pits, so the surviving bones are only a proportion of the original deposit.

Other than the pig burial A1, only ten pig bones were found, all from the eastern mass of bones. Most were immature, one of them a maxilla aged a few weeks (dp4 just in dentine-wear, M1 erupting through the bone). One atlas vertebra bore several fine cut marks. Separation of the skull

was thus done with minimal marks on the bones. Before the period of heavy metal cleavers, lack of chop-marks does not necessarily mean a lack of butchery. The probable continuing use of flint in the Iron Age has been noted elsewhere.

Two horse bones were found, one of them a third tarsal, which showed slight pathology (slight lipping on the anterior facet and irregularity on the outer articular surface), indicative of a fairly old individual. It was from quite low down in the eastern mass (3118). The other bone was from 3140, which is near the sheep/goat A8. It was a 4th metacarpal, the long narrow bone on the lateral side of the main bone, and sometimes used as a bone point. A fragment of tile found with this context may, however, indicate some intrusive material.

It is worth noting that no bones of dog were found, and neither were any marks of gnawing by dogs found, which suggests that the deposit was protected from scavenging animals during the period between its creation and sealing. At the much later temple sites such as Great Chesterford (Legge *et al.* 2000) the lack of dog-gnawing, and presence of an enclosure, suggested that dogs were excluded. King (2005), noting the low numbers of dog bones at Late Iron Age to Romano-British temple sites, similarly suggests the exclusion of dogs. Although there was no evidence at the Prebendal that the area was fenced off in any way, the existence of a temporary barrier is a possibility, although rapid burial seems more likely.

Three pieces of antler combs, thought to be from red deer antler, were found, and are described elsewhere. Two of them were burnt.

Other bones from the ritual deposit are probably natural occurrences, viz., the vole and water vole mentioned above (water vole mandible length including the incisor 27.1, cheek tooth row 9.5mm); and five bones of common toad, *Bufo bufo*, found in the eastern mass.

Pathology

Evidence for pathological bone changes were seen in one cattle bone, one horse bone, and eleven sheep/goat bones (Appendix 2). For the sheep/goat, two affected teeth; five affected the axial skeleton (vertebrae and ribs), two of them suggesting trauma; three affected joints, at the elbow and hock; and one was a fully healed break in a metatarsal. Pathology was seen in two of the animal skeletons, a fractured rib from the lamb A3, and bone alterations in the hock joint of the goat A9.

Bones from the upper layers of the ritual deposit and intrusive features

Bones from the uppermost layers of the ritual area (context 975, fills 630 and 631) and medieval pits cutting through the area (contexts 719, 543, 545, 627, 629, 801, 824 and 945) were recorded but not studied in detail. They are similar in species present, state of preservation, and presence of young sheep/goat, to those within the ritual area. The number of identified bones from context 975, for cattle, sheep/goat and pig were 1, 24 and 2 and the total including unidentified was 60.

Comparison with other sites

It is typical for Iron Age sites, that sheep/goat are more common relative to cattle than earlier, in the Bronze Age, and later in the Romano-British period (Hambleton 1999, 2008, 2009; Albarella 2007; Albarella and Pirnie 2008). In Buckinghamshire, some sites follow the pattern as found in other parts of central and southern England, for example the multi-period site at Aston Clinton (sheep/goat 59.7% in the Early Iron Age phase, Sibun 2008), but at many sites, particularly in the Milton Keynes area, cattle bones dominate (Kidd 2009; Hambleton, *ibid*.). The dominance of sheep, found in the collection from the ritual area, is unusual. Very high numbers of sheep in comparison with cattle are commonest in Wessex and central Southern England, although there is considerable variation. Using the commonest method of counting bones, the number of identified fragments, the percentages of cattle, sheep/goat and pig for the ritual area are 9%, 88% and 3%. This gives a cattle to sheep/goat ratio well beyond any of the sites quoted by Hambleton. Using the minimum number of individuals, the proportions of cattle, sheep/goat and pig are 14%, 78% and 8%, which is at the extreme edge of the range of sites quoted. A low proportion of pig bones is typical of Iron Age sites in Britain and the number at the Prebendal, by both methods, is at the low end of the ranges.

The choice of animal for the burials with humans excluded the use of cattle, but did include goat and pig. For the bone mass, which may be interpreted as evidence of a large scale feast or communal gathering of limited duration, lamb was the animal of choice. The bone mass may be compared with Late Bronze Age to Early Iron Age sites discussed by Serjeantson (2007) where the density of animal bone deposits at several sites has been interpreted as evidence of feasting, sometimes, as at the very large bone collection at 'Earliest Iron Age' East Chisenbury, based on sheep; and sometimes, as at Late Bronze Age/Early Iron Age Potterne and Runnymede, using all species but with an unusually high proportion of pig. Moving forward in time, at the late Iron Age and Romano-British site at Harlow, most remains were from sheep which formed 88% of bones in the Belgic phase (N2022) and 81–82% (N 685, 212) in the two temple phases (Legge and Dorrington 1985). The lambs were interpreted to be sacrificial animals, and the majority of them were at mandible stage C6+, aged 6–13 months at death (age estimates from Jones 2006). At the Romano-British temple site at Great Chesterford (Baxter 2011), sheep were the dominant species in the votive deposits. Most were lambs, which gave seasonal information for the different phases of activity. At the late Iron Age shrine at Hallaton, in the East Midlands, 97% of remains, interpreted as from feasting, were from pig (Score and Browning 2010).

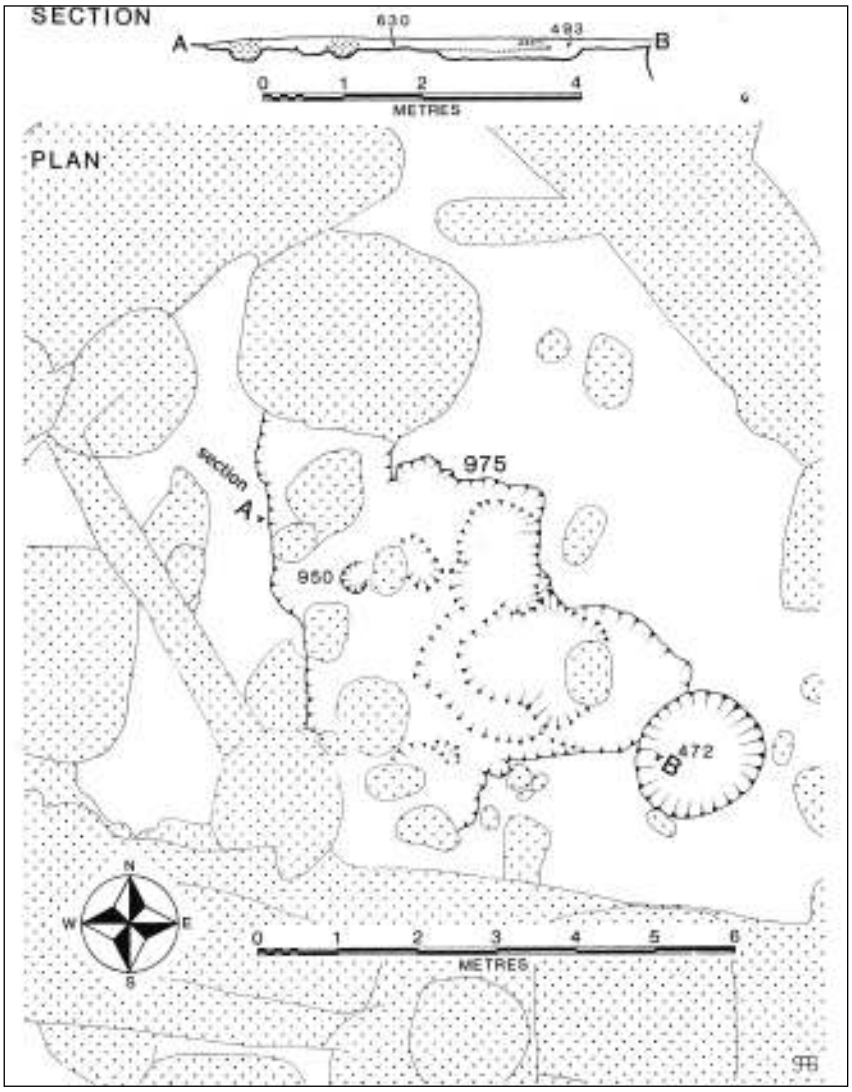

Figure 42. Post-excavation plan of sunken outline of ritual deposit (975); later features stippled. Section A–B through the deposit (top of figure) shows the relationship between layers 630 and 493 (burnt matter).

A deposit which bears some similarity to the ritual area, but using cattle, was found at Coldharbour Farm, less than 2km west of the Prebendal. One context (6249) contained almost exclusively cattle bones, consisting of disarticulated remains from whole animals, of a variety of ages, with no butchery marks (Johnstone 1997).

Another deposit from Buckinghamshire, although of much earlier date, is the very large collection of cattle bones from the Early Bronze Age Barrow 2, at Gayhurst, Newport Pagnell (Chapman 2007; Deighton and Halstead 2007). There are some points of similarity with the Prebendal deposit in the dominance of the deposit by a single species, the presence of many complete bones but which were disarticulated when deposited with very few cut marks. However, in contrast to the Prebendal, at Gayhurst many bones were missing, with bones of the foot almost absent, far fewer lower main limb bones than upper main limb, and most unfused bones lacking their loose epiphysis. There was no evidence of burning, and the bones were somewhat weathered. Unlike at the Prebendal, therefore, it was concluded that the cattle could not have been roasted whole and then deposited soon after.

An Iron Age fish bone

Andrew K. G. Jones

A single fish bone was recovered from the ritual deposit, a single fin ray that could not be assigned to species (SF 3142). See below for a second fish bone from an adjacent pit. Fish bones, even where sieving programmes are extensive, are found in low numbers at Iron Age sites, suggesting that there was very limited exploitation of fish (Hambleton 2008).

References for this section.

The Animal Bone Metrical Archive Project (ABMAP), Centre for Human Ecology, University of Southampton. http://ads.ahds.ac.uk/catalogue/specColl/abmap

Albarella U. (2007). The end of the Sheep Age: people and animals in the late Iron Age. In C. Haselgrove and T. Moore (eds). *The Late Iron Age in Britain and beyond*, pp.393-406. Oxford: Oxbow Books.

Albarella, U. and Pirnie, T. 2008 *A Review of Animal Bone Evidence from Central England.* http://ads.ahds.ac.uk/catalogue/archive/animalbone_eh_2007/?CFID=573996&CFTOKEN=39545028

Allen, D. (1986). Excavations in Bierton, 1979. A late Iron Age 'Belgic' settlement and evidence for a Roman villa and a twelfth to eighteenth century manorial complex. *Records of Buckinghamshire* 28, 1-120.

Baxter, I. L. (2011). Faunal remains, Temple Precinct. In: Medlycott, M. The Roman Town of Great Chesterford. *East Anglian Archaeology* 137, 320-344 & Appendix 5.1 (CD).

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

Chaix, L. and Grant, A. (1987). A study of a prehistoric population of sheep (*Ovis aries* L.) from Kerma (Sudan); archaeozoological and archaeological considerations. *Archaeozoologica* 1.1, 72-92.

Chapman, A (2007). A Bronze Age barrow cemetery and later boundaries, pit alignents and enclosures at Gayhurst Quarry, Newport Pagnell, Buckinghamshire. *Records of Buckinghamshire* 47 (Part 2) 83-211.

Clutton-Brock, J., Dennis-Bryan, K., Armitage, P. L. and Jewell, P. A. (1990). Osteology of the Soay Sheep. *Bulletin of the British Museum Natural History (Zoology)* 56, 1-56.

Copley, M. S., Berstan, R., Mukherjee, A.J., Dudd, S.N., Straker, V., Payne, S. and Evershed, R.P. (2003). Direct chemical evidence for widespread dairying in prehistoric Britain. *Proceedings of the National Academy of Sciences of the United States of America* 100(4), 1524-1529.

Davis, S. J. M. (1996). Measurements of a group of adult female Shetland sheep skeletons from a single flock: a baseline for zoo-archaeologists. *Journal of Archaeological Science* 23, 593-612.

Davis, S. M. J. (2000). The effect of castration and age on the development of the Shetland sheep skeleton and a metric comparison between bones of males, females and castrates. *Journal of Archaeological Science* 27, 373-390.

Deighton, K. and Halstead, P. (2007). The cattle bone from Barrow 2, in Chapman, A.: A Bronze Age barrow cemetery and later boundaries, pit alignments and enclosures at Gayhurst Quarry, Newport Pagnell, Buckinghamshire. *Records of Buckinghamshire* 47 (Part 2) 152-175.

Deniz, E. and Payne, S. (1982). Eruption and Wear in the mandibular dentition as a guide to ageing Turkish Angora Goats. In R. Wilson, C. Grigson and S. Payne (eds.) *Ageing and Sexing Animal Bones from Archaeological Sites*. Oxford, British Archaeological Reports British Series 109, 155-205.

von den Driesch, A. (1976) *A Guide to the Measurement of Animal Bones from Archaeological Sites*. Harvard, Peabody Museum Bulletin 1.

von den Driesch, A. and Boessneck, J. A. (1974). Kritische Anmerkungen aus Widerristhohenberechnung aus Langenmassen vor- und frühgeschichterlicher Tierknochen. *Säugetierkundliche Mitteilungen* 22, 325-348

Ewbank, J. M., Phillipson, D. W. and Whitehouse, R. D. (1964) Sheep in the Iron Age: a method of study. *Proceedings of the Prehistoric Society* 30, 423-426.

Garcia-Gonzales, R. (1981) Estudio de la osificacion postnatal en ovibos de raza aragonesa. *Munibe* 33, 259-79.

Grant, A. (1982) The Use of Tooth Wear as a Guide to the Age of Domestic Ungulates, pp. 91-108 in R. Wilson, C. Grigson and S. Payne (eds.), *Ageing and Sexing Animal Bones from Archaeological Sites*. Oxford, BAR British Series 109.

Grant, A. (1984a). Animal husbandry in Wessex and the Thames Valley. In B. W. Cunliffe and D. Miles (eds.) *Aspects of the Iron Age in Central Southern Britain*. Oxford, Oxford University Committee for Archaeology Monograph 2, 102-119.

Hambleton, E. (1999). *Animal Husbandry Regimes in Iron Age Britain*. British Archaeological Reports British Series 282.

Hambleton E. 2008. *Review of middle Bronze Age - late Iron Age faunal assemblages from Southern Britain.* Research Department Report Series number 71-2008. English Heritage.

Hambleton E. 2009. A Review of Animal Bone Evidence from Southern England. English Heritage. Archaeology Data Services, http://ads.ahds.ac.uk/catalogue/archive/animalbone_eh_2009/?CFID=573996&CFTOKEN=39545028

Jewell, P. A., Milner, C. and Morton-Boyd, J. (1974) *Island survivors - the Ecology of the Soay Sheep of St. Kilda*. University of London.

Johnstone, C. (1997). Vertebrate Remains, in J. Parkhouse and D. Bonner, Investigations at the prehistoric site at Coldharbour Farm, Aylesbury in 1996. *Records of Buckinghamshire* 39, 123-127.

Johnstone, C. (nd). Technical report: Vertebrate remains from the Prehistoric site at Coldharbour Farm, Aylesbury, Buckinghamshire. *Reports from the Environmental Archaeology Unit, York,* 97/3.

Jones. G. G. (1986) The Animal Bones, in Allen D (1986), 32-39, 74-75, 92-94, 113; microfiche 28-29.

Jones, G. G. (1994). Animal Bones, in B. Ayers, Excavations at Fishergate, Norwich, 1985. *East Anglian Archaeology* 68, 37-42; microfiche Tables 9-12.

Jones, G. G. (2006). Tooth eruption and wear observed in live sheep from Butser Hill, the Cotswold Farm Park and five farms in the Pentland Hills, UK. In D. Ruscillo *Recent Advances in Ageing and Sexing Animal Bones*. Proceedings of the 9th International Conference of Archaeozoology, Durham 2002. Oxford, Oxbow Books, 155-178.

Jones and Sadler (forthcoming), now published in the following two papers.
Jones, G. G. and Sadler, P. 2012. A review of published sources for age at death in cattle. *Environmental Archaeology*, 17, 1-10.

Jones, G. G. and Sadler, P. 2012. Age at death in cattle: methods, older cattle and known-age reference material. *Environmental Archaeology,* 17, 11-28.

Kidd, S. (2009) The Later Bronze Age and Iron Age, in Thorpe, D. ed. *An Archaeological Research Framework for Buckinghamshire; collected papers from the Solent-Thames Research Framework*. Buckinghamshire Papers No 15. Buckinghamshire Archaeological Society, Aylesbury.

King, A. (2005). Animal remains from temples in Roman Britain. *Britannia* 36, 329-369.

Lawrence, B., (1980). Evidences of Animal Domestication at Cayonu. In H. Cambel and R. J. Braidwood *The Joint Istanbul-Chicago Universities Prehistoric Research in Southeastern Anatolia*, 1. Istanbul, 257-308.

Legge, A. J. and Dorrington, E. J. (1985).The animal bones, in N. E. France and B. M. Gobels *The Romano-British temple at Harlow, Essex*. West Essex Archaeology Group, 122-33.

Legge, A.J., Williams, J. and Williams, P. (2000). Lambs to the slaughter: sacrifice at two Roman temples in southern England. In P. Rowley-Conwy.(ed.) *Animal Bones, Human Societies*, 152-7. Oxford, Oxbow Books.

Maltby, J. M. (1981). Iron Age, Romano-British and Anglo-Saxon Husbandry - A Review of the Faunal Evidence. In M. Jones and G. Dimbleby (eds) *The Environment of Man: the Iron Age to the Anglo-Saxon Period.* Oxford, British Archaeological Reports British Series 87, 155-203.

Moran, N. C. and O'Connor, T. P. (1994). Age attribution in domestic sheep by skeletal and dental maturation: a pilot study of available sources. *International Journal of Osteoarchaeology* 4, 267-285.

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 young 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.

Score, V. and Browning, J. (2010) Ritual, hoards and helmets: a late Iron Age shrine at Hallaton, East Leicestershire in M. Sterry, A. Tullett and N. Ray *In search of the Iron Age : Proceedings of the Iron Age Research Student Seminar 2008 University of Leicester* Leicester Archaeology Monographs 18, 145-164.

Serjeantson, D. (2007). Intensification of animal husbandry in the Late Bronze Age? The contribution of sheep and pigs. In C. Hazelgrove and R. Pope (eds.) *The Earlier Iron Age in Britain and the near Continent*. Oxford, Oxbow, 80-93.

Sibun, L. (2008). The animal bone from the Aston Clinton bypass. In R. Masefield *Prehistoric and later settlement and landscape from Chiltern scarp to Aylesbury Vale: the archaeology of the Aston Clinton bypass, Buckinghamshire*. British Archaeological Reports British Series 473, 169-178.

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