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TITLE Bones of birds and non-domestic species from Melbourne Street Sites I,IV,V,VI,and XX of Saxon Southampton.(HAMWIH), with Statistical Appendix (14.7.77) by J. Bourdillon Jennie Coy.

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UNIVERSITY OF SOUTHAMPTON

10.1.77

BONES OF BIRDS AND NON-DOMESTIC SPECIES FROM MELBOURNE STREET SITES I, IV, V, VI AND XX OF SAXON SOUTHAMPTON (HAMWIH)

JENNIE COY

INTRODUCTION

A full description of the bird and fish bones and all the non-domestic material will be published by the Council for British Archaeology with the domestic animal details and other reports for the Melbourne Street excavations. All the bone data will be summarised in 'The Animal Bones' by Jennifer Bourdillon and Jennie Coy. Further detailed information and measurements will be presented in the 'Statistical Appendix' for Melbourne Street animal bones which will be available later in 1977 from Southampton Archaeological Research Committee (S.A.R.C.). The report here includes outline information to fill the gap to publication.

PROCEDURE

All birds and wild species were recorded on summary sheets for each feature, by layer where appropriate, and these forms are deposited with S.A.R.C. Measurements are taken according to Von den Driesch.

DISCUSSION OF THE SPECIES PRESENT

A. Red Deer - Cervus elaphus

Some combs and other small finds were of antler and notes on these will be included in the relevant Melbourne Street reports. In addition, 58 antler fragments, most of them worked, are described in Table 1. A few other bones of red deer were found (Table 2).

The antler base in F3501 is comparable with those from larger modern red deer and wapiti. Some antlers from Grimes Graves are of a similar size. Until a larger sample is worked on and figures are available for more British material it is not possible to draw conclusions about the relative sizes of historic populations of red deer in Britain. The fragments in V, F11 and IV, F17 could be from growing antlers.

Small fragments of antler are not necessarily identifiable to species and antler forms are highly variable. Because of this, the possibility of antler imports, and the interest attached to the origins of the fallow deer , all the antler fragments were carefully checked against a wide range of antler material of red deer, fallow deer - Dama dama, and elk - Alces alces. With three exceptions the fragments fitted Cervus elaphus well. The exceptions appeared to be anomalous fragments rather than those of another species. There is thus so far no evidence of the fallow deer during the Saxon period of Southampton.

B. Roe Deer - Capreolus capreolus

There were 8 fragments of this species as described in Table 3.

C. Small Mammals

Woodmouse - Apodemus sp. - and the short-tailed vole - Microtus agrestis - are found occasionally when Melbourne Street layers are sieved. Only one bone of rabbit - Oryctolagus cuniculus was found. This was in F3, Site I, a pit which had been contaminated by later brickearth digging. No rat bones were found.

D. Whale

Five fragments of worked whalebone were found - three from Site IV and one each from Sites V and VI. There was sawing on all of them and burning on one - because of the extent of the working it has not been possible to carry the identification any further.

E. Birds

Altogether 1,200 bird bones were identified and there were 260

unidentifiable bird fragments. The bones were mostly those of domestic fowl and goose. Table 4 shows which bird bones were found in a sieved, rich feature - F16, Site V - and Table 5 gives results for the rest of this group of Melbourne Street sites. A species list is attached to the end of this report.

F. Amphibians

A bone of a large toad, Bufo bufo, and some frog bones, Rana sp. were found in Site V, F16. Other occasional amphibian bones which came to light were immature or fragmentary.

G. Fish

Of the 4,000 fish fragments, 983 were identified. Details are given in Table 6 . A species list is attached to the end of this report. Scales of two species were found in the sieved feature F 16, Site V.

A full discussion of the deer, bird and fish material will appear in the report mentioned in paragraph one above.

TABLE 1

site	feature	part of antler	working
I	F4	beam wall	sawn both ends
I	F9	tine point	smoothing probably in life
I	F12	top with 2 tines	smoothing as above, cuts
I	F33	?trez + beam	chopping on surface
I	F33	beam at tine base	cuts
IV	B4-17	tine	cuts
IV	C2-3		very small worked fragment
IV	C2-3	beam and tine jnct.	sawn both ends & junction
IV	D3-4	tine tip	sawn off
IV	D3-6	beam wall & tine	sawn on 3 sides and tine
IV	F1i	tine + beam frag.	chopped ?
IV	F13	antler core ?	sawn one end
IV	F13	tine section	Cut both ends and whittled
IV	F13	top of antler -3 tines	sawn off
IV	F16	beam	sawn on one end
IV	F16	tine	sawn off
IV	F16	wedge of main beam at tine junction	sawn on three sides
IV	F17	tine	sawn off
IV	F17	tine + piece beam	sawn off
IV	F17	tine	sawn in three directions
IV	F17	slice of tine	sawn at both ends
IV	F55	tine tip	sawn off, many cuts
IV	F55	beam wall	sawn fragment
IV	F59	large tine or small beam fragment	
IV	F111	wall of beam at tine junction	sawing both ends and of tine
IV	F111	beam frag at base tine	4 sawn surfaces
IV	F111	beam slice at base tine	sawn both ends and at tine
IV	F111	beam core at tine junction	sawing at one end and tine junction
IV	F111	tine base and beam fragment	squared and sawn across

continued

Site	feature	part of antler	working
IV	F111	beam core at tine base	sawing at one end
IV	F111	wall of small beam or large tine	sawn at one end
IV	F2351	tine tip	sawn off
IV	F3501	antler base at brow (could be cast antler)	sawing
IV	F3501	tine	
IV	F3501	tine	sawn both ends
IV	F3519	beam wall at tine base	sawn 3 sides & cut
IV	F3512	antler top with 2 tines	sawn off and whittled
IV	F3512	tine + beam frugment	sawn off
IV	F3523	R.frontal + pedicle	chopped, and antler has been sawn off this
IV	F3523	stunted antler ?	sawn off
IV	F3521	tine	sawn off
V	F11	antler top with 3 tines	developing antler ?
V	F14	beam of antler ?	
V	F16	tine	sawn off , whittled
V	F17	beam wall fragment	sawn or chopped on all sides
V	F16	R.frontal & pedicle	chopping, and antler sawn off
V	F27	beam wall	sawn both ends
V	F27	large tine or small beam	sawn one end
V	F34	wedge of main beam at tine junction	sawn on three sides
VI	F1i	tine + piece beam	sawn at one end
VI	F1ii	beam section + tine part	sawn in 3 planes
VI	F8	beam wall	sawn both ends
VI	F 27	wedge of antler ?	sawn on all sides
VI	F39iii	beam at tine junction	sawing on 3 surfaces
VI	F301	tine section	sawn at both ends
VI	F30v	tine tip	sawn off
XX	F70v	tine section	sawn both ends
XX	F131	tine section	sawn both ends

TABLE 2

RED DEER BONES

Site	feature	element	measurements (mm)
VI	F39iii	cranial frag.	
VI	F36vi	R.scapula	art.W 58, glenoid 47 x 42, Min.Neck 33
IV	D3-22	R.scapula	
IV	F17	L.scapula	immature
VI	F47	R.scapula	"
V	F16	L.scapula	"
V	F16	L.humerus	distal width 54
I	F25	L. femur prox.	unfused
V	F27	L. tibia dist	distal width 46
VI	F8v	phalanx I	Total length 53 Prox. width 18.5 Min. width 13.7 Distal width 17

TABLE 3

ROE DEER BONES

Site	feature	element	measurements total length	Prox.w	Dist. W
I	F29	R femur dist.			32
XX	F135v	R femur dist			35.5
V	F16	L humerus prox		32.6	
I	F7	R cranium ♀			
I	F7	L mandible	premolar 25.5		
VI	F30vii	L scapula	max.artic. 26.5, glenoid 21.5x18.7 min. neck 16.5		
V	F11	R frontal + antler			
IV	C4-16	R radius		25.7	

TABLE 4

Distribution of Bird Bones, Site V, Feature 16

Skeletal Element	Domestic Fowl	Probable Fowl (some immature)	Goose	Ducks	Great Northern Diver	Buzzard	Woodcock	Crow	Thrushes	Starling	Small passerines	Unidentified fragments	TOTALS
Cranial		2											2
Mandible			3				1	1					5
Sternum	4		1					1					6
Furcula	12												12
Coracoid	14		3						1				18
Scapula	9												9
Humerus	13	3	2							1	1	1	21
Radius	6	2	1										9
Ulna	10	3	3	1				2					19
Carpo-Metacarpus	8		1										9
Wing Phalanges		2	4										6
Sacrum		2	2										4
Other Vertebrae		14	6										20
Ribs		8	4										12
Pelvis	1	6											7
Femur	19		5					1					25
Tibio-Tarsus	22	2	8		1								33
Tarso-Metatarsus	14	2	7	1		1		2	2	3	1		33
Foot Phalanges		23	7									10	40
Other		2										250	252
TOTALS	132	71	57	2	1	1	1	7	3	4	2	261	542
	203												

Underlined figures show high values compared with the rest of Melbourne Street

TABLE 5

Distribution of all Birds, Other Than

Skeletal Element	Domestic Fowl	Probable Fowl (some immature	Goose	Duck(cf.mallard	Duck(cf.wigeon)	Teal	Great Northern Diver	Herring Gull	Great Black-backed Gull	Woodcock	Jackdaw		TOTALS
Cranial		2	1	1									4
Mandible		1	11										12
Sternum	9	2	0										19
Furcula	6		13										19
Coracoid	39	9	18	3					1				70
Scapula	15	3	13	1									32
Humerus	58	4	56	2	1						1	1	123
Radius	18	6	18		1	1	1	1					46
Ulna	52	4	25	1				4					86
Carpo-Metacarpus	10		12	1									23
Wing Phalanges			2										2
Sacrum		6	9										15
Other Vertebrae		3	1										4
Ribs		7	5										12
Pelvis	7	7	3										17
Femur	96	10	26	3									135
Tibio-Tarsus	108	20	42		1								171
Tarso-Metatarsus	74	19	24										117
Foot Phalanges		2	9										11
TOTALS	492	105	296	12	3	1	1	5	1	1	1		918
	597												

Table 6 Distribution of fish species by site

Site and feature	Thornback Ray	Sting Ray	Elasmobranch vertebrae	Salmon	Common Eel	Whiting	Cod	Bass	Horse Mackerel	Gilthead Sea Bream	Mackerel	Grey Mullet	Flounder	Plaice	Flatfish	Unidentified	TOTALS
I F4																1	1
I F7														1		1	2
I F31																1	1
IV E1-6			1														1
IV E1-9																1	1
IV E2-6										1							1
IV F2		1					3	1				3			9	53	70
IV F13								2								1	3
IV F15																1	1
IV F50																1	1
IV F111															1	1	2
IV F150							6										6
IV F3500																1	1
IV F3522								1									1
IV F3523																1	1
V F12															1		1
V F13																1	1
V F14							1									1	2
V F16	7		1	2	592	5		+scales 19	28		11	+scales 8	41	18	524	2,955	4,211
V F18																1	1
V F27																1	1
V F34							1						1			1	3
VI F1																1	1
VI F8																1	1
VI F30																1	1
XX F120																2	2
XX F123																33	33
XX F130																21	21
XX F131																1	1
XX F135																1	1
TOTALS	7	1	2	2	592	5	11	23	28	1	11	11	42	19	535	3,084	4,374

BIRDS - SPECIES LIST FOR MELBOURNE STREET

domestic fowl

domestic goose

great northern diver	Gavia immer (Brünnich)
mallard (or domestic duck)..	Anas platyrhynchos L
? wigeon	Anas penelope L
teal	Anas crecca L
buzzard	Buteo buteo (L)
herring gull or lesser black-backed gull	Larus argentatus Pontoppidan (or fuscus)
great black-backed gull ...	Larus marinus L
woodcock	Scolopax rusticola L
songthrush	Turdus philomelos Brehm
? redwing	Turdus iliacus L
starling	Sturnus vulgaris L
carrion crow or hooded crow	Corvus corone
jackdaw	Corvus monedula L

FISH - SPECIES LIST FOR MELBOURNE STREET

Cartilaginous fishes

Thornback ray ..... Raja clavata L

Sting ray ..... Dasyatis pastinaca (L)

Bony fishes

Salmon ..... Salmo salar L.

Eel ..... Anguilla anguilla (L)

Whiting ..... Merlangius merlangus (L)

?Pollack ..... Pollachius pollachius (L)

Cod ..... Gadus morhua L

Bass ..... Dicentrarchus labrax (L) + scales

Scad (horse mackerel)... Trachurus trachurus (L)

Gilt-head sea bream .... Sparus aurata L

Mackerel ..... Scomber scombrus L

Grey mullet sp. ..... Mugilidae + scales

Flounder ..... Platichthys flesus (L)

Plaice ..... Pleuronectes platessa L

14.7.77

STATISTICAL APPENDIX

to accompany the Animal Bone Report on material from Melbourne Street (Sites I, IV, V, VI and XX) excavated by the Southampton Archaeological Research Committee between 1971 and 1976.

J. Bourdillon, Southampton Archaeological Research Committee
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CONTENTS

Abbreviations

$\bar{x}$ mean (mm)

n number in sample

s standard deviation (mm)

v co-efficient of variation

$$\left(\frac{\text{Standard deviation}}{\text{mean}} \times 100\right)$$

WRH withers height

px proximal

dl distal

ALTHOUGH CALCULATIONS INVOLVED GREATER ACCURACY, ALL FIGURES ARE ROUNDED TO ONE DECIMAL PLACE.

1. MEASUREMENTS of the MAIN DOMESTIC MAMMALS

Mammal measurements are those defined by von den Driesch 1976 and are all in millimetres.

Mammal bones were measured only when their epiphyses had fused.

a) HORSE

Horse Mandible M_3 in wear

	a	b	c	d
premolar row		75.8	78.6	
molar row	83.3			
M_3 length	33.6			31.5
M_3 width	14.3			14.1

Horse Humerus

distal width	83.9
trochlea width	75.8

Horse Radius

proximal width	74.0
prox. articular width	67.4
distal width	80.9
distal articular width	69.1

Horse Metacarpus

	a	b
total length	219.9	
lateral length	213.9	
proximal width	48.8	48.6
proximal diameter	34.5	32.7
minimum shaft width	34.2	
minimum shaft diameter	28.5	
min. shaft circumference	100	
distal width	46.9	

Horse Femur

	a	b	c
total length	390		
length from caput	350	360	
proximal width	114		
depth of caput	54	58.6	59.4
minimum shaft width	40.5	42.2	
min. shaft diameter	50.6	52.3	
min. shaft circumference	149	157	
distal width		88.0	

Horse Tibia

	a	b
proximal width	85.0	
distal width		69.8
distal depth		47.0

Horse Astragalus

total length	55.7
total width	61.3

Horse Calcaneum

total length	110.0
total width	53.7

b) CATTLE

Cattle Horn Core, probable bulls and bullocks.

	MEAN		No. in SAMPLE	STAND. DEV.	COEFF. OF VARIATION
	$\bar{x}$ (mm)	RANGE	n	s (mm)	v (%)
circumference at base	152.7	100 - 197	15	31.8	20.8
max. diameter at base	51.6	33.0 - 66.8	15	11.0	21.3
min. diameter at base	41.0	31.0 - 58.1	15	8.8	21.4

Cattle Horn Core, probable cows.

	$\bar{x}$	RANGE	n	s	v
circumference at base	135.3	115 - 160	34	13.1	9.7
max. diameter at base	47.0	38.3 - 54.3	34	6.2	13.2
min. diameter at base	37.7	29.5 - 43.0	34	3.8	10.0
length of outer curve	152.0	120 - 210	34	22.5	14.8

Cattle Mandible, M_3 in wear

	$\bar{x}$	RANGE	n	s	v
total PM/M row		129.8 - 141.2	5		
pre-molar row	46.5	39.1 - 56.0	26	4.2	9.0
molar row	84.5	76.7 - 94.9	12	4.2	5.0
M_3 length	34.4	29.6 - 40.4	93	2.3	6.7
M_3 width	12.2	8.5 - 16.1	93	0.2	1.9

Cattle Scapula

	$\bar{x}$	RANGE	n	s	v
length at articulation	61.9	49.8 - 83.0	91	5.7	9.2
glenoid length	52.0	40.8 - 67.1	92	4.5	8.6
glenoid width	42.8	35.0 - 57.4	88	4.0	9.4
min. length at neck	45.4	34.0 - 62.3	73	5.3	11.7

Cattle Humerus

	$\bar{x}$	RANGE	n	s	v
proximal width		74.5, 91.8	2		
distal width	70.8	59.6 - 94.9	78	6.5	9.1
trochlea width	68.1	59.1 - 84.2	72	5.5	8.1

Cattle Radius

	$\bar{x}$	RANGE	n	s	v
total length		244.5, 249.0	2		
proximal width	73.9	60.0 - 96.1	116	7.0	9.5
prox. articular width	67.5	56.0 - 88.8	116	5.7	8.4
min. shaft width		37.1, 37.4	2		
distal width	68.3	60.1 - 84.6	47	6.8	9.9
dist. articular width	61.9	55.6 - 75.3	42	5.1	8.2

Cattle Ulna

	$\bar{x}$	RANGE	n	s	v
length olecranon	90.0	77.0 - 112.2	13	9.9	11.0
min. diam. olecranon	49.6	44.2 - 60.2	13	5.2	10.5
diameter over beak	60.5	55.0 - 74.9	13	6.8	11.3
width articulation	44.7	35.4 - 52.0	14	4.6	10.3

Cattle Metacarpus

	$\bar{x}$	RANGE	n	s	v
total length	189.7	171.9 - 224.8	42	9.8	5.2
proximal width	53.5	40.9 - 64.2	33	5.8	10.8
proximal diameter	32.6	25.6 - 39.5	35	3.7	11.2
min. shaft width	30.3	24.6 - 38.0	33	3.4	11.2
min. shaft diameter	22.5	17.2 - 27.4	34	2.6	11.6
min. shaft circumference	90.6	78 - 113	32	8.9	9.8
distal width	55.9	48.6 - 67.1	49	5.8	10.4

Cattle Pelvis

	$\bar{x}$	RANGE	n	s	v
length of acetabulum	59.4	52.8 - 70.4	36	4.3	7.2

Cattle Femur

	$\bar{x}$	RANGE	n	s	v
proximal width	101.8	85.6 - 124.5	10	11.0	10.8
depth of caput	42.3	36.5 - 50.7	74	3.4	7.9
distal width	83.6	77.1 - 98.4	23	6.1	7.3

Cattle Tibia

	$\bar{x}$	RANGE	n	s	v
total length		294.7	1		
proximal width	85.5	77.3 - 96.2	15	4.6	5.4
min. shaft width		30.4	1		
min. shaft circumference		90	1		
distal width	56.8	49.1 - 67.9	111	4.7	8.3
distal depth	42.6	36.1 - 57.7	110	4.2	9.9

Cattle Astragalus

	$\bar{x}$	RANGE	n	s	v
lateral length	60.9	49.2 - 71.5	167	3.5	5.7
total width	40.9	30.7 - 50.2	172	3.2	7.8
total depth	31.5	25.7 - 37.2	173	2.2	6.9

Cattle Calcaneum

	$\bar{x}$	RANGE	n	s	v
total length	123.1	108.9 - 150.5	68	8.8	7.1
total width	42.3	34.1 - 56.0	67	4.8	11.3

Cattle Metatarsus

	$\bar{x}$	RANGE	n	s	v
total length	211.8	195.5 - 228.0	32	9.3	4.4
proximal width	43.5	38.2 - 48.6	26	2.5	5.8
proximal diameter	40.7	36.4 - 45.4	26	2.2	5.4
min. shaft width	24.6	20.6 - 31.1	26	1.8	7.3
min. shaft diameter	24.1	20.8 - 26.3	25	1.5	6.2
min. circumference	87.1	78 - 103	26	6.0	6.9
distal width	50.4	44.6 - 62.3	43	4.0	8.0

c) SHEEP AND GOAT

Sheep Horn Core, rams

	$\bar{x}$	RANGE	n	s	v
circumference at base	131.6	100 - 165	8	19.5	14.8
max. diameter at base	48.5	35.0 - 58.0	6	8.0	16.5
min. diameter at base	36.0	24.5 - 44.3	6	7.4	20.1
length of outer curve	202.9	180 - 230	7	28.1	13.8

Sheep Horn Core, ewes and probable wethers

	$\bar{x}$	RANGE	n	s	v
circumference at base	102.9	66 - 135	26	23.1	22.5
max. diameter at base	37.3	24.6 - 47.5	24	5.7	15.3
min. diameter at base	25.8	19.9 - 30.3	25	3.6	14.1
length of outer curve	122.7	78 - 170	26	23.9	19.5

Goat Horn Core, male

	$\bar{x}$	RANGE	n	s	v
circumference at base	153.2	124.2 - 187.0	22	16.4	10.7
max. diameter at base	57.4	48.8 - 66.4	20	5.2	9.1
min. diameter at base	38.6	30.5 - 48.0	22	4.9	12.8
length of outer curve	291.2	270 - 370	9	27.4	9.4

Goat Horn Core, female

	$\bar{x}$	RANGE	n	s	v
circumference at base		85, 95, 95	3		
max. diameter at base		30.8, 32.1,34.0	3		
min. diameter at base		21.0, 21.9,23.4	3		
length of outer curve		170, 175	2		

Sheep/Goat Mandible (M_3 in wear)

	$\bar{x}$	RANGE	n	s	v
total PM/M row	69.4	57.4 - 79.4	49	4.8	6.9
PM row	21.1	14.9 - 25.4	51	2.4	11.3
molar row	48.5	42.1 - 56.1	55	2.9	6.0

Sheep Scapula

	$\bar{x}$	RANGE	n	s	v
length at articulation	32.3	25.6 - 36.8	192	2.9	9.0
glenoid length	24.6	19.8 - 28.5	197	1.7	6.7
glenoid width	20.4	16.0 - 28.4	197	1.9	9.3
min. length at neck	20.1	14.4 - 25.0	194	1.1	5.2
spine to glenoid	19.6	15.1 - 27.8	195	2.1	10.6

Goat Scapula

	$\bar{x}$	RANGE	n	s	v
length at articulation		27.0, 32.3, 34.4	3		
glenoid length		21.9, 25.4, 25.8	3		
glenoid width		21.3, 23.4, 23.5	3		
min. length at neck		18.9, 20.5, 20.9	3		
spine to glenoid		25.8, 26.3, 26.3	3		

Sheep Humerus

	$\bar{x}$	RANGE	n	s	v
total length		117.0 - 134.2	5		
proximal width	37.8	30.0 - 43.9	35	3.4	8.9
proximal diameter	43.8	36.7 - 49.8	42	3.3	7.4
minimum shaft width		14.1 - 17.3	5		
distal width	30.0	24.9 - 36.2	209	2.1	6.9
trochlea width	28.7	24.0 - 31.6	200	2.8	9.9

Goat Humerus

	$\bar{x}$	RANGE	n	s	v
distal width	32.7	30.8 - 34.6	9	1.4	4.2
trochlea width	31.5	29.6 - 33.6	9	1.3	4.0

Sheep Radius

	$\bar{x}$	RANGE	n	s	v
total length	153.5	141.2 - 176.1	58	9.4	6.1
proximal width	30.9	25.7 - 38.9	289	2.3	7.3
prox. articular width	28.4	24.5 - 31.8	294	1.8	6.5
minimum shaft width	17.3	13.8 - 20.0	56	1.3	7.7
distal width	28.4	24.2 - 32.3	105	1.6	5.8
distal articular width	23.3	19.8 - 28.1	103	1.8	7.7

Goat Radius

	$\bar{x}$	RANGE	n	s	v
total length		169.1, 173.1	2		
proximal width	33.9	32.2 - 36.5	13	1.2	3.6
prox. articular width	31.5	30.4 - 32.9	13	0.9	2.7
min. shaft width		18.3, 18.8	2		
distal width		31.4,32.2,32.4,32.9	4		
distal art. width		24.9,25.0,25.2,25.4	4		

Sheep Ulna

	$\bar{x}$	RANGE	n	s	v
length olecranon	39.9	32.9 - 47.3	68	4.5	11.4
min. diameter olecranon	22.5	17.2 - 26.1	67	1.5	6.7
width at articulation	18.4	14.7 - 21.0	67	1.5	8.1

Goat Ulna

	$\bar{x}$	RANGE	n	s	v
length olecranon		27.1 , 27.8	2		
min. diameter olecranon		24.2, 25.0,25.2	3		
width at articulation		24.8 - 28.7	4		

Sheep Metacarpus

	$\bar{x}$	RANGE	n	s	v
total length	126.3	110.0 - 144.9	65	7.1	5.6
proximal width	23.0	19.0 - 25.8	64	1.4	6.2
min. shaft width	14.1	11.4 - 16.7	64	1.1	7.6
distal width	25.5	20.9 - 28.6	61	1.7	6.5

Goat Metacarpus

	$\bar{x}$	RANGE	n	s	v
total length	116.7	112.0 - 122.0	7	3.6	3.1
proximal width	27.2	24.7 - 28.9	8	1.3	4.7
min. shaft width	18.6	17.8 - 19.0	8	0.5	2.7
distal width	31.1	29.4 - 33.9	7	1.4	4.5

Sheep/Goat Pelvis

	$\bar{x}$	RANGE	n	s	v
length of acetabulum	26.3	22.8 - 29.7	77	1.5	5.8

Sheep Femur

	$\bar{x}$	RANGE	n	s	v
total length		179.9	1		
length from caput		176.7	1		
proximal width	44.9	40.1 - 49.5	39	3.1	6.8
depth of caput	19.9	18.4 - 23.2	40	1.0	5.2
min. shaft width		16.8	1		
min. shaft circumference		59	1		
distal width	37.0	32.9 - 44.1	42	2.5	6.6

Goat Femur

	$\bar{x}$	RANGE	n	s	v
proximal width		45.8 - 51.9	5		
depth of caput		19.9 - 22.8	5		

Sheep/Goat Tibia

	$\bar{x}$	RANGE	n	s	v
total length		199.2, 208.0	2		
proximal width	40.2	38.7 - 44.6	41	2.6	6.5
min. shaft width		15.2, 16.1	2		
min. shaft circumference		48, 49	2		
distal width	25.9	21.8 - 30.0	267	1.4	5.4

Sheep/Goat Astragalus

	$\bar{x}$	RANGE	n	s	v
lateral length	28.1	22.9 - 31.1	56	1.6	5.8
total width	19.3	15.1 - 21.8	56	1.5	7.7
total depth	15.5	13.8 - 17.8	54	1.1	7.4

Sheep Calcaneum

	$\bar{x}$	RANGE	n	s	v
total length	55.3	49.7 - 61.6	56	2.7	4.8
total width	18.0	14.9 - 20.5	55	1.5	8.1

Goat Calcaneum

	$\bar{x}$	RANGE	n	s	v
total length		59.2,59.8,63.3	3		
total width		17.0,18.3,19.1	3		

Sheep Metatarsus

	$\bar{x}$	RANGE	n	s	v
total length	135.0	120.4 - 149.0	53	6.9	5.1
proximal width	20.1	16.1 - 21.9	51	1.2	6.0
min. shaft width	12.3	10.2 - 14.4	53	0.9	6.9
distal width	23.8	20.1 - 25.4	50	1.1	4.7

Goat Metatarsus

	$\bar{x}$	RANGE	n	s	v
total length		126.5 - 129.8	4		
proximal width		21.2 - 23.2	4		
min. shaft width		14.5 - 15.2	4		
distal width		25.6 - 28.3	4		

d) PIG

Pig Mandible (M_3 in wear)

	$\bar{x}$	RANGE	n	s	v
total row, PM_2 - M_3	97.0	92.4 -101.8	9	3.3	3.4
PM row, 2-4	33.3	28.7 - 36.9	28	1.8	5.3
molar row	63.8	57.8 - 70.4	17	3.5	5.5
M_3 length	31.1	25.5 - 34.0	51	2.0	6.3
M_3 width	13.3	11.7 - 15.2	51	1.5	11.4

Pig Upper M^3 (in wear)

	$\bar{x}$	RANGE	n	s	v
length	28.8	25.6 - 33.0	53	1.9	6.7
width	15.8	12.8 - 17.9	53	1.1	6.7

Pig Scapula

	$\bar{x}$	RANGE	n	s	v
length at articulation	34.9	30.0 - 40.7	82	2.3	6.5
glenoid length	28.7	24.3 - 33.5	82	2.1	7.3
glenoid width	24.8	21.6 - 29.0	82	2.0	7.9
min. length at neck	21.2	19.2 - 29.9	81	2.1	9.9

Pig Humerus

	$\bar{x}$	RANGE	n	s	v
total length		156.2,157.0, 160.9	3		
proximal width	48.0	42.2 - 53.0	13	3.6	7.5
proximal depth	62.6	58.9 - 69.1	13	4.0	6.4
min. shaft width		16.4,17.2,19.0	3		
distal width	38.7	34.9 - 45.4	98	2.4	6.2
trochlea width	29.4	25.4 - 35.6	96	2.1	7.1

Pig Radius

	$\bar{x}$	RANGE	n	s	v
total length		134.5 - 147.9	5		
proximal width	27.8	24.1 - 34.4	123	1.9	6.8
min. shaft width	18.8	17.4 - 19.3	6	0.8	4.3
distal width	33.7	31.7 - 34.4	6	1.0	3.0
width at distal articulation	27.8	26.6 - 28.3	6	0.6	2.3

Pig Ulna

	$\bar{x}$	RANGE	n	s	v
width at articulation	22.2	20.5 - 24.9	13	1.3	5.9
min. diameter olecranon	27.4	24.7 - 30.3	16	1.7	6.1
diameter over beak	35.9	32.7 - 39.1	15	1.9	5.3

Pig Metacarpus III

	$\bar{x}$	RANGE	n	s	v
total length	69.9	65.8 - 77.6	25	3.4	4.9
proximal width	18.9	16.2 - 21.2	27	1.7	8.7
min. shaft width	14.6	12.8 - 16.2	29	1.1	7.2
distal width	16.7	15.2 - 19.3	27	1.1	6.6

Pig Metacarpus IV

	$\bar{x}$	RANGE	n	s	v
total length	70.1	62.8 - 81.0	25	3.7	5.3
proximal width	15.0	13.4 - 18.0	25	1.1	7.5
min. shaft width	13.0	10.6 - 16.2	25	1.2	9.2
distal width	16.5	14.2 - 19.2	24	1.1	6.7

Pig Pelvis

	$\bar{x}$	RANGE	n	s	v
length acetabulum	31.9	29.0 - 36.7	76	1.9	5.8

Pig Femur*

	$\bar{x}$	RANGE	n	s	v
total length		228.8	1		
length from caput		191.1, 201.0, 205.4, 205.6, 226.9	5		
proximal width		52.9,54.6,63.4	3		
depth of caput		24.5,24.7,25.3, 26.0,34.5	5		
min. shaft width		18.0,18.3,18.7, 23.1	4		
distal width	43.8	42.1 - 48.5	9	3.5	8.0

* Each line includes a measurement from one exceptional femur which could perhaps have come from a wild pig (see text p.).

Pig Tibia

	$\bar{x}$	RANGE	n	s	v
total length		174.1, 186.0, 187.9	3		
proximal width		43.0 - 47.7	4		
min. shaft width		18.2,19.7,19.9	3		
min. circumference		57, 58, 60	3		
distal width	29.4	26.4 - 33.2	52	1.6	5.3

Pig Astragalus

	$\bar{x}$	RANGE	n	s	v
lateral length	38.4	31.3 - 42.8	53	2.5	6.5
medial length	35.7	29.8 - 39.9	53	2.3	6.5

Pig Calcaneum

	$\bar{x}$	RANGE	n	s	v
total length	75.0	69.0 - 88.6	18	4.2	5.6
total width	21.4	17.4 - 25.5	18	1.9	9.0

Pig Metatarsus III

	$\bar{x}$	RANGE	n	s	v
total length	77.4	72.0 - 80.7	20	2.3	2.9
proximal width	15.9	14.3 - 17.0	20	0.8	5.0
min. shaft width	13.3	11.5 - 15.2	20	0.8	6.2
distal width	16.3	14.8 - 17.4	20	0.8	4.9

Pig Metatarsus IV

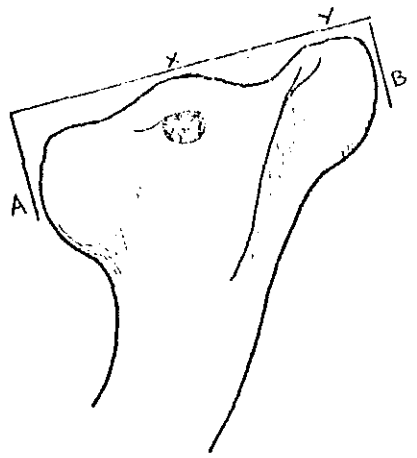
	$\bar{x}$	RANGE	n	s	v
total length	81.7	75.8 - 87.2	19	3.5	4.2
proximal width	15.5	13.3 - 17.4	19	1.3	8.3
min. shaft width	13.1	11.0 - 14.9	19	1.3	9.7
distal width	16.9	14.8 - 19.4	19	1.2	7.2

e) GOOSE

Goose Caracoid — Measurements are those defined by Bacher (1967) unless otherwise indicated.

	$\bar{x}$	RANGE	n	s	v
maximum (diagonal) length		73.7,74.1,74.2	3		
medial length	65.2	64 - 67.8	6	1.6	2.5
distal diameter		31	1		
basal width		29, 30.3, 31	3		

Goose Scapula



measurements A - B using points X and Y as stabilizers.

	$\bar{x}$	RANGE	n	s	v
measurement A-B above	19.4	18.2 - 20.6	9	0.7	3.9

Goose Humerus

	$\bar{x}$	RANGE	n	s	v
maximum length		160	1		
proximal width	35.1	33.1 - 36.5	7	1.4	4.1
min. width shaft	11.2	10.3 - 12.3	21	0.5	4.5
min. depth shaft	8.4	7.4 - 9.1	24	0.5	5.6
distal width	23.8	21.6 - 26	17	1.1	4.6

Goose Radius

	$\bar{x}$	RANGE	n	s	v
maximum length		134	1		
proximal width	8.2	7.3 - 9.2	11	0.5	6.7
proximal diameter	9.2	8.1 - 10.0	10	0.58	6.3
min. width shaft	4.6	4 - 5.1	8	0.4	7.8
distal width		9.7 - 11.1	5		

Goose Ulna

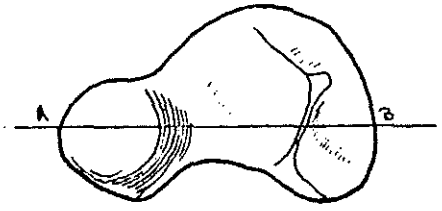
	$\bar{x}$	RANGE	n	s	v
maximum length		148	1		
proximal width		13 - 13.8	4		
minimum width shaft	7.2	6.7 - 8.2	12	0.5	6.7
distal diagonal		14.2 - 17.3	5		

Goose Carpometacarpus

	$\bar{x}$	RANGE	n	s	v
maximum length	91.6	84.7 - 97	7	5.0	5.4
proximal width	21.6	19.8 - 23.5	9	1.2	5.6
max. width both shafts	10.4	10 - 11	8	0.3	3.0
distal diagonal	11.5	10.1 - 12.5	8	0.8	6.7

Goose Femur Bacher's proximal width was considered inadequately defined here and that used by Don Bramwell (personal communication) substituted. The Bramwell measurement is illustrated below. A minimum width shaft measurement is added.

Proximal End



AB = Proximal width

Goose Femur

	$\bar{x}$	RANGE	n	s	v
maximum length	81.1	75.5 - 87.8	14	4.0	4.9
medial length	76.7	71.7 - 83.1	12	3.9	5.0
proximal width (Bramwell)	21.3	19.7 - 22.6	17	1.0	4.6
min width shaft	8.5	7.6 - 9.9	26	0.5	5.8
distal width	20.8	19.4 - 22.6	17	0.9	4.2
distal depth	16.4	15.1 - 18.1	13	1.0	5.8

Goose Tibio-tarsus

	$\bar{x}$	RANGE	n	s	v
maximum length		133, 136	2		
diagonal proximal width	25	24.1 - 25.9	7	0.7	2.8
min. width shaft	8.6	8.1 - 9.5	22	0.5	5.6
min. depth shaft	7.1	6.1 - 8.8	31	0.6	7.9
distal width	17.3	16.1 - 19	24	0.9	5.1

Goose Tarso-metatarsus

	$\bar{x}$	RANGE	n	s	v
maximum length	85.8	81.2 - 91.6	9	4.2	4.9
proximal width	19.1	18.1 - 20	7	0.9	4.5
min. width shaft	8.3	7.2 - 9.3	19	0.4	5.1
max. distal width	19.9	18.4 - 21.2	13	1.1	5.3
distal diagonal	20.0	18 - 21.1	12	1.2	5.9

f) DOMESTIC FOWL

Measurements are those defined by Erbersdobler (1968).

Domestic Fowl Coracoid

	$\bar{x}$	RANGE	n	s	v
maximum length	51.6	47.3 - 60.3	32	4.1	7.9
medial length	49.1	43.6 - 57.7	39	3.9	7.9
*distal diameter	14.3	12.6 - 17.4	8	1.7	11.7
+basal width	11.1	8,3 - 14.0	33	1.3	11.6

* This name is misleading. The measurement is maximum basal width (Bb of von den Driesch)

\+ This is the width of the Facies articularis basalis (BF of von den Driesch)

Domestic Fowl Scapula

	$\bar{x}$	RANGE	n	s	v
cranial width	11.9	10.8 - 13.9	20	0.9	7.9
min. width behind cranial end	5.1	4.2 - 6.0	23	0.5	10.4

Domestic Fowl Humerus

	$\bar{x}$	RANGE	n	s	v
maximum length	65.3	55 - 75.5	37	5.3	8.1
proximal width	17.9	16.5 - 20.6	47	1.4	7.7
minimum width shaft	6.7	6.1 - 7.9	59	0.4	6.7
distal width	14.3	13 - 16.6	54	1.0	6.8

Domestic Fowl Radius

	$\bar{x}$	RANGE	n	s	v
maximum length	56.5	46.5 - 66.2	16	4.05	7.2
proximal width		4.5, 5.0, 5.5	3		
distal width	6.3	5.7 - 7.3	20	0.46	7.3

Domestic Fowl Ulna

	$\bar{x}$	RANGE	n	s	v
maximum length	66.3	52.8 - 76.8	23	6.6	10.0
proximal width	10.0	8.5 - 11.5	37	1.0	9.5
min. shaft width	5.5	4.6 - 6.2	50	0.5	8.6
distal depth	9.4	8.1 - 11.5	44	0.8	8.5

Domestic Fowl Carpometacarpus

	$\bar{x}$	RANGE	n	s	v
maximum length	36.7	33.5 - 42.5	15	3.4	9.3
proximal width	11.2	10.1 - 13.4	14	1.2	10.2
max. width both shafts	9.5	8.3 - 11.0	13	0.9	9.1
distal depth	7.0	6.4 - 8.3	14	0.6	8.6

Domestic Fowl Femur

	$\bar{x}$	RANGE	n	s	v
maximum length	73.8	66 - 84.2	50	5.7	7.7
medial length	69.4	61.3 - 79.5	55	5.6	8.1
*proximal depth	9.7	8.1 - 11.7	66	1.0	9.9
min. width shaft	6.3	5.5 - 7.8	77	0.6	9.1
distal width	13.8	12.2 - 17	74	2.9	21.1

* Erbersdobler calls this a proximal width but we consider that name misleading.

Domestic Fowl Tibio-Tarsus

	$\bar{x}$	RANGE	n	s	v
maximum length	101	74.8 - 119	15	10.7	10.7
*proximal width	12.7	10.7 - 15.7	35	1.4	11.3
min. width shaft	5.9	4.9 - 7.8	69	0.6	11.1
distal width	10.6	9.3 - 12.4	71	0.8	8.0

* This is the measurement across the condyles and not the diagonal width of von den Driesch.

Domestic Fowl Tarso-Metatarsus

MALES (probably includes castrates)

	$\bar{x}$	RANGE	n	s	v
maximum length	79.5	58.0 - 89.6	12	7.6	9.6
proximal width	13.9	13.0 - 15.1	16	0.5	3.6
min. width shaft	7.1	6.3 - 8.7	22	0.5	7.0
distal width	13.5	13.0 - 14.0	12	0.3	2.2

FEMALES

maximum length	65.2	49.1 - 71.0	33	4.1	6.3
proximal width	12.0	11.0 - 12.6	47	0.8	6.7
min. width shaft	5.6	5.0 - 6.3	37	0.3	5.4
distal width	11.5	10.7 - 12.6	34	0.5	4.3

2. WITHERS HEIGHTS

all based on factors recommended by von den Driesch and Boessneck, 1974; measurements forming the basis of these calculations are taken from the measurement tables above.

Horse

(Kiesewalter's factors)

bone	n	factor	WRH in cm.
Metacarpus	1	x 6.41	137.1
Femur	1	x 3.51	136.9
Femur*			140.7

* estimate

Cattle

(Fock's factors for Metapodia; Matolcsi's factors for other bones)

bone	n	factor	mean WRH in cm.	range
Radius	2	x 4.30		105.1, 107.1
Metacarpus	42	x 6.325	116.2	105.3 - 137.7
Tibia	1	x 3.45		101.7
Metatarsus	32	x 5.45	115.4	106.5 - 124.3
overall	77		115.4	101.7 - 137.7

Sheep

(Teichert's factors for prehistoric and early historic sheep)

bone	n	factor	mean WRH in cm.	range
Humerus	5	x 4.28		50.1,50.9, 56.1, 56.6, 57.4
Radius	58	x 4.02	61.7	56.8 - 70.8
Metacarpus	65	x 4.89	61.8	53.8 - 70.9
Femur	1	x 3.53		63.5
Tibia	2	x 3.01		60.0, 62.6
Metatarsus	53	x 4.54	61.3	54.7 - 67.6
overall	184		61.4	50.1 - 70.9

Goat

(Schramm's factors)

bone	n	factor	mean WRH in cm.	range
Radius	2	x 3.98		67.3, 68.9
Metacarpus	7	x 5.75	67.1	64.4 - 70.2
Metatarsus	4	x 5.34		67.6, 67.8, 68.2, 69.3
overall	13		67.6	64.4 - 70.2

Pig

(Teichert's factors)

bone	n	factor	mean WRH in cm.	range
Humerus	3	x 4.05		63.2,63.6,65.2
Radius	5	x 5.26		70.7,72.6,73.4, 73.9,77.8
Femur	1	x 3.65		83.5
Femur*	4			70.3,74.0,75.6, 75.9
Tibia	3	x 3.92		68.2,72.9,73.7
overall	16		72.3	63.2 - 83.5
excluding largest femur as perhaps wild.	15		71.5	63.2 - 77.8

* estimate

3.
MAIN DOMESTIC ANIMALS

Stages of tooth eruption and wear

STAGE	% age of animals killed			
	Horse	Cattle	Sheep/ Goat	Pig
M_1 not yet coming into wear	-	5.7	4.5	1.5
M_2 not yet coming into wear (cumulative)	- -	12.3 18.0	14.7 19.2	18.8 20.3
M_3 not yet coming into wear (cumulative)	- -	22.3 40.3	18.1 37.3	39.0 59.3
M_3 coming into wear (cumulative)	- -	13.7 54.0	27.2 64.5	14.1 73.4
M_3 in full wear (cumulative)	60 60	29.4 83.4	26.4 90.9	14.6 88.0
M_3 in heavy wear (cumulative)	40 100	16.6 100	9.1 100	12.0 100

4.

AGE BY EVIDENCE OF BONE FUSION

a) HORSE

No UNFUSED bones present.

b) CATTLE

fusion age (modern)	BONE	No. unfused	total	%age killed before fusion	no. unfused	total	%killed before fusion
7-10m	Scapula				7	166	4.2
1½ yr.	Humerus dl	17	120	14.2	111	1086	10.2
	Radius px	9	125	7.2			
	Phalanx 1	71	556	12.8			
	Phalanx 2	14	285	4.9			
2½ yr.	Tibia dl	58	190	30.5	120	331	36.3
	Metacarpus	62	141	44.0			
3 yr.	Metatarsus				53	118	44.9
3½ - 4 yr.	Femur px	71	166	42.8	204	437	46.7
	Calcaneum	89	178	50.0			
	Tibia px	11	20	55.0			
	Radius dl	33	73	45.2			

c i) SHEEP

fusion age (modern)	BONE	No. unfused	total	%age killed before fusion	No. unfused	total	%killed before fusion
6-8m.	Scapula	32	284	11.3			
10m.	Humerus dl.	16	297	5.4	56	923	6.1
10m.	Radius px	8	342	2.3			
13-16m	Phalanx 1	16	161	9.9	17	180	9.4
	Phalanx 2	1	19	5.3			
1½-2yr	Tibia dl	49	334	14.7	88	482	18.3
	Metacarpus	39	148	26.4			
2yr 4m	Metatarsus				43	126	34.1
2½yr	Ulna				50	128	39.1
3yr	Radius dl.	133	250	53.2	261	515	50.7
	Femur px	89	160	55.6			
	Calcaneum	39	105	37.1			
3½yr	Humerus px	56	106	52.8			
	Femur dl	69	134	51.5	210	374	56.1
	Tibia px	85	134	63.4			

c ii) GOAT - metapodial fusion

Bone	No. unfused	total	%age killed before fusion	No. unfused	total	%killed before fusion
Metacarpus	5	14	35.7	6	19	31.6
Metatarsus	1	5	20.0			

d) PIG

fusion age (modern)	BONE	No. unfused	total	%age killed before fusion	No. unfused	total	%killed before fusion
1yr	Scapula	61	170	35.9	163	584	27.9
	Humerus dl	47	199	23.6			
	Radius px	46	192	24.0			
	Phalanx 2	9	23	39.1			
2yr	Tibia dl	97	154	63.0	157	246	63.8
	Phalanx 1	60	92	65.2			
2-2½yr	Metapodia	473	633	74.7	571	751	76.0
	Calcaneum	98	118	83.1			
3½yr	Radius dl	109	115	94.8	429	463	92.7
	Ulna	95	104	91.3			
	Femur px + dl	123	137	89.8			
	Tibia px	102	107	95.3			

5.

Minimum Numbers, bone by bone

	Horse	Cattle	Sheep or Sheep/Goat	Goat	Pig
Horn Core		95	130	28	
Mandible	5	211	265		192
Scapula		102	159	3	119
Humerus	1	124	162	5	113
Radius	2	125	201	7	111
Ulna		79	100	1	70
Metacarpus	3	111	79	13	47
Femur	3	90	85	5	78
Tibia	1	109	174		92
Metatarsus	1	103	85	4	47
Astragalus	1	118	34		39
Calcaneum	1	106	59	3	51

6. IDENTIFIED FRAGMENTS of the Main Domestic Animals: distribution over the body.

	Horse		Cattle		Sheep/ Goat		Goat		Pig	
	T	%	T	%	T	%	T	%	T	%
Horn Core			301	1.3	282	1.9	54	41.5		
Cranial			1198	5.0	383	2.6	8	6.2	596	8.6
Maxilla/Premaxilla			279	1.2	127	0.8			257	3.7
Mandible	4	8.2	1055	4.4	565	3.9			506	7.3
Loose upper tooth	1	2.0	388	1.6	225	1.6			134	1.9
Loose lower tooth	5	10.3	431	1.8	265	1.8			302	4.3
Atlas/Axis			305	1.3	250	1.7	6	4.6	102	1.5
Other vertebra	1	2.0	3645	15.3	1945	13.4			648	9.3
Rib	8	16.4	7439	31.1	5157	35.8			955	13.6
Scapula			967	4.0	584	4.0	3	2.3	359	5.2
Humerus	1	2.0	790	3.3	524	3.6	8	6.2	354	5.1
Radius	3	6.1	710	3.0	648	4.5	16	12.3	251	3.6
Ulna			292	1.2	242	1.7	1	0.8	230	3.3
Metacarpus	5	10.3	462	1.9	400	2.8	17	13.1	397	5.7
Pelvis	1	2.0	1056	4.4	667	4.6			407	5.9
Femur	5	10.3	767	3.2	509	3.5	6	4.6	330	4.7
Tibia	2	4.1	894	3.7	736	5.1			318	4.6
Astragalus	1	2.0	215	0.9	65	0.4			76	1.1

Contd. .....

..... Contd.

	Horse		Cattle		Sheep/ Goat		Goat		Pig	
	T	%	T	%	T	%	T	%	T	%
Calcaneum	1	2.0	266	1.1	116	0.8	4	3.1	122	1.8
Carpal/Tarsal	1	2.0	347	1.5	83	0.6			30	0.4
Metatarsus	1	2.0	492	2.1	403	2.8	5	3.8	325	4.7
Phalanx	6	12.2	1294	5.4	214	1.5	2	1.5	151	2.2
Other	3	6.1	303	1.3	86	0.6			103	1.5
Total	49		23,896		14,476		130		6,953	

T = Total fragments

7.

Relative frequency of the main Domestic Animals by fragment count.

	HORSE %	CATTLE %	SHEEP %	GOAT %	PIG %		TOTAL
Total	49 0.1	23896 52.5	14476 31.8	130 0.3	6953 15.3		45,504
Site I	7 0.1	2643 49.2	2009 37.4	17 0.3	701 13.0		5,377
IV	12 0.1	6214 52.1	3900 32.7	38 0.3	1756 14.7		11,920
V	15 0.1	7882 54.3	4622 31.8	41 0.3	1957 13.5		14,517
VI	6 0.1	4129 53.6	2099 27.2	21 0.3	1450 18.8		7,705
XX		1959 49.7	1334 33.8	7 0.2	641 16.3		3,941
occupation surface	9 0.4	1069 52.3	512 25.0	6 0.3	448 21.9		2,044

RELATIVE FREQUENCY OF THE MAIN DOMESTIC ANIMALS by fragment count (continued).

Major pits in descending order of fragments	HORSE	%	CATTLE	%	SHEEP	%	GOAT	%	PIG	%	TOTAL
Site V F16	4	0.1	2501	53.7	1412	30.3	25	0.5	718	15.4	4660
VI F30			858	52.6	461	28.2	4	0.2	309	18.9	1632
VI F39	2	0.1	879	54.4	326	20.2	6	0.4	403	24.9	1616
IV F13			742	49.9	562	37.8	3	0.2	180	12.1	1487
IV F3523	3	0.2	664	49.3	438	32.5	3	0.2	240	17.8	1348
V F17	1	0.1	567	43.0	520	39.5	3	0.2	227	17.2	1318
V F34	3	0.2	670	53.8	462	37.1	1	0.1	109	8.8	1245
VI F33			700	56.9	342	27.8	2	0.2	186	15.1	1230
VI F1	4	0.3	475	39.2	457	37.7	2	0.2	273	22.5	1211
IV F3501	1	0.1	661	55.8	310	26.2	3	0.3	207	17.5	1182
V F14	2	0.2	588	50.3	447	38.2	1	0.1	132	11.3	1170
VI F8			715	61.8	299	25.8	2	0.2	141	12.2	1157
V F11			818	71.6	237	20.7	1	0.1	87	7.6	1143
I F4			627	55.0	376	33.0	1	0.1	135	11.9	1139
IV F55	3	0.3	597	58.9	222	21.9	2	0.2	189	18.7	1013
V F10			545	54.3	270	26.9	3	0.3	186	18.5	1004
IV F50			543	64.3	205	24.3	6	0.7	91	10.8	845
V F21	2	0.2	549	65.8	212	25.4	5	0.6	66	7.9	834
V F22			495	65.6	188	24.9	1	0.1	71	9.4	755
XX F131			258	35.2	326	44.5	1	0.1	148	20.2	733
IV F2			344	51.2	244	36.3	1	0.1	83	12.4	672
XX F114			419	62.6	150	22.4			100	14.9	669

Contd.

Relative frequency of the main Domestic Animals by fragment count

(Contd.)

Major pits in descending order of fragments	HORSE %	CATTLE %	SHEEP %	GOAT %	PIG %	TOTAL
Site XX F70		428 65.1	160 24.4	1 0.2	68 10.4	657
IV F17		380 58.1	193 29.5	3 0.5	78 11.8	654
XX F130		173 26.9	343 53.3	2 0.3	126 19.6	644

RELATIVE FREQUENCY OF THE MAIN DOMESTIC ANIMALS by weight (in kilos).

kg	HORSE %	CATTLE %	SHEEP %	GOAT %	PIG %		TOTAL
TOTAL	4.4 0.5	587.9 72.1	121.1 14.9	7.0 0.9	94.8 11.6		815.2
Site I	1.2 1.2	67.7 69.0	18.2 18.5	1.4 1.5	9.7 9.9		98.2
IV	1.5 0.7	166.8 72.4	34.6 15.0	1.5 0.7	25.9 11.2		230.4
V	0.8 0.3	187.8 74.2	37.1 14.6	2.4 0.9	25.2 10.0		253.3
VI	0.7 0.5	103.3 71.5	18.2 12.6	1.1 0.8	21.2 14.7		144.5
XX		39.9 69.5	9.4 16.3	0.3 0.5	7.9 13.7		57.5
occupation surface	0.2 0.6	22.8 71.3	3.7 11.5	0.3 0.8	5.1 15.8		32.1
major pits V F16	0.2 0.2	60.0 73.9	11.8 14.5	1.3 1.6	7.9 9.7		81.2
VI F30		23.7 69.8	4.6 13.6	0.3 0.8	5.4 15.8		34.0
VI F39	0.4 2.1	25.4 70.5	3.2 9.0	0.1 0.4	6.3 17.9		35.4
IV F13		18.1 70.7	4.9 19.2	0.1 0.5	2.5 9.6		25.5
IV F3523	0.3 1.5	16.5 70.6	3.2 13.8	0.3 1.3	3.0 12.9		23.4
V F17	0.05 0.2	14.2 65.6	4.2 19.3	0.1 0.5	3.1 14.4		21.7
V F34	0.2 1.1	12.3 77.5	1.9 11.7	0.03 0.2	1.5 9.4		15.9
VI F33		12.9 78.0	2.4 14.5	0.3 1.8	0.9 5.6		16.5
VI F1	0.3 1.2	12.5 60.4	3.4 16.3	0.2 1.0	4.4 21.1		20.6
IV F3501	0.1 0.3	16.7 73.3	3.1 13.7	0.1 0.3	2.8 12.4		22.7
V F14	0.1 0.5	11.8 71.1	2.9 17.4	0.03 0.2	1.8 10.8		16.5
VI F8		14.2 75.8	2.6 14.1	0.1 0.3	1.9 9.9		18.7
V F11		17.3 82.5	2.5 12.1	0.1 0.3	1.1 5.2		20.9

Relative frequency by weight (continued)

	HORSE	CATTLE	SHEEP	GOAT	PIG		TOTAL
		%	%	%	%		
Site I F4		14.7 72.2	3.9 19.3	0.03 0.1	1.7 8.4		20.4
IV F55	0.4 1.9	17.3 75.8	2.1 9.1	0.1 0.5	2.9 12.7		22.8
V F10		16.0 71.1	2.8 12.6	0.5 2.2	3.2 14.2		22.6
IV F50		13.8 79.2	2.1 12.1	0.3 1.8	1.2 7.0		17.4
V F21	0.2 1.3	13.4 80.9	1.7 10.4	0.3 1.5	1.0 5.9		16.6
V F22		11.8 79.6	1.6 10.6	0.05 0.3	1.4 9.5		14.8
XX F131		4.7 57.2	2.0 23.8	0.03 0.3	1.6 18.7		8.3
IV F2		8.7 73.5	1.9 16.4	0.02 0.2	1.2 9.9		11.9
XX F114		8.8 77.6	1.3 11.3		1.3 11.1		11.4
XX F70		9.9 83.2	1.1 9.3	0.03 0.2	0.9 7.3		11.8
IV F17		10.6 77.2	1.8 13.4	0.1 0.7	1.2 8.7		13.7
XX F130		2.9 44.7	2.1 32.1	0.03 0.4	1.5 22.8		6.4

RELATIVE FREQUENCY OF THE MAIN DOMESTIC ANIMALS by Minimum Numbers.

	HORSE	%	CATTLE	%	SHEEP	%	GOAT	%	PIG	%	TOTAL
TOTAL by mandibles	5	0.7	211	31.4	265	39.4			192	28.5	673
TOTAL cumulative	21	1.6	422	32.2	421	32.1	59	4.5	386	29.5	1309
Site I by mandibles	2	1.9	27	26.0	44	42.3			31	29.8	104
cumulative	6	2.5	75	31.4	78	32.6	11	4.6	69	28.9	239
Site IV by mandibles	1	0.5	76	36.9	79	38.3			50	24.3	206
cumulative	7	1.9	113	31.1	120	33.1	21	5.8	102	28.1	363
Site V by mandibles	1	0.7	35	24.8	67	47.5			38	27.0	141
cumulative	6	1.6	118	31.6	122	32.7	14	3.8	113	30.3	373
Site VI by mandibles	1	0.7	52	35.1	48	32.4			47	31.8	148
cumulative	2	1.0	70	33.3	66	31.4	9	4.3	63	30.0	210
Site XX by mandibles			18	31.0	19	32.8			21	36.2	58
cumulative			46	37.1	35	28.2	4	3.2	39	31.5	124
occupation surface by mandibles			3	18.8	8	50.0			5	31.3	16

RELATIVE FREQUENCY OF THE MAIN DOMESTIC ANIMALS by Minimum Numbers (continued)

PITS	HORSE	%	CATTLE	%	SHEEP	%	GOAT	%	PIG	%	TOTAL
Site V F16	1	1.6	19	31.1	17	27.9	6	9.8	18	29.5	61
VI F30			17	37.8	12	26.7	2	4.4	14	31.1	45
VI F39	1	2.3	16	37.2	11	25.6	1	2.3	14	32.6	43
IV F13			7	26.9	12	46.2	2	7.7	5	19.2	26
IV F3523	1	3.0	11	33.3	9	27.3	1	3.0	11	33.3	33
V F17	1	3.1	9	28.1	12	37.5	1	3.1	9	28.1	32
V F34	1	4.2	6	25.0	9	37.5	1	4.2	7	29.2	24
VI F33			7	31.8	8	36.4	1	4.5	6	27.3	22
VI F1	1	3.7	7	25.9	10	37.0	1	3.7	8	29.6	27
IV F3501	1	3.4	8	27.6	12	41.4	1	3.4	7	24.1	29
V F14	1	3.8	7	26.9	9	34.6			9	34.6	26
VI F8			8	26.7	13	43.3	1	3.3	8	26.7	30
V F11			10	40.0	9	36.0	1	4.0	5	20.0	25
I F4			10	35.7	9	32.1	1	3.6	8	28.6	28
IV F55	1	3.8	7	26.9	8	30.8	1	3.8	9	34.6	26
V F10			8	30.8	9	34.6	1	3.8	8	30.8	26
IV F50			9	40.9	4	18.2	3	13.6	6	27.3	22
V F21	1	4.3	10	43.5	6	26.1	1	4.3	5	21.7	23
V F22			9	32.1	10	35.7	1	3.6	8	28.6	28
XX F131			4	26.7	4	26.7	1	6.7	6	40.0	15

Contd. ....

RELATIVE FREQUENCY OF THE MAIN DOMESTIC ANIMALS by Minimum Numbers (continued)

PITS	HORSE %	CATTLE %	SHEEP %	GOAT %	PIG %	TOTAL
Site IV F2		3 33.3	2 22.2	1 11.1	3 33.3	9
XX F114		8 42.1	5 26.3		6 31.6	19
XX F70		13 50.0	6 23.1	1 3.8	6 23.1	26
IV F17		7 36.8	7 36.8	1 5.3	4 21.1	19
XX F130		6 40.0	4 26.7	1 6.7	4 26.7	15

References

BACHER, A. (1967).

Vergleichend morphologische Untersuchungen an Einzelknochen des postcranialen Skeletts in Mitteleuropa vorkommender Schwäne und Gänse.
Dissertation Veterinary Faculty,
University of Munich.

DRIESCH, A. von den (1976)

Das Vermessen von Tierknochen aus vor-und frühgeschichtlichen Siedlungen.
Institut f. Paläoanatomie,
Domestikationsforschung u. Geschichte der Tiermedizin,
University of Munich.

(An English version is now obtainable from:

Peabody Museum of Archaeology and Ethnography,
Harvard University,
11 Divinity Avenue,
Cambridge, MA 02138,
U.S.A.)

DRIESCH, A. von den, and BOESSNECK, J. (1974).

Kritische Anmerkungen zur Widerristhöhenberechnung aus Längenmassen vor-und frühgeschichtlicher Tierknochen.
Säugetierkundliche Mitteilungen, 22, (4), 325-348.

ERBERSDOBLER, K. (1968).

Vergleichend morphologische
Untersuchungen an Einzelknochen des postcranialen Skeletts
in Mitteleuropa vorkommender mittelgrosser Huhnervögel.
Dissertation, Veterinary Faculty,
University of Munich.