4 **ANIMAL BONES: DATA** by Andy Hammon

4.1 **Appendix 1: methods**

Taxonomic identification

All specimens were identified to species or taxonomic group where possible. Ribs and vertebrae (excluding the axis and atlas) and unidentifiable specimens were assigned to size class (large/medium). The English Heritage vertebrate skeleton reference collection (held at Fort Cumberland, Portsmouth) was used for identification purposes in addition to published criteria (see below).

Sheep/goat

The distinction between sheep (*Ovis aries*) and goat (*Capra hircus*) was attempted on the mandibular third and fourth deciduous premolars using the criteria of Payne (1985) and on the permanent dentition when *in situ* using the criteria of Halstead *et al*. (2002). Distinction of the following elements was attempted using a combination of Boessneck (1969) and Prummel and Frisch (1986): horncore, humerus, radius, ulna, metacarpal, tibia, astragalus, calcaneum and metatarsal. Additionally, the criteria of Kratochvil (1969) was used for the distal tibia.

Pig/wild boar

Metrical data for the mandibular teeth and distal humerus were used to distinguish between domestic pig and its progenitor wild boar (*Sus scrofa*) following Payne and Bull (1988).

Equids

Species distinction was attempted on the maxillary and mandibular dentition when *in situ* using the criteria of Davis (1987b, 1980), primarily in the effort to separate horse (*Equus caballus*) from donkey (*E. asinus*).

Red/fallow deer

The distinction between red deer (*Cervus elaphus*) and fallow deer (*Dama dama*) was attempted on all elements using the criteria of Lister (1996).

Lagomorphs

The distinction between hare (*Lepus* sp.) and rabbit (*Oryctolagus cuniculus*) was attempted on all elements using the criteria of Callou (1997).

Domestic fowl

The distinction between chicken (*Gallus gallus*) and the closely related species of Guinea fowl (*Numida meleagris*) and pheasant (*Phasianus colchicus*) was attempted on the following elements using the criteria of Albarella (pers. comm.) and MacDonald (1992): scapula, carpometacarpus, femur and tarsometatarsus.

Recording

Identified or classified (rib and vertebrae) fragments were recorded on a Microsoft Access XP database. Each fragment was given an identification number and the following information was recorded: site code; context number; taxa/taxonomic group; skeletal element; side; presence/absence of bone zone (see below); mandibular tooth eruption and wear; post-cranial epiphyseal proximal and distal fusion; whether foetal/neonatal or juvenile; and articulation with other specimens. In addition, other variables were recorded relating taphonomy and biometry (see below).

Taphonomy

The recovery method, state of surface preservation, presence/absence of root etching, angularity of breaks, gnawing, burning and completeness were all recorded. The type of burning was recorded because it provides a crude measure of temperature and may indicate cooking or disposal method. The type and location of butchery was recorded, the latter using Serjeantson's (1996, 195–200) zones. This will be especially useful when assessing diachronic butchery patterns and in discussions regarding the acculturation of the indigenous population.

Quantification

Three methods of quantification were used to compare the frequencies of the main taxa/taxonomic groups. These methods mirror those used in the earlier reports to make results directly comparable between the hillfort (Grant 1984), DEP (Hamilton 2000a, 2000c, 2000d, 2000e, 2000f; Roncaglia and Grant 2000) and other DERP (Vol. 2 parts 1–3, 5 and 6) assemblages.

Number of Identified Fragments

All fragments identified to species were included in the Number of Identified Fragments (NIF) count; 'classified' vertebrae and ribs have been excluded. NIF equates to Number of Identified Specimens/Skeletal Parts (NISP). The fragmentation of specimens was recorded following the zoning system devised by Cohen and Serjeantson (1996, 109–12) and Serjeantson (1996, 195–200); each element has up to eight zones for which the presence (>50%) or absence is recorded.

Epiphyses Only

The epiphysis only (EO) method is described in Grant (1975, 379). In summary, it only includes bones with part of an epiphysis or diaphysis (shaft) fusion surface present, plus mandibles with at least one tooth. Whole bones, except phalanges, are counted twice, once for each epiphysis. Skull fragments, carpals, patella, tarsals, third phalange, sacrum, vertebrae and ribs are excluded.

Minimum Number of Individuals

Minimum Number of Individuals (MNI) was calculated for whole phases following the methodology used by Hamilton (2000b, 75, pers. comm.) for the DEP sites. MNI for individual anatomical elements equates to Minimum Number of Elements (MNE). For the long bones, MNI was calculated from the greater number of left or right ends for each element taking into account fusion. Foetal/neonatal and juvenile bones were treated separately and added to produce a total long bone MNI. A range of methods were used to calculate MNI from mandibles (see Table 7); the greater number of Zone 1 (area of symphysis) or Zone 8 (jaw articulation) taking into account side; the number of mandibles with teeth *in situ* taking into account wear stage and side; the number of mandibular deciduous fourth premolars (dP_4) and third molars (M_3), *in situ* or isolated taking into account side. The overall MNI was the highest element MNE.

Skeletal representation for the main species (sheep/goat, cattle, pig, equid and dog) was calculated using the same method as Grant (1984, 498–500). The percentage for each element is calculated relative to the most common element and corrections are made when there are fewer than two particular bones per skeleton; dog metapodials divided by four, equid phalanges divided by two and cattle/sheep/pig phalanges divided by four.

Ageing

Tooth eruption and wear

Tooth wear was recorded for mandibular teeth *in situ* and isolated: dP_4, permanent fourth premolar (P_4), first molar (M_1), second molar (M_2) and M_3. Tooth eruption and wear for cattle and pig were recorded and 'Mandible Wear Stages' (MWS) assigned using Grant (1982). Payne (1973, 1987) was used for recording eruption and wear stage and assigning age for sheep/goat.

Post-cranial epiphyseal fusion

Epiphyseal fusion stages were recorded and ages assigned using Silver (1969). The fusion stages for mammalian long bones were recorded as 'unfused', 'fusing' and 'fused'. A bone was recorded as 'fusing' when spicules had formed between the shaft and epiphyses with open spaces still present and 'fused' when the line of fusion was closed (Albarella and Davis 1996, 5). Specimens were also classed as 'foetal/neonatal' and 'juvenile' where pertinent to provide greater resolution.

The data in the epiphyseal fusion tables show figures that have been 'minimized' following the method used in the DEP reports, Hamilton (2000a, 75–6) for instance; the greater number of either unfused epiphyses or number of corresponding shaft fusion surfaces taking side into account.

Discrepancies between tooth eruption and wear and the post-cranial epiphyseal fusion data are the result of small datasets and taphonomic factors, including recovery. Immature mandibles are especially prone to greater levels of post-depositional destruction (Munson 2000; Munson and Garniewicz 2003).

Sexing

An attempt was made to sex the pelvis of the main domesticates using Grigson (1982). Domestic fowl (chicken) was sexed on the tarsometatarsus using the presence of spurs and spur-scars. This is not always a reliable indicator because hens also occasionally develop spurs (see Sadler 1991; West 1985). No attempt was made to sex (and age) the horncores of cattle and sheep/goat.

Measurements

Measurements were taken following the standards of von den Driesch (1976). The standardized method allows for the measurements to be compatible with animal bone measurements from the hillfort (Grant 1984, microfiche 16:A3–17:E8) and DEP assemblages, Hamilton (2000a, microfiche 14:B1–D11) for instance, in addition to other Iron Age and Romano-British datasets. The extra measurements to distinguish domestic pig and wild boar are described in Payne and Bull (1988). Additional measurements (BatF, 1, 2, 3, 4, 5, 6, a and b) were taken for cattle, sheep/goat and deer using Davis (1992). Skeletally immature specimens were not measured because to do so would introduce a bias into the dataset. The dimensions of a bone when burnt alter so they were excluded also (see Davis 1987a, 26).

Withers heights for dog were calculated using the factors of Harcourt (1974) and von den Driesch and Boessneck (1974), and for equid using May (1985).

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4.2 A**ppendix 2: measurements**

Taxa codes

OVA	Sheep (*Ovis aries*)
CAH	Goat (*Capra hircus*)
O	Sheep (*O. aries*)/goat (*C. hircus*)
B	Cattle (*Bos taurus*)
BOP?	Aurochs? (cf. *B. primigenius*)
EQC	Horse (*Equus caballus*)
EQ	Equid (*Equus* sp.)
CAF	Dog (*Canis familiaris*)
CAF?	Dog? (cf. *Canis familiaris*)
VUV?	Ref fox? (cf. *Vules vulpes*)
GAG	Chicken (*Gallus gallus*)
GN	Chicken (*G. gallus*)/Guinea fowl (*Numida meleagris*)
GP	Chicken (*G. gallus*)/pheasant (*Phasianus colchicus*)
GNP	Chicken (*G. gallus*)/Guinea fowl (*N. meleagris*)/pheasant (*P. colchicus*)

Sheep/goat

FOURTH DECIDUOUS PREMOLAR

Phase	Context number	Taxa	Bone ID	W
LIA	TH F1116/1 (3)	OVA	5639	5.7
ERB	TH F1136 (3)	OVA	5748	6.7
RB	TH 736	OVA	4759	5.8
RB	TH 754	OVA	4989	6.2
RB	TH F1112 (1)	OVA	5275	6.1
RB	TH F1112 (1)	OVA	5286	6.7
RB	TH F1112 (1)	OVA	5287	6.5
RB	TH F1096 (1)	OVA	5355	6.4
RB	TH F1112 (1)	OVA	5434	6.7
na	TH 720	OVA	4725	6.7

FIRST MOLAR

Phase	Context number	Taxa	Bone ID	W
LIA	TH F1112 (5)	OVA	5501	7.4
LIA	TH F1116/1 (3)	OVA	5639	6.6
LIA	TH F1116/1 (3)	OVA	5641	6.8
LIA	TH F1128 (2)	OVA	5765	6.6
ERB	TH F1063/4 (3)	OVA	5143	7.4
na	TH 729	OVA	4805	6.9
na	TH F1115 (3)	OVA	5662	6.9
RB	TH 736	OVA	4759	7.1
RB	TH F1112 (1)	OVA	5286	7.4
RB	TH F1085 (2)	OVA	5352	6.8
RB	TH F1112 (1)	OVA	5434	7.6
RB	TH F1112 (2)	OVA	5437	7.4
ERB	TH F1136 (3)	OVA	5748	7.6

SECOND MOLAR

Phase	Context number	Taxa	Bone ID	W
LIA	TH F1112 (5)	OVA	5501	8.2
LIA	TH F1116/1 (3)	OVA	5641	7.3
LIA	TH F1128 (2)	OVA	5765	7.4
ERB	TH F1136 (2)	OVA	5682	7.6
RB	TH 736	OVA	4759	7.7
RB	TH F1066/2 (1)	OVA	5024	7.4
RB	TH F1066/7 (1)	OVA	5103	8.1
RB	TH F1112 (1)	OVA	5286	7.8
RB	TH F1085 (2)	OVA	5352	7.3
RB	TH F1112 (1)	OVA	5434	8.2
RB	TH F1112 (2)	OVA	5437	8.2
na	TH 729	OVA	4805	7.1
na	TH F1115 (3)	OVA	5662	7.6
na	TH PH1221 (1)	OVA	5732	7.5

THIRD MOLAR

Phase	Context number	Taxa	Bone ID	W
LIA	TH F1112 (5)	OVA	5501	8.4
LIA	TH F1116/1 (3)	OVA	5641	7.3
ERB	TH F1063/2 (4)	O	5055	8.2

ERB	TH F1112 (3)	O	5471	8.1
ERB	TH F1136 (2)	OVA	5682	7.8
RB	TH 724	O	4703	8.9
RB	TH 724	O	4704	8.4
RB	TH 769	OVA	4996	7.8
RB	TH F1066/2 (1)	OVA	5024	8.0
RB	TH F1066/7 (1)	OVA	5103	8.1
RB	TH F1112 (1)	OVA	5283	8.6
RB	TH F1112 (1)	O	5284	8.0
RB	TH F1112 (1)	O	5285	9.1
RB	TH F1112 (1)	O	5293	8.5
RB	TH F1102 (1)	O	5328	8.4
RB	TH F1112 (2)	OVA	5437	8.6
na	TH 720	O	4729	8.7
na	TH 726	O	4868	7.5
na	TH F1064 (1)	O	5071	8.3
na	TH F1115 (3)	OVA	5662	7.8
na	TH PH1221 (1)	OVA	5732	7.7

SCAPULA

Phase	Context number	Taxa	Bone ID	SLC
ERB	TH F1063/3 (3)	O	5173	15.6

HUMERUS

Phase	Context number	Taxa	Bone ID	BT	HT	HTC
LIA	TH F1116/2 (3)	OVA	5644	23.8	15.8	11.8
RB	TH F1083 (2)	OVA	5343	28.7	16.9	12.1

RADIUS

Phase	Context number	Taxa	Bone ID	Bp	BFp
RB	TH F1112 (1)	O	5299	28.6	26.8

METACARPAL

Phase	Context number	Taxa	Bone ID	Bp	BatF	1	3	4	5	6	a	b
ERB	TH 743	OVA	4787	24.5				9.0	15.7	13.4		11.3
RB	TH F1145 (1)	OVA	5710	22.6	24.6	10.6	13.9				11.2	
na	TH 732	O	4830	21.0								

TIBIA

Phase	Context number	Taxa	Bone ID	Bd	Dd
ERB	TH F1063/2 (4)	OVA	5056	25.8	19.0
ERB	TH F1063/5 (2)	OVA	5119	25.3	19.3
RB	TH F1112 (1)	OVA	5306	24.9	19.2

CALCANEUM

Phase	Context number	Taxa	Bone ID	GL	C	C+D
na	TH 720	OVA	4734	55.3	13.0	23.1

Cattle

FIRST MOLAR

Phase	Context number	Taxa	Bone ID	W
RB	TH F1102 (1)	B	5323	14.5
na	TH F1072 (1)	B	5379	15.2

SECOND MOLAR

Phase	Context number	Taxa	Bone ID	W
ERB	TH F1136 (5)	B	5750	15.1
ERB	TH F1136 (5)	B	5751	14.3
RB	TH F1102 (1)	B	5323	15.1
na	TH F1072 (1)	B	5379	16.8

THIRD MOLAR

Phase	Context number	Taxa	Bone ID	L	W
LIA	TH F1112 (5)	B	5491		14.8
LIA	TH F1116/1 (2)	B	5601		15.1
ERB	TH F1063/4 (4)	B	5111		16.5
ERB	TH F1112 (3)	B	5452		14.9
ERB	TH F1136 (5)	B	5750	36.1	15.8
ERB	TH F1136 (5)	B	5751	34.4	14.9
na	TH 741	B	4889	35.5	14.9
na	TH F1072 (1)	B	5379	35.3	15.7

HORNCORE

Phase	Context number	Taxa	Bone ID	45	46
RB	TH 752	B	4978	39.7	32.9

SCAPULA

Phase	Context number	Taxa	Bone ID	SLC
LIA	TH F1128 (3)	B	5702	50.2

HUMERUS

Phase	Context number	Taxa	Bone ID	GLC	BT	HT	HTC	Comments
LIA	TH F1112 (8)	B	5578	240.5	68.0	38.6	29.8	Skeleton(s); ID 5575-91; left
LIA	TH F1112 (8)	B	5579		75.9	44.9	31.9	Skeleton(s); ID 5575-91; right
RB	TH F1112 (1)	BOP?	5213		99.8	67.1	44.3	Estimates due to preservation
RB	TH F1112 (1)	B	5214		66.6	38.6	26.9	

RB	TH F1112 (1)	B	5227				32.5							
RB	TH F1112 (1)	B	5229				32.8							

RADIUS

Phase	Context number	Taxa	Bone ID	GL	SD	Bp	BFp	Bd	BFd	Comments
LIA	TH F1112 (8)	B	5580			82.3	73.3			Skeleton(s); ID 5575-91; left
LIA	TH F1112 (8)	B	5581	248.0	33.4	70.0	65.9			Skeleton(s); ID 5575-91; right
LIA	TH F1112 (8)	B	5582	229.0	42.5	85.1	78.1	77.5	76.4	Skeleton(s); ID 5575-91; right
LIA	TH F1128 (1)	B	5718			70.3	63.8			

METACARPAL

Phase	Context number	Taxa	Bone ID	Bp	BatF	Bd	1	4	6	a	b
ERB	TH F1063/2 (4)	B	5052	54.4							
ERB	TH F1063/2 (4)	B	5053		46.6	52.3	21.5	19.9	25.2	25.4	24.1

FEMUR

Phase	Context number	Taxa	Bone ID	GLC	SD	Bd	Comments
LIA	TH F1112 (8)	B	5587			83.5	Skeleton(s); ID 5575-91; left
LIA	TH F1112 (8)	B	5588	313.5	30.6	88.9	Skeleton(s); ID 5575-91; right
LIA	TH F1112 (8)	B	5589			93.9	Skeleton(s); ID 5575-91; right

TIBIA

Phase	Context number	Taxa	Bone ID	GL	SD	Bd	Dd	Comments
LIA	TH F1112 (8)	B	5590	331.5	36.4	56.4	44.5	Skeleton(s); ID 5575-91; left
LIA	TH F1112 (8)	B	5591	330.5	37.2	56.1	45.2	Skeleton(s); ID 5575-91; right
LIA	TH F1116/1 (3)	B	5630			54.6		
ERB	TH F1164 (1)	B	5715			63.9	49.8	

ASTRAGALUS

Phase	Context number	Taxa	Bone ID	GLl	GLm	Dl	Bd
LIA	TH F1112 (6)	B	5544	69.2	62.2	37.4	46.0
RB	TH 744	B	4925	65.1	60.1	36.1	44.0
na	TH F1124 (2)	B	5742	62.8	58.2	33.9	38.2

CALCANEUM

Phase	Context number	Taxa	Bone ID	C	C+D
na	TH F1072 (1)	B	5382	27.1	46.4

METATARSAL

Phase	Context number	Taxa	Bone ID	GL	SD	Bp	BatF	Bd	1	2	3	6	a	b
ERB	TH F1082/1 (2)	B	5392			41.1								
ERB	TH F1164 (1)	B	5693	210.5	28.6	47.7	49.3	56.0	22.4	30.2	26.8	27.3	26.5	25.7
na	TH 729	B	4801				48.5							

Pig

FOURTH DECIDUOUS PREMOLAR

Phase	Context number	Bone ID	WP
LIA	TH F1128 (2)	5772	8.0

FIRST MOLAR

Phase	Context number	Bone ID	WA	WP
LIA	TH F1128 (2)	5772	9.7	10.3
ERB	TH F1063/4 (3)	5146	10.7	11.3

SECOND MOLAR

Phase	Context number	Bone ID	WA	WP
LIA	TH F1128 (2)	5772	12.3	
ERB	TH 743	4792		13.4
ERB	TH F1063/2 (4)	5057	12.6	13.6
ERB	TH F1063/4 (3)	5146	12.9	13.4

PELVIS

Phase	Context number	Bone ID	LA
LIA	TH F1128 (2)	5774	33.3

Equid

FOURTH PREMOLAR

Phase	Context number	Taxa	Bone ID	L1	Wa	Comments
RB	TH F1167	EQC	5673	35.8	9.2	Left
RB	TH F1167	EQC	5674	35.7	9.3	Right

HUMERUS

Phase	Context number	Taxa	Bone ID	BT	HT	HTC
ERB	TH F1164 (1)	EQ	5697	71.3	48.2	34.2

RADIUS

Phase	Context number	Taxa	Bone ID	GL	Ll	SD	Bp	BFp	Bd	BFd	Comments
ERB	TH F1082/1 (1)	EQ	5407	313.0	292.0	34.7	74.7	69.4	69.2	57.4	Articulated; ID 5404-8 (UL)
RB	TH F1066/5 (1)	EQ	5060						74.9	62.6	

METACARPAL

Phase	Context number	Taxa	Bone ID	GL	GLl	Ll	SD	Bp	Bd	Dp	Dd
ERB	TH F1136 (5)	EQ	5757	210.5	207.0	202.5	31.4	48.5	47.9	31.5	35.1
RB	TH 752	EQ	4982					43.4			33.8
RB	TH F1066/3 (1)	EQ	5014					43.1		28.0	

PELVIS

Phase	Context number	Taxa	Bone ID	LAR	LA
ERB	TH F1136 (5)	EQ	5701	57.9	61.4

TIBIA

Phase	Context number	Taxa	Bone ID	Bd	Dd
LIA	TH F1112 (8)	EQ	5592	62.6	41.8

ASTRAGALUS

Phase	Context number	Taxa	Bone ID	GH	LmT	GB	BFd	Comments
LIA	TH F1112 (5)	EQ	5504	47.7	49.6	56.6	44.2	Skeleton; ID 5504-32

FIRST PHALANGE

Phase	Context number	Taxa	Bone ID	GL	SD	Bp	BFp	Dp	Bd	BFd
ERB	TH F1136 (5)	EQ	5758	85.1	32.9	52.7	48.0	35.2	46.7	42.1
RB	TH 733	EQ	4856			49.4	43.7	31.2		
RB	TH F1066/2 (1)	EQ	5035			52.0	49.7	37.2		
RB	TH F1112 (1)	EQ	5310	82.3	33.1	53.6	48.0	32.8	45.4	43.5

THIRD PHALANGE

Phase	Context number	Taxa	Bone ID	GL	LF	GB	BF	Ld
ERB	TH F1164 (1)	EQ	5717	69.0	25.7	79.2	49.0	47.6

Dog

FIRST MOLAR

Phase	Context number	Taxa	Bone ID	L	W
ERB	TH F1082/2 (3)	CAF	5376	21.0	8.9
RB	TH F1066/2 (1)	CAF	5036		8.4

MANDIBLE

Phase	Context number	Taxa	Bone ID	8	9	10	11	12
ERB	TH F1082/2 (3)	CAF	5377	72.7	67.4	35.9	37.8	32.0

HUMERUS

Phase	Context number	Taxa	Bone ID	Bd
RB	TH F1119 (2)	CAF	5657	33.5

PELVIS

Phase	Context number	Taxa	Bone ID	LA	Comments
na	TH F1060 (1)	CAF	5203	20.9	Skeleton; ID 5203-11

SECOND METACARPAL

Phase	Context number	Taxa	Bone ID	GL	Bd	Comments
ERB	TH 743	VUV?	4797	39.9	6.3	Articulated; ID 4794-7 (HU, RA, MC2 & MT4)

THIRD METATARSAL

Phase	Context number	Taxa	Bone ID	GL	Bd	Comments
ERB	TH F1082/2 (1)	CAF	5367	66.3	8.1	Articulated; ID 5367-8 (MT3 & MT5)
na	TH F1060 (1)	CAF	5209	33.7	6.8	Skeleton; ID 5203-11

FOURTH METATARSAL

Phase	Context number	Taxa	Bone ID	GL	Bd	Comments
ERB	TH 743	VUV?	4796	60.0	5.7	Articulated; ID 4794-7 (HU, RA, MC2 & MT4)

FIFTH METATARSAL

Phase	Context number	Taxa	Bone ID	GL	Bd	Comments
ERB	TH F1082/2 (1)	CAF	5368	60.2	7.5	Articulated; ID 5367-8 (MT3 & MT5)
na	TH F1060 (1)	CAF	5208	35.4	7.1	Skeleton; ID 5203-11

Domestic fowl

CORACOID

Phase	Context number	Taxa	Bone ID	GL	Lm	BF
ERB	TH F1112 (3)	GNP	5484	49.0	46.8	10.3

HUMERUS

Phase	Context number	Taxa	Bone ID	GL	SC	Bp	Bd
ERB	TH F1136 (5)	GNP	5728	74.9	7.4	20.3	16.2

RADIUS

Phase	Context number	Taxa	Bone ID	GL
ERB	TH F1112 (3)	GNP	5487	54.5

FEMUR

Phase	Context number	Taxa	Bone ID	GL	Lm	SC	Bp	Dp	Bd	Dd
ERB	TH F1112 (3)	GNP	5488						13.1	10.8
ERB	TH F1136 (3)	GN	5749	75.3	70.7	6.3	14.9	9.2	13.9	11.6
RB	TH F1112 (1)	GN	5317				13.4	9.1		

TIBIOTARSUS

Phase	Context number	Taxa	Bone ID	Dip	Bd	Dd
ERB	TH F1136 (5)	GNP	5730	17.4		
RB	TH F1112 (2)	GNP	5445		9.7	10.3

METATARSAL

Phase	Context number	Taxa	Bone ID	GL	SC	Bp	Bd
RB	TH F1112 (1)	GN	5319	67.3	5.7	12.0	10.9
na	TH 729	GN	4820				12.0
na	TH F1064 (1)	GN	5094			11.5	

4.3 A**ppendix 3: mandibular tooth eruption and wear**

Taxa codes

OVA	Sheep (*Ovis aries*)
CAH	Goat (*Capra hircus*)
O	Sheep (*O. aries*)/goat (*C. hircus*)

Element codes

dP4	Deciduous fourth premolar
P4	Fourth premolar
M1	First molar
M2	Second molar
M3	Third molar
M12	First OR second molar

Sheep/goat

Phase	Context number	Bone ID	Taxa	dP4	P4	M1	M2	M3	M12
LIA	TH F1112 (5)	5501	OVA		9A	9A	9A	2A	
LIA	TH F1112 (5)	5502	O						9A
LIA	TH F1116/1 (2)	5605	O						B
LIA	TH F1116/1 (2)	5606	O						9A
LIA	TH F1116/1 (2)	5607	O					0	
LIA	TH F1116/1 (1)	5623	O						7A
LIA	TH F1116/1 (3)	5639	OVA	16L		5A			
LIA	TH F1116/1 (3)	5640	O		15A	15A	12A	11G	
LIA	TH F1116/1 (3)	5641	OVA		8B	9A	9A	4A	
LIA	TH F1116/1 (4)	5671	O						3C
LIA	TH F1128 (2)	5765	OVA			9A	8A		
LIA	TH F1128 (2)	5766	O						9A
LIA	TH F1128 (2)	5767	O		0				
LIA	TH F1128 (2)	5768	O					0	
ERB	TH 743	4783	O						7A
ERB	TH 743	4784	O						9A
ERB	TH 743	4785	O						6A
ERB	TH F1063/2 (4)	5055	O					10H	
ERB	TH F1063/4 (3)	5143	OVA		11S	9A			
ERB	TH F1063/2 (2)	5158	O						9A
ERB	TH F1063/1 (1)	5198	O						B
ERB	TH F1063/1 (2)	5212	O						9A
ERB	TH F1112 (3)	5464	O		0				
ERB	TH F1112 (3)	5465	O						9A
ERB	TH F1112 (3)	5466	O						7A
ERB	TH F1112 (3)	5467	O						8A
ERB	TH F1112 (3)	5468	O					2A	
ERB	TH F1112 (3)	5469	O						9A
ERB	TH F1112 (3)	5470	O						9A
ERB	TH F1112 (3)	5471	O					9H	
ERB	TH F1136 (2)	5682	OVA				9A	10G	
ERB	TH F1164 (1)	5694	O						9A
ERB	TH F1136 (3)	5748	OVA	14L		7A			
RB	TH 724	4699	O						0
RB	TH 724	4700	O						8B
RB	TH 724	4701	O						9A
RB	TH 724	4702	O						9A
RB	TH 724	4703	O					9G	
RB	TH 723	4712	O						9A
RB	TH 723	4713	O						0
RB	TH 736	4759	OVA	18L		9A	6A		
RB	TH 736	4760	O						9A
RB	TH 731	4853	O					5A	
RB	TH 744	4951	O					2A	
RB	TH 744	4952	O					8G	
RB	TH 744	4953	O					11G	
RB	TH 744	4954	O					11G	
RB	TH 744	4955	O		9A				
RB	TH 744	4956	O						9A
RB	TH 744	4957	O						9A
RB	TH 747	4971	O						7A
RB	TH 766	4987	O						9A

RB	TH 754	4989	OVA	16L					
RB	TH 769	4996	OVA					6A	
RB	TH 785	4999	OVA		9A				
RB	TH F1066/2 (1)	5024	OVA		15A	15A	9A	11G	
RB	TH F1066/2 (1)	5028	O		12S				
RB	TH F1066/7 (1)	5103	OVA				9A	5A	
RB	TH F1066/4 (1)	5134	O						9A
RB	TH F1112 (1)	5275	OVA	16L					
RB	TH F1112 (1)	5279	O		11S				
RB	TH F1112 (1)	5280	O						9A
RB	TH F1112 (1)	5281	O						9A
RB	TH F1112 (1)	5282	O						9A
RB	TH F1112 (1)	5283	OVA					9G	
RB	TH F1112 (1)	5284	O					6A	
RB	TH F1112 (1)	5285	O					11G	
RB	TH F1112 (1)	5286	OVA	16L		9A	E		
RB	TH F1112 (1)	5287	OVA	14L					
RB	TH F1112 (1)	5288	OVA		15A				
RB	TH F1112 (1)	5291	O						9A
RB	TH F1112 (1)	5292	O						9A
RB	TH F1112 (1)	5293	O					9G	
RB	TH F1102 (1)	5327	O					13H	
RB	TH F1102 (1)	5328	O					9G	
RB	TH F1085 (1)	5334	O						9A
RB	TH F1080 (1)	5351	O		0				
RB	TH F1085 (2)	5352	OVA	14L		9A	5A		
RB	TH F1096 (1)	5355	OVA	16L					
RB	TH F1112 (1)	5434	OVA	17L		9A	6A		
RB	TH F1112 (2)	5435	O						8A
RB	TH F1112 (2)	5436	O						9A
RB	TH F1112 (2)	5437	OVA		11S	9A	9A	8G	
RB	TH F1119 (1)	5660	O						9A
RB	TH F1120 (1)	5677	O						10A
na	TH 720	4725	OVA	17L					
na	TH 720	4726	O						9A
na	TH 720	4727	O						9A
na	TH 720	4728	O						7A
na	TH 720	4729	O					2A	
na	TH 729	4805	OVA		7S	9A	8A	2A	
na	TH 729	4808	O						9A
na	TH 729	4809	O						7A
na	TH 729	4810	O						7A
na	TH 729	4811	O						9A
na	TH 729	4812	O						9A
na	TH 732	4826	O						B
na	TH 732	4827	O						9A
na	TH 726	4866	O						9A
na	TH 726	4867	O						9A
na	TH 726	4868	O					2A	
na	TH 720	4878	O						8A
na	TH 740	4884	OVA		9A	9A	9A	11G	
na	TH 735	4886	O						7A
na	TH 730	4891	O						8A
na	TH F1064 (1)	5069	O						0
na	TH F1064 (1)	5070	O						8A
na	TH F1064 (1)	5071	O					9G	
na	TH F1072 (1)	5385	O		8B				
na	TH F1072 (1)	5386	O						9A
na	TH F1115 (3)	5662	OVA			9A	7A	0	
na	TH PH1221 (1)	5732	OVA				9A	8G	
na	TH F1126 (1)	5737	O						9A

Cattle

Phase	Context number	Bone ID	dP4	P4	M1	M2	M3	M12
LIA	TH F1112 (5)	5491		g	o	l	g	
LIA	TH F1112 (5)	5492	k		j	g	E	
LIA	TH F1116/1 (2)	5601					j	
LIA	TH F1116/1 (3)	5629	k		g			
ERB	TH 743	4770						j
ERB	TH F1063/4 (4)	5111					k	
ERB	TH F1063/2 (2)	5152						k
ERB	TH F1112 (3)	5452		g	n	l	g	
ERB	TH F1136 (5)	5750				j	g	
ERB	TH F1136 (5)	5751				g	d	
RB	TH 752	4977						l
RB	TH F1066/2 (1)	5017						k
RB	TH F1066/5 (1)	5058						l
RB	TH F1112 (1)	5218						l
RB	TH F1112 (1)	5219						g
RB	TH F1102 (1)	5323			k	g		
RB	TH F1102 (1)	5324						k
na	TH 729	4799						h
na	TH 741	4889					f	
na	TH F1072 (1)	5379			k	k	h	
na	TH F1115 (2)	5667						k

Pig

Phase	Context number	Bone ID	dP4	P4	M1	M2	M3	M12
LIA	TH F1128 (2)	5772	k		e	b		
ERB	TH F1063/2 (4)	5057		b	j	e		
ERB	TH F1063/4 (3)	5146		b	f	e		
RB	TH F1066/3 (1)	5012						d
RB	TH F1066/3 (1)	5013						e
na	TH F1064 (1)	5084						g

4.4 **Tabulated data**

Table 1. Numbers of fragments (NIF) for all cases by phase and feature type

Phase/	**LIA**				**LIA**		**ERB**				**ERB**		**RB**				**RB**		**ND**	**TOTAL**	
Feature/	Ditch		Shaft		**Total**		Ditch		Shaft		**Total**		Shaft		Occupation		**Total**				
Taxa	NIF	*%*	NIF	*%*	NIF	*%*	NIF	*%*	NIF	*%*	NIF	*%*	NIF	*%*	NIF	*%*	NIF	*%*	NIF	NIF	*%*
Cattle	23	*19.5*	30	*29.7*	53	*24.2*	78	*30.7*	11	*23.9*	89	*29.7*	71	*47.0*	109	*26.7*	180	*32.2*	46	368	*27.4*
Sheep	4	*3.4*	1	*1.0*	5	*2.3*	6	*2.4*			6	*2.0*	10	*6.6*	10	*2.5*	20	*3.6*	6	37	*2.8*
Sheep/Goat	37	*31.4*	7	*6.9*	44	*20.1*	70	*27.6*	21	*45.7*	91	*30.3*	48	*31.8*	137	*33.6*	185	*33.1*	93	413	*30.7*
Pig	14	*11.9*			14	*6.4*	10	*3.9*	2	*4.3*	12	*4.0*	1	*0.7*	10	*2.5*	11	*2.0*	10	47	*3.5*
Horse															3	*0.7*	3	*0.5*		3	*0.2*
Equid	4	*3.4*	3	*3.0*	7	*3.2*	13	*5.1*	2	*4.3*	15	*5.0*	1	*0.7*	10	*2.5*	11	*2.0*	3	36	*2.7*
Dog	1	*0.8*	31	*30.7*	32	*14.6*	9	*3.5*			9	*3.0*	3	*2.0*	21	*5.1*	24	*4.3*	14	79	*5.9*
Dog/Fox			24	*23.8*	24	*11.0*	1	*0.4*			1	*0.3*								25	*1.9*
Cat																			1	1	*0.1*
Aurochs?													1	*0.7*			1	*0.2*		1	*0.1*
Red deer							1	*0.4*			1	*0.3*	1	*0.7*	1	*0.2*	2	*0.4*		3	*0.2*
Roe deer							1	*0.4*			1	*0.3*								1	*0.1*
Red fox																			1	1	*0.1*
Red fox?							4	*1.6*			4	*1.3*							4	8	*0.6*
Badger			2	*2.0*	2	*0.9*			1	*2.2*	1	*0.3*	4	*2.6*			4	*0.7*	3	10	*0.7*
Hare															1	*0.2*	1	*0.2*	1	2	*0.1*
Stoat																			2	2	*0.1*
Chicken/Guinea fowl							1	*0.4*			1	*0.3*	2	*1.3*			2	*0.4*	2	5	*0.4*
Chicken/Guinea fowl/Pheasant							2	*0.8*	6	*13.0*	8	*2.7*	3	*2.0*	3	*0.7*	6	*1.1*		14	*1.0*
Chicken/Guinea fowl/Pheasant?															2	*0.5*	2	*0.4*		2	*0.1*
Goose	1	*0.8*			1	*0.5*														1	*0.1*
Raven																			1	1	*0.1*
Red kite																			1	1	*0.1*
Turdid/Sturnid													1	*0.7*			1	*0.2*	4	5	*0.4*
Water rail?																			1	1	*0.1*
Total identified	84		98		182		196		43		239		146		307		453		193	1067	
Large mammal	18	*15.3*			18	*8.2*	31	*12.2*			31	*10.3*	1	*0.7*	43	*10.5*	44	*7.9*	34	127	*9.4*
Medium mammal	16	*13.5*	3	*2.9*	19	*8.6*	27	*10.6*	3	*6.6*	30	*10.2*	4	*2.5*	58	*14.3*	62	*10.8*	39	150	*11.1*
Total classified	34		3		37		58		3		61		5		101		106		73	277	
TOTAL	118		101		219		254		46		300		151		408		559		266	1344	

Table 2. Surface preservation and root etching by phase and feature type

LIA	**Poor**	*%*	**Moderate**	*%*	**Good**	*%*	**Yes**	*%*	**No**	*%*	**Total**
Ditch	13	*15.5*	69	*82.1*	2	*2.4*	38	*45.2*	46	*54.8*	84
Shaft	1	*1.0*	59	*60.2*	38	*38.8*	2	*2.0*	96	*98.0*	98
Total	14	*7.7*	128	*70.3*	40	*22.0*	40	*22.0*	142	*78.0*	182

ERB	**Poor**	*%*	**Moderate**	*%*	**Good**	*%*	**Yes**		**No**		**Total**
Ditch	66	*33.7*	105	*53.6*	25	*12.7*	110	*56.1*	86	*43.9*	196
Shaft	2	*4.7*	38	*88.3*	3	*7.0*	6	*14.0*	37	*86.0*	43
Total	68	*28.5*	143	*59.8*	28	*11.7*	116	*48.5*	123	*51.5*	239

RB	**Poor**	*%*	**Moderate**	*%*	**Good**	*%*	**Yes**		**No**		**Total**
Shaft	64	*43.8*	80	*54.8*	2	*1.4*	105	*71.9*	41	*28.1*	146
Occupation	199	*64.8*	106	*34.5*	2	*0.7*	232	*75.6*	74	*24.4*	307
Total	263	*58.1*	186	*41.0*	4	*0.9*	337	*74.4*	115	*25.6*	453

Table 3. Butchery marks by phase and taxa, excluding isolated teeth

LIA	Cattle	*%*	Sheep/goat	*%*	Pig	*%*
Chopped	7	*15.6*	1	*4.3*		
Cut	4	*8.9*				
Sawn						
Shave marks						
Split axially	1	*2.2*				
Unbutchered	33	*73.3*	22	*95.7*	9	*100.0*
Total	45		23		9	

ERB	Cattle	*%*	Sheep/goat	*%*	Pig	*%*	Domestic fowl	*%*
Chopped	5	*7.0*			1	*8.3*		
Cut	1	*1.4*	1	*2.3*	1	*8.3*		
Sawn								
Shave marks	3	*4.2*						
Split axially	6	*8.5*						
Unbutchered	56	*78.9*	43	*97.7*	10	*83.4*	9	*100.0*
Total	71		44		12		9	

RB	Cattle	*%*	Sheep/goat	*%*	Pig	*%*	Domestic fowl	*%*
Chopped	8	*5.3*						
Cut	1	*0.7*					1	*10.0*
Sawn								
Shave marks	3	*2.0*						
Split axially	20	*13.2*						
Unbutchered	119	*78.8*	83	*100.0*	6	*100.0*	9	*90.0*
Total	151		83		6		10	

Table 4. Burning frequencies by phase, excluding isolated teeth

LIA	Ditch	*%*	Shaft	*%*	ALL	*%*
Singed	5	*9.8*			5	*3.6*
Burnt						
Calcined						
Unmodified	46	*90.2*	89	*100.0*	135	*96.4*
Total	51		89		140	

ERB	Ditch	*%*	Shaft	*%*	ALL	*%*
Singed	15	*11.2*	3	*9.7*	18	*10.9*
Burnt						
Calcined						
Unmodified	119	*88.8*	28	*90.3*	147	*89.1*
Total	134		31		165	

RB	Shaft	*%*	Occupation	*%*	ALL	*%*
Singed	19	*19.4*	9	*4.7*	28	*9.7*
Burnt			1	*0.5*	1	*0.3*
Calcined						
Unmodified	79	*80.6*	181	*94.8*	260	*90.0*
Total	98		191		289	

Table 5. Gnawing frequencies by phase, excluding isolated teeth

LIA	ALL exc.	*%*	ART.	*%*	Inc.	*%*
Canid	14	*19.2*	1	*1.5*	19	*13.6*
Felid						
Rodent	1	*1.4*			1	*0.7*
Part digested						
Unmodified	58	*79.4*	66	*98.5*	120	*85.7*
Total	73		67		140	

ERB	ALL exc.	*%*	ART.	*%*	Inc.	*%*
Canid	16	*10.2*			16	*9.7*
Felid						
Rodent						
Part digested						
Unmodified	141	*89.8*	8	*100.0*	149	*90.3*
Total	157		8		165	

RB	ALL exc.	*%*	ART.	*%*	Inc.	*%*
Canid	10	*3.7*			10	*3.5*
Felid						
Rodent						
Part digested	3	*1.1*			3	*1*
Unmodified	257	*95.2*	19	*100.0*	276	*95.5*
Total	270		19		289	

Table 6. Numbers of identified fragments (NIF), Epiphyses only (EPIF) and minimum minimum of individuals (MNI) by major domesticate and phase

LIA	**All except articulated**					**Articulated**					**All**					
	NIF	*%*	Epiph.	*%*	MNI	NIF	*%*	Epiph.	*%*	MNI	NIF	*%*	Epiph.	*%*	MNI	*%*
Cattle	36	*32.7*	11	*34.4*	2	17	*24.7*	17	*32.7*	2	53	*29.6*	28	*33.3*	4	*28.6*
Sheep	49	*44.5*	7	*21.9*	3						49	*27.4*	7	*8.3*	3	*21.4*
Pig	14	*12.7*	6	*18.7*	1					1	14	*7.8*	6	*7.2*	2	*14.3*
Equid	5	*4.6*	4	*12.5*	1	2	*2.9*	1	*1.9*	1	7	*3.9*	5	*6.0*	2	*14.3*
Dog	6	*5.5*	4	*12.5*	1	50	*72.4*	34	*65.4*	2	56	*31.3*	38	*45.2*	3	*21.4*
Total	110		32		8	69		52		6	179		84		14	

ERB	**All except articulated**					**Articulated**				**All**					
	NIF	*%*	Epiph.	*%*	MNI	*%*	NIF	Epiph.	MNI	NIF	*%*	Epiph.	*%*	MNI	*%*
Cattle	89	*41.8*	35	*53.0*	5	*35.7*				89	*41.0*	35	*50.0*	5	*31.3*
Sheep	91	*42.7*	13	*19.7*	5	*35.7*				91	*42.0*	13	*18.5*	5	*31.2*
Pig	12	*5.6*	6	*9.1*	2	*14.4*				12	*5.5*	6	*8.6*	2	*12.5*
Equid	13	*6.1*	7	*10.6*	1	*7.1*	2	2	1	15	*6.9*	9	*12.9*	2	*12.5*
Dog	8	*3.8*	5	*7.6*	1	*7.1*	2	2	1	10	*4.6*	7	*10.0*	2	*12.5*
Total	213		66		14		4	4	2	217		70		16	

RB	**All except articulated**					**Articulated**					**All**					
	NIF	*%*	Epiph.	*%*	MNI	*%*	NIF	*%*	Epiph.	*%*	MNI	NIF	*%*	Epiph.	*%*	MNI	*%*
Cattle	181	*43.7*	74	*63.2*	13	*52.0*						181	*41.6*	74	*58.7*	13	*44.8*
Sheep	197	*47.6*	23	*19.7*	9	*36.0*	8	*38.1*	8	*44.4*	1	205	*47.1*	31	*24.6*	10	*34.5*
Pig	11	*2.7*	5	*4.3*	1	*4.0*						11	*2.6*	5	*4.0*	1	*3.5*
Equid	11	*2.7*	9	*7.7*	1	*4.0*	3	*14.3*			1	14	*3.2*			2	*6.9*
Dog	14	*3.3*	6	*5.1*	1	*4.0*	10	*47.6*	10	*55.6*	2	24	*5.5*	16	*12.7*	3	*10.3*
Total	414		117		25		21		18		4	435		126		29	

Table 7. Minimum Number of Individuals, using different methods

Cattle	**LIA**		**ERB**	**RB**
	ALL exc.	ART.	ALL exc.	ALL exc.
Longbone	**2**	**2**	**5**	**13**
Prox/dist mandible	**2**		**5**	2
dP4/M3	**2**		3	
Teeth *in-situ*	**2**		3	1

Sheep	**LIA**	**ERB**	**RB**	
	ALL exc.	ALL exc.	ALL exc.	ART.
Longbone	**3**	**5**	**9**	**1**
Prox/dist mandible		1	1	
dP4/M3	**3**	2	**9**	
Teeth *in-situ*	**3**	3	4	

Pig	**LIA**		**ERB**	**RB**
	ALL exc.	ART.	ALL exc.	ALL exc.
Longbone	**1**		1	**1**
Prox/dist mandible			1	**1**
dP4/M3		**1**		
Teeth *in-situ*		**1**	**2**	

Equid	**LIA**		**ERB**		**RB**	
	ALL exc.	ART.	ALL exc.	ART.	ALL exc.	ART.
Longbone	**1**	**1**	**1**	**1**	**1**	
Prox/dist mandible						
dP4/M3						
Teeth *in-situ*						**1**

Dog	**LIA**		**ERB**		**RB**	
	ALL exc.	ART.	ALL exc.	ART.	ALL exc.	ART.
Longbone	**1**	**2**	**1**	**1**	**1**	**2**
Prox/dist mandible		**2**	**1**			
dP4/M3		1				
Teeth *in-situ*			**1**			1

Table 8. Sheep mandible wear stages following Payne (1973 and 1987)

LIA	Def.	Attrib.	Range	Range	*Accum. min. %*	*Accum. max. %*	Suggested age
A							0-2 mnths
B				BCD 1			2-6 mnths
C	2						6-12 mnths
D							1-2 yrs
E	2	1					2-3 yrs
F							3-4 yrs
G							4-6 yrs
H							6-8 yrs
I	1						8-10 yrs
Total	5	1					

ERB	Def.	Attrib.	Range	Range	Suggested age
A					0-2 mnths
B					2-6 mnths
C		1			6-12 mnths
D					1-2 yrs
E	1	1			2-3 yrs
F	3				3-4 yrs
G					4-6 yrs
H					6-8 yrs
I					8-10 yrs
Total	4	2			

RB	Def.	Attrib.	Accum.	*Accum. %*	Range	Range	*Accum. min. %*	*Accum. max. %*	Suggested age
A									0-2 mnths
B						BCD 3		*12.5*	2-6 mnths
C	1	1	2	*10.5*			*20.8*	*20.8*	6-12 mnths
D			2	*10.5*			*20.8*	*20.8*	1-2 yrs
E	5	1	8	*42.1*		EFG 2	*45.8*	*54.2*	2-3 yrs
F	9		17	*89.5*			*91.7*	*91.7*	3-4 yrs
G	1		18	*94.7*			*95.8*	*95.8*	4-6 yrs
H			18	*94.7*			*95.8*	*95.8*	6-8 yrs
I	1		19	*100.0*			*100.0*	*100.0*	8-10 yrs
Total	17	2							

Table 9. Sheep epiphysial fusion data following Silver (1969), excluding articulated specimens

Phase	**LIA**		**ERB**			**RB**		
Element/Fusion	U	F	U	F	*F%*	U	F	*F%*
6-8 mnths								
Scapula				1	*100.0*			
10 mnths								
Humerus D		1	1	1	*50.0*	1	1	*50.0*
Radius P	1			1	*100.0*		2	*100.0*
Total/Average	*1*	*1*	*1*	*2*	*75.0*	*1*	*3*	*75.0*
13-16 mnths								
1st phalange	1					1	2	*66.7*
2nd phalange		1		1	*100.0*		2	*100.0*
Total/Average	*1*	*1*		*1*	*100.0*	*1*	*4*	*80.0*
1.5-2 yrs								
Tibia D	1	1		2	*100.0*		1	*100.0*
Metapodial D			1	1	*500.0*		2	*100.0*
Total/Average	*1*	*1*	*1*	*3*	*75.0*		*3*	*100.0*
2.5-3 yrs								
Radius D	1							
Ulna								
Femur P	1							
Total/Average	*1*							
3-3.5 yrs								
Humerus P			1			1		
Femur D	2							
Tibia P						1		
Calcaneum								
Total/Average	*2*		*1*			*2*		

NB. Metatarsal 20-28 mnths

Table 10. Sheep anatomical representation by phase

Phase/	**LIA**	**ERB**	**RB**		
Articulation/	ALL exc.	ALL exc.	ALL exc.		ART.
Element	N	N	N	%	N
Horncore					
Skull	4	4	15	*100.0*	
Mandible		1	2	*13.3*	
Atlas					
Axis					
Scapula	1	1	2	*13.3*	
Humerus P		1	4	*26.7*	
Humerus D	2	2	7	*46.7*	
Radius P	3	2	5	*33.3*	1
Radius D	4	4	2	*13.3*	1
Ulna		2	2	*13.3*	1
Metacarpal P		3	2	*13.3*	
Metacarpal D		8	5	*33.3*	
Pelvis	1	1	2	*13.3*	
Femur P					
Femur D	2				
Patella					
Tibia P	3	9	4	*26.7*	1
Tibia D	5	7	12	*80.0*	2
Astragalus			2	*13.3*	
Calcaneum			1	*6.7*	
Navicular cuboid					
Metatarsal P		1	4	*26.7*	
Metatarsal D			3	*20.0*	
1st phalange	1		2	*13.3*	
2nd phalange	1	1	1	*6.7*	
3rd phalange			1	*6.7*	

Table 11. Cattle mandible wear stages following Grant (1982)

LIA	Def.	Attrib.	Range		Range	Suggested age
1-5			1-10		1-15	
6-10			6-15		6-20	<6 mnths
11-15			11-20		11-25	
16-20			16-25		6-25	
21-25			21-30	1		
26-30	1		26-35		26-40	2-2.5 yrs
31-35			31-40			2-3 yrs
36-40			36-45		36-50	
41-45			41-50	1	41-55	
46-50	1		46-55			
Total	2					

ERB	Def.	Attrib.	Range		Range	Suggested age
1-5			1-10		1-15	
6-10			6-15		6-20	<6 mnths
11-15			11-20		11-25	
16-20			16-25		6-25	
21-25			21-30			
26-30			26-35		26-40	2-2.5 yrs
31-35			31-40	1		2-3 yrs
36-40			36-45		36-50	
41-45	1		41-50	1	41-55	
46-50			46-55	1		
Total	1					

RB	Def.	Attrib.	Range		Range	Suggested age
1-5			1-10		1-15	
6-10			6-15		6-20	<6 mnths
11-15			11-20		11-25	
16-20			16-25		6-25	
21-25			21-30			
26-30			26-35		26-40	2-2.5 yrs
31-35			31-40	1		2-3 yrs
36-40			36-45		36-50	
41-45			41-50		41-55	
46-50			46-55			
Total						

Table 12. Cattle epiphysial fusion data following Silver (1969), excluding articulated specimens

Phase	**LIA**		**ERB**			**RB**		
Element/Fusion	U	F	U	F	*F%*	U	F	*F%*
7-10 mnths								
Scapula		1		1	*100.0*	1		
12-16 mnths								
Humerus D		1		5	*100.0*		16	*100.0*
Radius P		2	1	4	*80.0*	1	24	*96.0*
1st phalange				3	*100.0*			
2nd phalange		1		1	*100.0*		1	*100.0*
Total/Average		*4*	*1*	*13*	*92.9*	*1*	*41*	*97.6*
2-3 yrs								
Tibia D		2		6	*100.0*	1	11	*91.7*
Metapodial D				2	*100.0*	1		
Total/Average		*2*		*8*	*100.0*	*2*	*11*	*84.6*
3.5-4 yrs								
Humerus P							1	*100.0*
Radius D			1			1		
Ulna			1					
Femur P				1	*100.0*		1	*100.0*
Femur D				2	*100.0*	1	1	*50.0*
Tibia P			1	1	*50.0*			
Calcaneum			1					
Total/Average			*4*	*4*	*50.0*	*2*	*3*	*60.0*

Table 13. Cattle anatomical representation by phase

Phase/	**LIA**		**ERB**	**RB**	
Articulation/	ALL exc.	ART.	ALL exc.	ALL exc.	
Element	N	N	N	N	%
Horncore		1	1	1	*4.5*
Skull	2	1	2	5	*22.7*
Mandible	3		5	4	*18.2*
Atlas	1				
Axis				1	*4.5*
Scapula	2		3	2	*9.1*
Humerus P		2	1	4	*18.2*
Humerus D	2	2	7	14	*63.6*
Radius P	2	3	4	22	*100.0*
Radius D		3		2	*9.1*
Ulna	2	3	6	10	*45.5*
Metacarpal P			1	1	*4.5*
Metacarpal D			1	2	*9.1*
Pelvis	2	1	3	2	*9.1*
Femur P	1	3	2	3	*13.6*
Femur D	2	3	7	12	*54.5*
Patella					
Tibia P		2	2	4	*18.2*
Tibia D	5	2	6	9	*40.9*
Astragalus	1			8	*36.4*
Calcaneum	1		2	4	*18.2*
Navicular cuboid					
Metatarsal P			2		
Metatarsal D			1		
1st phalange	1		1	1	*4.5*
2nd phalange	1		1	1	*4.5*
3rd phalange					

Table 14. Pig mandible wear stages following Payne (1973 and 1987)

LIA	Def.	Attrib.	Range	Range		Suggested age
1-5			1-10			<6 mnths
6-10			6-15			<12 mnths
11-15			11-20	11-35	1	<15 mnths
16-20			16-25			c. 15 mnths
21-25			21-30	21-50		<2 yrs
26-30			26-35			
31-35			31-40			>2 yrs
36-40			36-45			
41-45			41-50			
46-50			46-55			
Total					1	

ERB	Def.	Attrib.	Range	Range		Suggested age
1-5			1-10			<6 mnths
6-10			6-15			<12 mnths
11-15			11-20	11-35	3	<15 mnths
16-20			16-25			c. 15 mnths
21-25			21-30	21-50		<2 yrs
26-30			26-35			
31-35			31-40			>2 yrs
36-40			36-45			
41-45			41-50			
46-50			46-55			
Total					3	

Table 15. Pig epiphysial fusion data following Silver (1969), excluding articulated specimens

Phase	**LIA**		**ERB**		**RB**	
Element/Fusion	U	F	U	F	U	F
1 yr						
Scapula						
Humerus D					1	
Radius P						
2nd phalange				1		
Total/Average				*1*	*1*	
2-3 yrs						
Tibia D	1		1			
Calcaneum						
Metapodial D						
1st phalange					1	
Total/Average	*1*		*1*		*1*	
3.5-4 yrs						
Humerus P					1	
Radius D						
Ulna	1					
Femur P						
Femur D						
Tibia P	2					
Total/Average	*3*				*1*	

Table 16. Pig anatomical representation by phase

Phase/ Articulation/ Element	**LIA** ALL exc. N	**ERB** ALL exc. N	**RB** ALL exc. N
Skull	1	1	2
Mandible	1	5	
Atlas			
Axis			
Scapula	1	1	
Humerus P			1
Humerus D			1
Radius P			
Radius D			
Ulna	1		
Metacarpal P			
Metacarpal D			
Pelvis	1		1
Femur P		1	
Femur D	1	1	
Patella			
Tibia P	2	1	
Tibia D	2	1	
Astragalus			
Calcaneum			
Navicular cuboid			
Metatarsal P	1		1
Metatarsal D			
1st phalange			1
2nd phalange		1	
3rd phalange			

Table 17. Equid epiphysial fusion data following Silver (1969), excluding articulated specimens

Phase	**LIA**		**ERB**		**RB**	
Element/Fusion	U	F	U	F	U	F
1 yr						
Scapula				1		
1st phalange				1		3
2nd phalange						
Total/Average				*2*		*3*
15-18 mnths						
Humerus D				1		
Radius P						1
Metapodial D		1		1		1
Total/Average		*1*		*2*		*2*
20-24 mnths						
Tibia D		1				
3-3.5 yrs						
Humerus P						
Radius D					1	1
Ulna						
Femur P						
Femur D						
Tibia P						
Calcaneum						
Total/Average		*1*			*1*	*1*

NB. Scapula 12 mnths; Metatarsal 16-20 mnths; 1st phalange 13-15 mnths; 2nd phalange 9 mnths

Table 18. Equid anatomical representation by phase

Phase/	**LIA**		**ERB**		**RB**	
Articulation/	ALL exc.	ART.	ALL exc.	ART.	ALL exc.	ART.
Element	N		N		N	N
Skull	1		2		2	1
Mandible						2
Atlas						
Axis	1					
Scapula			2			
Humerus P			1			
Humerus D			1			
Radius P				1	1	
Radius D				1	2	
Ulna				1		
Metacarpal P	1		1		1	
Metacarpal D	1		1		1	
Pelvis	1		1		1	
Femur P						
Femur D						
Patella						
Tibia P	1		1			
Tibia D	1		1			
Astragalus		1				
Calcaneum		1				
Navicular cuboid						
Metatarsal P			1			
Metatarsal D						
1st phalange			1		2	
2nd phalange						
3rd phalange			1			

Table 19. Dog anatomical representation by phase

Phase/	**LIA**		**ERB**		**RB**	
Articulation/	ALL exc.	ART.	ALL exc.	ART.	ALL exc.	ART.
Element	N	N	N	N	N	N
Skull		2			2	1
Mandible		4	2			
Atlas					1	
Axis						
Scapula	1	4			1	
Humerus P		4			1	
Humerus D		4			1	
Radius P		3				1
Radius D		3				
Ulna		3			1	1
Metacarpal P	1		1		1	1
Metacarpal D	1		1		1	1
Pelvis	1	1			1	2
Femur P		1				2
Femur D		1				1
Patella						
Tibia P		3				
Tibia D		3				
Astragalus						
Calcaneum						
Navicular cuboid						
Metatarsal P			1	1		1
Metatarsal D			1	1		1
1st phalange						
2nd phalange						
3rd phalange						

4.5 **Small mammals: data** by Jim Williams

Table 1. Small mammal bones recovered from Thruxton.

SITE	TH02	TH02	TH02	TH02	TH02	TH02	TH02	TH02	TH02	TH02	TH02	TH02	TH02	TH02	TH02
CONTEXT	F1078 (1)	F1125 (1)	754	F1066/ 2 (1)	F1066/ 2 (1)	F1066/ 2 (1)	F1112 (6)	F1112 (9)	F1112 (9)	F1112 (8)	F1064 (1)	729	729	729	729
SAMPLE			4078					4073	4073			4076	4076	4076	4076
SPECIES	20	20	20	20	20 large	6	8	7	8	8	19	20	8	1	3
no of bones	4	3	1	7	7	9	3	7	7	12	21	150	287	4	1
R mandible						1					1		8		
R M1						1							21	1	1
R M2						1							13		
R M3													11		
L mandible						1					1		11		
L M1						2							19	1	
L M2						2							11		
L M3													5		
Incisors					2	1							52		
R maxilla							1	1	1	2			18		
R M1													20	1	
R M2								1		1			11	1	
R M3										1			12		
L maxilla							1	1	1	2			5		
L M1													13		
L M2								1	1	1			11		
L M3								1		1			14		
Incisors			1		2		1	2	2	4			32		
Scapula												22			
Ulna				2							3	23			
Radius											1	27			
Humerus											4	30			
Pelvis		1										5			
Femur		1		1	2							11			
Tibia	1	1		1							1	25			
Fibula															
other and indet bones	3			3	1				2		10	7			

Species code: 1 = *Apodemus sp.*, 3 = *Mus domesticus*, 6 = *Arvicola terrestris*, 7 = *Clethrionomys glareolus*, 8 = *Microtus agrestris*, and 19 = *Talpa europaea*

4.6 **Assessment of amphibian bones** by Chris Gleed-Owen

Introduction

Locations in the vicinity of Danebury Hillfort, Hampshire, were excavated as part of the Danebury Environs Roman Project between 1994 and 2004, led by Barry Cunliffe (Institute of Archaeology, University of Oxford). The excavations are reported elsewhere (Vol. 2 *passim*). This assessment was carried out in order to evaluate the significance of amphibian remains from the Danebury sites. A series of bags of sorted amphibian bones were selected and provided (by Andy Hammon, English Heritage Centre for Archaeology), mostly from the 2002 excavations at Thruxton Villa and 2003 excavations at Rowbury Farm. It is unusual for amphibian or reptile remains from archaeological excavations to be investigated in any detail, but herpetofauna can be used as palaeoenvironmental indicators (Gleed-Owen 1998, 1999), and even for historical and conservation purposes (Beebee *et al.* 2005; Gleed-Owen 2000). They potentially also have archaeological significance as a human food resource (Bailon 1999), although this has not unequivocably been demonstrated in Britain (Gleed-Owen 2006).

Aim

This assessment aimed to examine sorted amphibian bones from a range of samples, to identify the taxa represented and count the number of identifiable specimens (NISP) and minimum number of individuals (MNI). Agents of accumulation would be considered (predator, pitfall, natural death in hibernation, etc.) and any signs of digestion (as opposed to weathering) would be noted. Comparison between phases and deposits, e.g. relative abundance, modes of accumulation, were not attempted. Sex, age and demography of the assemblages could be usefully considered in the context of accumulation mechanisms and season.

Methodology

Bulk sample sieving and flotation produced the 80 bags of sorted amphibian bones upon which this study was based. These comprised 56 bags from Rowbury Farm (RF03), 20 bags from Thruxton Villa (TH02), two bags from Flint Farm (FF04), and one bag each from Grateley South (GR99) and Houghton Down (HD97). It was assumed that the sorting had been accurate, and that the bags contained all or nearly all the amphibian remains from the samples. No reptile remains were seen and it is assumed that none were recovered. The remains were identified using a binocular microscope at x6-x40 magnification, and separated according to taxon to the highest level possible. Remains from each sample were sub-bagged according to taxon. Specific identification is normally possible for most toad skeletal elements, even in poor condition. It is possible for some frog elements, but many frog elements can only reliably be identified to genus *(Rana*). For newts (and reptiles), vertebrae are the most useful for specific identification, although cranial elements can be identified to species. Even where species cannot be identified, it is normally possible to identify the genus, and almost certainly the family. Some of the flots samples studied here had an unusually high incidence of certain newt cranial elements that was evidently due to their containing trapped air. Whilst this might be fortuitous, it highlights the loss of most other newt bones through the wet sieving programme (i.e. they do not appear in any of the residue sorts).

Results

Table 1 (at the end of this report) summarizes the results for each sample and fraction, showing MNI and NISP for each taxon. Of the 80 samples seen, 78 contained amphibian remains (only those from Grateley South and Houghton Down did not). The abundance and condition of remains varies greatly. Table 1 gives MNI and NISP values for each sample, and describes the patterns of predatory and non-predatory damage seen. Taxonomic identification is generally possible to generic level, even with poorly preserved frog and toad remains, and this assemblage is fairly typical in this respect.

Figure 1 (at the end of this report) shows that, as might be expected, MNI is roughly proportional to NISP whatever the taxonomic level. For example, three male common toad right humeri give the same MNI as three indeterminate frog/toad urostyles. Some bones are more readily useful for MNI counts, such as paired elements that are easy to side (e.g. humeri), and readily recognizable axial elements (e.g. sacra). Femora and tibiofibulae are not easy to side when incomplete, and I have typically divided totals by two.

Column 'Pred?' shows the occurrence of observed predatory damage of four types: breakage, crunching, digestive corrosion, toothmarks. These forms of damage may be seen singly or in combination, and can be very variable in their frequency (I have observed them previously in archaeological material at frequencies ranging from nil to virtually 100 per cent of bones). The column 'Sex' shows which sexes were identifiable in each sample. It is possible to sex frogs and toads using the humerus which bears posterolateral crests in males associated with breeding amplexus. Male frogs and toads also have a distinctive metacarpal. The column 'Age' shows the lifestages present.

Discussion

Although amphibian remains appear to be moderately abundant within many of the samples seen, the herpetofaunal assemblage it represents is quite impoverished. Only two species (common frog and common toad) are found in the majority of samples; a third species (smooth newt) is only found in two samples. All sexable bones were noted: nine samples had both male and female bones, six had only male bones, and 14 had only female bones. This demonstrates a general bias towards females across the samples seen. Moreover, an unusually high proportion of female frogs and toads was visible in two samples, at a ratio of 5:1. This is an unusually skewed ratio (populations are normally fairly evenly balanced, or 2:1 at most), and may suggest selective factors biasing predation towards females, or may be related to different behaviours in the frogs/toads (e.g. male frogs hibernate at the bottom of ponds, females on land).

Across the samples seen, most remains were from adults or subadults. Some samples contained juveniles and/or metamorphs, suggesting summer/autumn death, but there are relatively few juvenile remains here compared to other sites where I have recorded large numbers of juveniles (Gleed-Owen 2003, 2006). Large accumulations of juvenile frogs and toads usually imply pitfall scenarios. The preponderance of adults and subadults seen here is consistent with other accumulative mechanisms such as predation.

The preponderance of common toad and common frog and the paucity of other herpetofaunal remains is not unusual, but rather frustrating. These are the most catholic amphibian species in Britain, and their presence here alongside smooth newt (the most catholic newt) provides limited environmental information. The presence of common toad in significant volume

implies a scrubby or deciduous wooded environment, typically more closed vegetation cover than the common frog prefers. Common toads require a still water-body in which to breed (usually within a few hundred metres but potentially several kilometres away); breeding ponds are usually clear, deep and relatively larger and deeper than ponds used by frogs. However, the common toad is a fairly ubiquitous species, and may inhabit a range of environments. The common frog is fairly catholic but more of an open country species, typically suggesting open grass and herb cover, rather than blanket woodland. It may breed in any permanent or ephemeral water-body, often small and shallow, such as a ditch or pit.

Whilst this impoverished fauna lacks elements with narrow tolerances that could build a more specific environmental picture, it doesn't mean that other amphibian and reptile species weren't present nearby. Taphonomic factors, such as the predator species responsible for accumulating microfaunal remains, can bias an assemblage. Various mustelids, insectivores, canids, felids, raptors, corvids, ardeids may predate frogs, toads, newts, lizards and snakes, and even passerines may feed on larval and juvenile lifestages. Reptiles are active during the daytime, rarely above ground at night, and therefore only available to diurnal predators. Hence, the absence of reptiles from an assemblage may reflect the absence of diurnal predators as accumulators, rather than the absence of reptiles locally. Amphibians are active in the daytime, too, particularly during the breeding season, but they are most active at night. Nocturnal (and crepuscular) predators such as owls will obviously be able to take amphibians readily at night, but will rarely come into contact with reptiles.

The behaviour of the amphibian species themselves can also account for patterns of accumulation in archaeological features. One post-hole at Puggetoften, Scania, Sweden (Gleed-Owen 2003) contained the remains of over 900 froglets, almost certainly pitfall victims in their summer/autumn diaspora.

Amphibians are most active in the spring breeding season; in modern times this is from January to March for frogs and March to May for common toads. This is the most likely time that predators find them in large numbers. Frogs do not have such an *en masse* peak migration as toads do. Toads embark on mass migrations during damp/wet nights in spring, heading for traditional breeding ponds. This is the most likely time that so many adult toads would have been predated. Toad skin is also very distasteful to many animals, and some may skin them before eating them. Scatterings of mutilated toads are sometimes found near breeding sites, although there is no agreement whether this is carried out by corvids, otters or other mustelids. It is quite possible that nocturnal raptors or mustelids predated the majority of the amphibians during breeding migrations.

As there is definite evidence of digestion and other predatory damage in many of the amphibian remains, it implies accumulation by diurnal predator(s) such as the kestrel and small mustelids such as weasels. Breakage consistent with predation was noted in at least five samples. Damage due to crunching was observed in at least 18 samples (with a high degree noted in six of them). Crunching that obviously occurred at death is recognizable as crushing and contortion of bone whilst it was still pliable, which has then hardened post-mortem. Digestive corrosion was also seen in at least 18 samples, and follows typical patterns of thinned ends and exposed cancellous bone on articular surfaces. Toothmarks were seen in at least nine samples (probably more), and were prevalent in three samples. Small toothmarks can be inflicted by snakes, but in this case are consistent with small mustelids such as weasels, or possibly insectivores such as hedgehogs. Little experimental research has been carried out to satisfactorily characterize the effects of British predator species on herpetofauna remains.

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Site name	Site code	Tr.	Context	Samp	Box	Cut	Notes	Pred?	Sex	Age	Tv NISP	Tv MNI	Tv/h NISP	Tv/h MNI	Bb NISP	Bb MNI	Bsp NISP	Bsp MNI	Rt NISP	Rt MNI	Rsp NISP	Rsp MNI	Anu NISP	Anu MNI
Flint Farm	FF04		F1340	6			No obvious digestion; covered in marly deposit. Bb/Bsp - adult, subadult. Rt/Rsp - subadult.			I					3	1	2	1	1	1	1	1	2	2
Flint Farm	FF04		F1340	6			Broken bits of tibiofibula (small).														4	1		
Grately South	GR99		F812	7 "Hand coll"			(No herpetofauna - only mammal innominate).																	
Houghton Down	HD97		F609	1			(No herpetofauna - only mammal/bird, digested).																	
Rowbury Farm	RFO3	1	F1197/8	1	19		Adult. Very worn (PM?), possibly root damage.			A					4	1								
Rowbury Farm	RF03	1	P405	4F		4206	Adult female, good condition, no digestion.		F	A					1	1								
Rowbury Farm	RFO3	1	P405	6A	1		Some moderate damage, but no apparent digestion. Both sexes present.		MF						16	2	3	1					2	1
Rowbury Farm	RFO3	1	P405	6A		4207	Bb - 1yr (crunched?) and <1yr old (1st autumn).	?C									2	1						
Rowbury Farm	RFO3	1	P405	6C			Rsp - 1 femur and tribiofibula with possible predation crunching of ends, tibiale with possible toothhole.	C?T											1	1	7	2		
Rowbury Farm	RF03	1	P406	5F		4200	Subadult, very broken/worn ends, probably digested.	BD		I											1	1		
Rowbury Farm	RF03	1	P407	3F		4201	Subadult,broken, possibly digested.	BD		I											1	1		
Rowbury Farm	RFO3	?	P408	1		4229	Young adult.			A					2	1								
Rowbury Farm	RFO3	?	P408	12	2		All bones with dusty/marly sediment coating. No obvious predation, just usual PM wear/damage. Rt/Rsp - most are 1yr old or less (8/13 ilia, 10/15 femora, 23/27 tibiofibulae), others are adult, includes both sexes. Bb - c.40% adult, 40% subadult (1-2yrs), 20% juvs (metamorphs). Some Bb long bones from recent metamorph (mid to late summer). Bb humeri include both sexes (9 female:1 male).		MF	AIJ					111	8			13	8	51	14	31	13
Rowbury Farm	RFO3	1	P408	16		4236	Bb - adult/subadult. Rt is male humerus. Rsp includes a few definitely crunched bones, MNI from size differences, all juvs <1yr or metamorhps (early-mid summer).	C	M	AIJ							4	1	1	1	16	7	5	1

Site name	Site code	Tr.	Context	Samp	Box	Cut	Notes	Pred?	Sex	Age	Tv NISP	Tv MNI	Tv/h NISP	Tv/h MNI	Bb NISP	Bb MNI	Bsp NISP	Bsp MNI	Rt NISP	Rt MNI	Rsp NISP	Rsp MNI	Anu NISP	Anu MNI
Rowbury Farm	RF03	1	P408	16		4233	Most in perfect condition (occasional crunching and some digestion observable in the mammal bones, e.g. rodent mandible). Bb - c.1yr old. Bsp - immature to adult. Rsp - metamorphs and juveniles to c.1yr old. Anu - metamorphs, juveniles and immatures (mostly phalanges/metapodials). Tv - 30L and 26R prootic-exoccipitals, 7 trunk vertebrae, 11 caudal vertebrae, all efts/juveniles. Tsp (Tv/h) - 5L and 4R ischia, and various long bones, all efts/juvs/immatures. Prootic-exoccipitals obviously float very well, hence bias towards their recovery in flots. Only tin (juvenile) vertebrae; adult vertebrae would presumably be recovered in the sieve residues.	CD		AIJ	74	3	2	5	1	1	26	2			33	2	85	3
Rowbury Farm	RF03	1	P408	16F		4236	Most in perfect condition (no sign of predation). Bb - juvenile femora, <1yr old (autumn). Bsp - c.1yr old, subadult and adult. Rsp - all metamorphs (died in summer) or juveniles <1yr old (died in autumn), with 3 size classes of coracoid giving MNI. Anu - 10 bones from metamorphs (early to mid-summer), others are juveniles and subadults (probably Rt). Tv - 7L and 10 R prootic-exoccipitals (all juv/imm), 8 trunk vertebrae and 1 caudal vertebra (all efts/juvs). Tsp (Tv/h) - various elements, all juv/imm (MNI from humeri).			AIJ	26	1	16	3	2	1	6	2			28	3	29	1
Rowbury Farm	RFO3	1	P408 "Special deposit"	16	2		All good condition, no predation, just worn PM. Bb - all ad females (humeri), except subad L and R ilia and 2 femora (same individual?), MNI from ilia sizes. Rsp - 1 L ilium, 2 tibiofibulae and 1 femur are c.1yr old, others are ad/subad (some c.2yrs, others older). Rt/Rsp humeri = 5 female:1 male.		MF	AI					4	4	1	1	7	4	48	7	7	5
Rowbury Farm	RF03	1	P410	2F		4197	Digested, subadult.	D		I											1	1		
Rowbury Farm	RFO3	1	P411	2	4		Slight damage, not predation. Bb is female.		F						1	1					1	1		
Rowbury Farm	RFO3	1	P411	3	6		Rt - 2 tibiofibulae with severe puncture/digestion, both sexes present. Bb - all ad/subad, R ilium with severe punctures, lots bones badly damaged ends (not sure if digested), both sexes present. Bsp - 1 tibiofibula subadult, others adult.	DT	MF	AI					47	7	13	2	11	6	41	8	15	9
Rowbury Farm	RFO3	1	P411	3	5		Bb adults (different sizes), includes both sexes (5 females:1 male) some excellent condition, some v. worn, possibly rootmarks, lots of etching. Rt/Rsp - ad/subad (c.3yrs), includes male. Anu - 1 urostyle with severe etching (rootmarks?).		MF	AI					43	5			4	2	3	2	13	5

Site name	Site code	Tr.	Context	Samp	Box	Cut	Notes	Pred?	Sex	Age	Tv NISP	Tv MNI	Tv/h NISP	Tv/h MNI	Bb NISP	Bb MNI	Bsp NISP	Bsp MNI	Rt NISP	Rt MNI	Rsp NISP	Rsp MNI	Anu NISP	Anu MNI
Rowbury Farm	RFO3	1	P411	1 (1st bag)	4		Bb - quite a few with flaking damage, including various probable toothholes. Bsp - 1 subad femur, others adult. Bb and Rsp include females.	?T	F	AI					2	3	6	1			4	1	3	1
Rowbury Farm	RFO3	1	P411	1 (2nd bag)	4		All adult. Quite a few in poor condition, seems to be PM though. Bb includes both sexes.		MF	A					21	3	2	1			5	1	2	1
Rowbury Farm	RF03	1	P411	2F		4230	Bb/Bsp - some breakage and possible toothmarks, but no unequivocal digestion/predation (MNI of 3 ad/subad, 1 juv post-metamorph but <1yr old, late summer/autumn). Rt - no digestion. Rsp - end breakage/digestion.	?B?T		AIJ					14	4	18	2	1	1	2	1		
Rowbury Farm	RF03	1	P412	1F		4202	Very fragmentary, adult and subadult, lots of toothmarks.	TT		AI							19	3						
Rowbury Farm	RFO3	?	P413	3		4224	Rsp is 1yr or less, Bb is metamorph (<1yr, mid-late summer). Ends of both worn thin, possibly digested but can't confirm.	?D		IJ					1	1					1	1	2	1
Rowbury Farm	RFO3	?	P413	6		4226	c.1yr old or less.			I											1	1		
Rowbury Farm	RFO3	1	P414	4		4212	Bb is juv, 1yr maximum.			J					2	1							1	1
Rowbury Farm	RFO3	1	P414	6		4214	Young adult.			A											2	1	1	1
Rowbury Farm	RFO3	1	P414	6		4214	Subadult (c.2yr old).			I									4	1				
Rowbury Farm	RFO3	1	P414	7	7		Adult, v. good condition.			A					1	1								
Rowbury Farm	RFO3	1	P414	8	7		Adult, not damaged.			A					1	1								
Rowbury Farm	RFO3	1	P415	2	7		Adult, includes female.		F	A					3	1								
Rowbury Farm	RFO3	1	P415	3	7		Adult.			A					2	1								
Rowbury Farm	RFO3	1	P415	4	7		Partial skeleton of 1 adult female, in good condition. Small feature, sealed context?		F	A					11	1								
Rowbury Farm	RFO3	1	P419	3	7		All adults. No obvious predation. Bb remains represent 2 partial skeletons (male and female).		MF	A					29	2	6	2			2	1	3	1
Rowbury Farm	RFO3	1	P419	3	7		Adult.			A					1	1								
Rowbury Farm	RFO3	?	P419	4		4220	Adult.			A							1	1						
Rowbury Farm	RFO3	1	P419	4	7		Subadult.			I					1	1								
Rowbury Farm	RFO3	?	P419	6		4222	Bb/Bsp - no apparent digestion/predation; 5 ilia = 3 x <1yr olds, 1 x c.1yr old, 1 adult; includes both sexes (3 females:2 male). Rsp - c.1yr old or less, digested. Anu - metamorph.		MF	AIJ					2	5	7	1			1	1	4	2
Rowbury Farm	RFO3	1	P419	6	8		Mostly v. good condition, no pattern of damage. Both sexes present. MNI from size diffs in tibiofibulae and femora.		MF	AI					27	5	2	1						

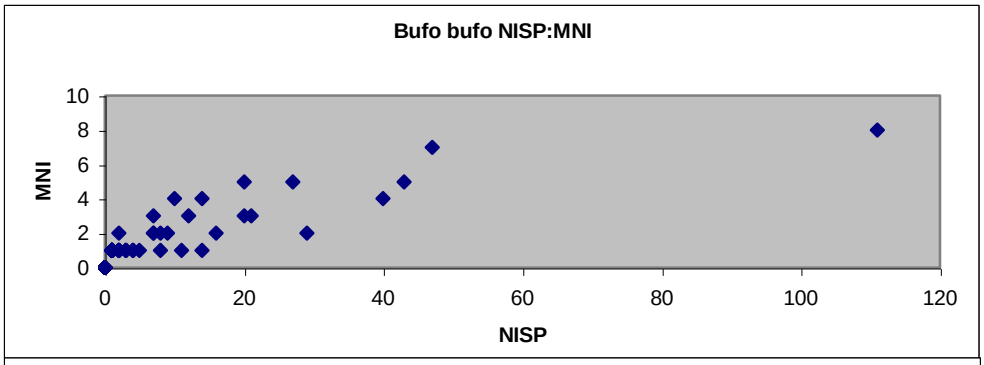
Site name	Site code	Tr.	Context	Samp	Box	Cut	Notes	Pred?	Sex	Age	Tv NISP	Tv MNI	Tv/h NISP	Tv/h MNI	Bb NISP	Bb MNI	Bsp NISP	Bsp MNI	Rt NISP	Rt MNI	Rsp NISP	Rsp MNI	Anu NISP	Anu MNI
Rowbury Farm	RF03	1	P419	5F		4221	(Mammal).																	
Rowbury Farm	RFO3	1	P421	4	8		Adult. Clearly predated, ends very crunched, obviously contemporary with death, poss teethmarks too. (Worth photo)	C?T		A					1	1								
Rowbury Farm	RFO3	1	P421	5	8		Partial skeleton of subadult female (c.2-3yr old). No signs of predation, all fairly complete, good condition.		F	I									2	1	19	1		
Rowbury Farm	RFO3	1	P422	3	8		Adults. Bit of damage but not clear cause. Possible tooth graze on Bb tibiofibula. Rsp MNI from slight size diffs in tibiofibulae. Bb includes females, Rt includes male.	?T	M	A					4	1			2	1	4	1		
Rowbury Farm	RFO3	1	P425	4	9		Damaged. PM?														1	1		
Rowbury Farm	RFO3	1	P425	7		4249	Rsp tibiofibulae crunched (predated). Half Rsp ad/subad, half less than 1yr old.	C		AIJ							1	1			7	4	3	1
Rowbury Farm	RFO3	1	P425	7	9		Fairly complete skeleton of 1 adult female.		F	A					14	1	15	1						
Rowbury Farm	RFO3	1	P425	7	9		Adult. Ends worn PM.			A					1	1								
Rowbury Farm	RFO3	1	P425	9		4252	c.1yr old or less.			I									1	1				
Rowbury Farm	RFO3	1	P428	3	9		Adults. MNI from humeri, both adult males.		M	A					7	2								
Rowbury Farm	RFO3	1	P434	13	10		Bb adult. Rt - all 3 probably young male (2-3yrs), 1 ilium crunched mid-shaft at death.	C	M	AI					1	1			3	2	1	1		
Rowbury Farm	RFO3	1	P436	3	10		Adult. Bit worn (PM?).			A					1	1								
Rowbury Farm	RFO3	2	P438	9	22		Partial skeleton of 1 adult female. Dirty but good condition.		F	A					8	1	1	1						
Rowbury Farm	RFO3	2	P442	10	25		Adult, includes female. MNI from femora but also different radioulnae sizes.		F	A					7	2	2	1						
Rowbury Farm	RFO3	2	P442	11		4296	Rt includes male. Rsp - subad c.2yrs, some broken into pieces, prob predation crunching.	?B?C	M	I					1	1	2	1	3	1	17	2	22	1
Rowbury Farm	RFO3	2	P442 "Skulls special deposit B"		23		Adult. Very worn PM.			A					2	1							1	1
Rowbury Farm	RFO3	2	P442 "Special deposit A"	4	23		Partial skeleton of 1 adult female. All very worn PM.		F	A					5	1	4	1						
Rowbury Farm	RFO3	2	P442 "Special deposit C"	10C			Partial skeleton of 1 adult female. Quite smooth.		F	A					4	1								
Rowbury Farm	RFO3	2	P442 "Special deposit D"	10C			Adult. End broken (recent PM) into fragments.			A					1	1								
Thruxton Villa	TH02		729				Subadult; pathological; worn, broken, poor condition.			I											1	1		

Site name	Site code	Tr.	Context	Samp	Box	Cut	Notes	Pred?	Sex	Age	Tv NISP	Tv MNI	Tv/h NISP	Tv/h MNI	Bb NISP	Bb MNI	Bsp NISP	Bsp MNI	Rt NISP	Rt MNI	Rsp NISP	Rsp MNI	Anu NISP	Anu MNI
Thruxton Villa	TH02		743				All adults. Bb - lots toothmarks. Bsp - toothmarks, crunched. Rsp - broken, digested.	CDTT		A					1	1	1	1			1	1		
Thruxton Villa	TH02		755				Bb - adult; intact. Bsp - adult; crunched, broken. Rsp - adult, subadult; worn, broken, digested.	BCD		AI					1	1	1	1			6	2		
Thruxton Villa	TH02		"?"				All very poor condition, lots of crunching, breakage, possible digestive corrosion. Lots of anuran fragments are continuing to break in bag. Bb - 2 males. Rt - 2 males.	BCC?D	MF	AI					9	2	25	3	2	2	6	1	26	1
Thruxton Villa	TH02		F1064	1			All adults and subadults; lots of crunching in particular, but also toothmarks, digestion. Possibly more anuran fragments in 'non-herp' bag (difficult to separate/identify due to poor condition). Rt - 1 male.	CCDT	M	AI					8	2	7	2	5	3	12	3	5	2
Thruxton Villa	TH02		F1066/2	1			Some digestion, worn, broken, crunching. Bb - predatory crunching, toothmarks, breakage, digestion. Bb/Bsp - adult. Rsp - adult, subadult.	BCDT		AI					3	1	3	1			4	2		
Thruxton Villa	TH02		F1066/3	1			Bb - adult female; badly corroded, possible toothmarks. Rsp - adult, subadult; toothmarks, crunching.	D?T	F	AI					1	1					7	3		
Thruxton Villa	TH02		F1066/3	1		4069	Adults, subadults. Lots crunched, with toothmarks.	CT		AI									3	3	8	3		
Thruxton Villa	TH02		F1066/4	1			Crunching, digestion, toothmarks. Bsp - ilial ala very crunched (Worth photo).	CCDT							1	1	1	1	1	1	5	2	9	1
Thruxton Villa	TH02		F1078	1			Rt/Rsp - some toothmarks, crunching, some end digestion; adults, subadults. Bb/Bsp - lots crunching, breakage; adults, subadults.	CCDT		AI					7	3	5	1	6	3	19	5	3	1
Thruxton Villa	TH02		F1112	5			All good condition, no sign of predation. Bb - large adult. Rsp - young adult.			A					3	1					3	2		
Thruxton Villa	TH02		F1112	6			All very good condition, no sign of digestion. Bb - adult, large adult.			A					12	3	5	3	3	2	18	5		
Thruxton Villa	TH02		F1112	8		4071	Bb/Bsp - adult, good condition. Rsp - 3 adult bones, 8 subadult (1-2yrs); some definite digestion, but most in good intact condition. Bb - 1 female.	D	F	AI					2	1	3	2			11	3		
Thruxton Villa	TH02		F1112	8			Virtually intact, no crunching/digestion								1	1								
Thruxton Villa	TH02		F1112	9		4073	Pathogenically fused adult sacrum and urostyle; left transverse process crooked and directed posteriorly.								1	1								

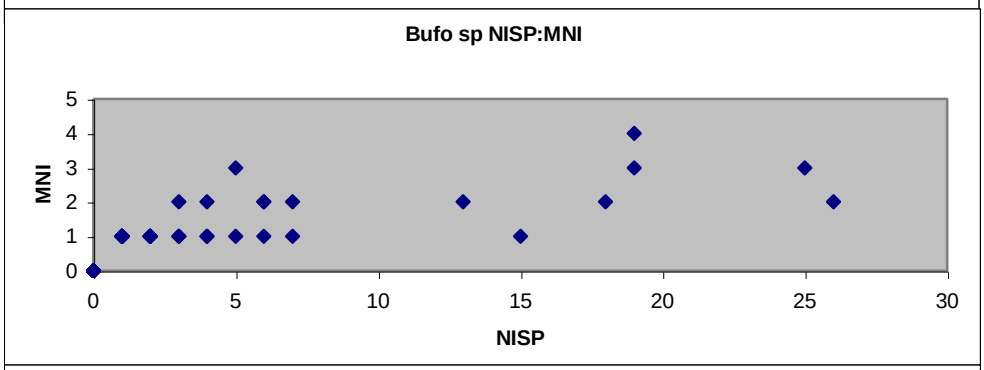
Site name	Site code	Tr.	Context	Samp	Box	Cut	Notes	Pred?	Sex	Age	Tv NISP	Tv MNI	Tv/h NISP	Tv/h MNI	Bb NISP	Bb MNI	Bsp NISP	Bsp MNI	Rt NISP	Rt MNI	Rsp NISP	Rsp MNI	Anu NISP	Anu MNI
Thruxton Villa	TH02		F1124	2			Lots of crunching and toothmarks, some digestion; poor condition. Tiny anuran fragments.	CCDTT							1	4	19	4	1	1	2	1	15	1
Thruxton Villa	TH02		F1125	1			Bb - adult female, possible predation breakage/toothmarks.	?B?T	F	A					1	1								
Thruxton Villa	TH02		F1125	2			Definite crunching & digestion. Rt/Rsp - adults and subadult (<2yr). Bb/Bsp - adults.	CD		AI					2	2	4	2	3	2	7	2	2	1
Thruxton Villa	TH02		F1146	1			Crunched and definitely digested.	CD															1	1
Thruxton Villa	TH02		PH1225	1			Rt - 2 adults, 1 less than 1yr. Rsp - strong toothmarks & digestion in tibiofibulae. Bsp - very crunched (worth photo); adults.	CCDT		AJ					1	1	1	1	3	3	5	1		

Table 1. Amphibian and reptile remains from selected samples from Longstone Edge. Species abbreviations: Tv = *Triturus vulgaris* (smooth newt), Tv/h = *Triturus* sp *(vulgaris* or *helveticus)* (smooth or palmate newt), Bb = *Bufo bufo* (common toad), Bsp = *Bufo* sp (toad), Rt = *Rana temporaria* (common frog), Rsp = *Rana* sp (frog), Anu = Anura indet. (frog or toad). Lifestages: Ad = adults, subad = subadult, imm = immature, juv = juvenile. L = left, R = right. PM = post-mortem. B = predatory breakage, C = crunching, D = digestive corrosion, T = toothmarks (doubled if lots); query '?' preceding a letter denotes uncertainty. M = male, F = female, A = adult, I = immature, J = juvenile.

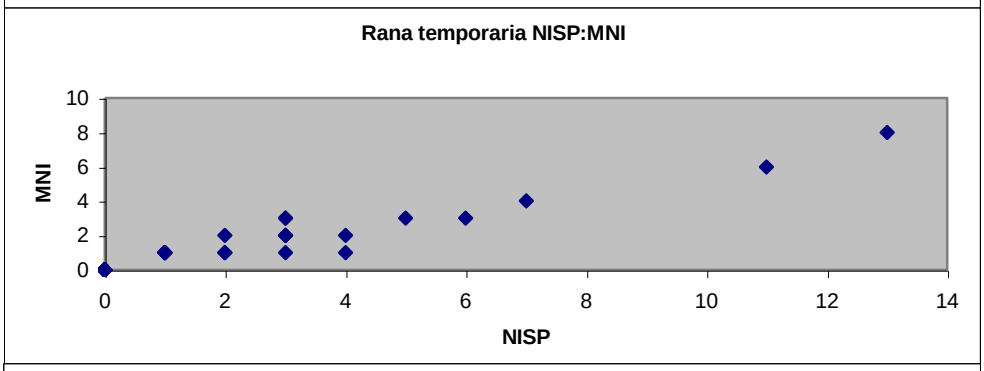
a)



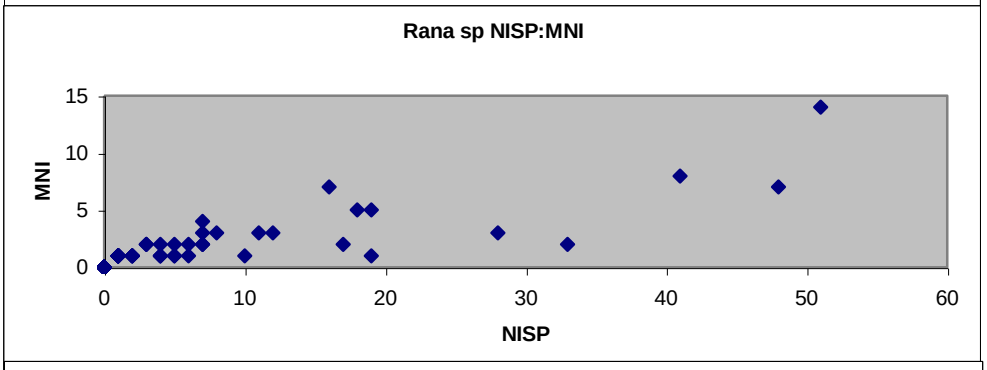
b)



c)



d)



e)

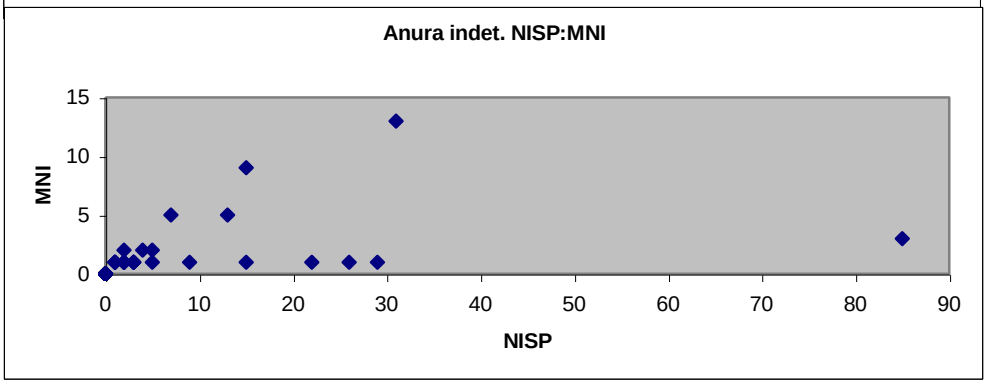


Figure 1a-e. Scatterplots showing ratio of NISP:MNI for a) common toad, b) indet. toad, c) common frog, d) indet. frog, e) indet frog/toad.