Appendix 3 – Animal bone: methodology and overview

by Gillian Jones

Introduction

The animal bones from the Eton Rowing Course were recorded by several different researchers, under the overall direction of Gillian Jones. Most of the bones from Areas 15 and 10 and the watching briefs were studied by Sarah Crump as part of a postgraduate project at Sheffield University, supervised by Paul Halstead and Patricia Collins, following discussion with GJ. All other animal bones relevant to this volume were recorded by the author, who analysed all of the bones and wrote the reports. Fish bones have been studied by Andrew Jones. Richard Sabin at the Natural History Museum kindly reported upon the bear bone.

Identification

The bones were studied using the author's reference collection, plus the mammal and bird collections at the Environmental Archaeology Unit, York and the collection of deer bones of P Sadler. All parts of the skeleton were identified where possible, including long bone shafts, skull, all teeth and fairly complete vertebrae. Vertebral fragments, ribs and unidentified fragments were classed as large/medium/small/bird and as vertebra/rib/other. Sheep/goat distinctions were made using reference material and published work by Boessneck *et al*. (1964), Lawrence (1980) and, for young mandibles, Payne (1985). The method is similar to that used in earlier work by Wilson, Levitan and Jones in Oxfordshire and Buckinghamshire.

Recording

Records were made onto computer using a Microsoft Access application, 'AnBone', developed by Anthony Beck at the OAU, following discussion with GJ and Sarah Crump, using aspects of Levitan's 'Bonerec', Dobney and Jaques's Paradox input system and Halstead's SPSS database. (The first two of these were developed for English Heritage.) The application permits validation and sensible ordering of the species, element and other fields, avoids excessive abbreviations, is soundly designed, and allows easy integration of bone results with the rest of the archaeology of the site. GSys records were made of the find spot for the prehistoric bones. For each bone the following information was recorded where appropriate: small find number, box number, whether sieved or hand-collected, species or species group, element, number of bones, number of pieces (eg one bone broken into 29 pieces, see below), side, which part or 'zone' was more than or less than half present, fusion (ie bone maturity), preservation (eg burning), butchery, measurements, tooth development, who made the record, comments, and whether or not there was pathology or other developmental anomalies. The zone method follows Dobney and Reilly (1988). Measurements follow in general the York EAU protocol and von den Driesch's (1976) manual and, for antler, de Nahlik (1959). Lower teeth were recorded following Payne (1973 and 1987) for sheep and Grant (1982) for cattle and pigs. For the very fragmented Neolithic material, each bone was bagged separately during excavation and processing, and the number of pieces was written on the bag. This number was recorded without re-counting. Skull and horncores were described following Grigson (1976), Armitage (1982) and Armitage and Clutton-Brock (1976). At an early stage of bone recording, records were made onto Dobney and Jaques's Paradox input system, and these were later transferred onto AnBone.

The recording method for the bone studied by Sarah Crump was similar except that upper teeth were not recorded. These were subsequently added by GJ. This was relevant especially for Area 15, where 30% of the identified bones were teeth and there were three times more upper teeth than lower. The unidentified bone was not counted. In the SPSS analysis program, summaries were made using a different counting method, where counts were based on 'ends' of bones (ie a complete bone would count as two), and these counts were used in SC's dissertation. The primary record, however, treated each bone as one record. This primary SPSS data, which used numbers only, was converted into Access, and the records appended to the main animal bone database.

Overview of the animal bone from the Eton Rowing Course

Animal bones of Mesolithic to early Bronze Age date were found in many areas of the Rowing Course, with a total of 2943 bones, 1003 of which were identified. The most important were the

Table App 3.1 Number of animal bones from each area of the site of Mesolithic to early Bronze Age date

Area	*Main type of context*	*Phases with >50 identified bones*	*Identified*	*Total*	*Preservation*	*Chapter*
Areas 6 and 10	working hollows	ENeo, Neo	550	1648	poor	5, 7
Areas Ex1-3 and Area 11	terrace, floodplain and channel	ENeo, LNeo/EBA	223	494	variable	4, 6, 9
Area 16	floodplain	LNeo	117	502	poor	6, 8, 9
Watching Briefs	floodplain and channel	LNeo/EBA	56	65	good	7, 8
Areas 3 and 5	palaeochannel		42	110	good	4, 6
NW Groups*	floodplain		15	124	poor	4, 8
Total			1003	2943		3, 10

* Includes one bone from Area 4 and one from an evaluation trench.

groups from the early Neolithic hollows and other features in Areas 6 and 10, the sections across the floodplain and the former Thames channel in Areas Ex1-3, and the area of the floodplain in Area 16. These areas, with further bones from other parts of the site (Table App 3.1), provided good samples of early Neolithic date from domestic rather than ceremonial deposits, with smaller samples of Mesolithic, early to middle Neolithic, middle Neolithic, late Neolithic and early Bronze Age date.

The quality of preservation of the bones was variable, with those from the floodplain being generally poorly preserved, often breaking into many pieces. They were, however, carefully collected, each having been given a small find number. Those from the former Thames channels were often exceptionally well preserved, although in many cases the dating of the deposits was more difficult.

The wild and domestic species at Eton

Evidence of Mesolithic activity from the animal bones found was slight (Table App 3.2). Of the few finds, most were from red deer antler, one of which was an antler mattock (see Fig. 4.9). The only post-cranial bones were a red deer metatarsal and two cattle bones from Area Ex3, and a beaver incisor from an evaluation trench. Two further cattle bones and one pig were from Mesolithic or Neolithic layers. It is presumed that all the cattle and the pig were wild, although one of the Mesolithic cattle bones was quite small (see Areas Ex1-3).

Evidence of more substantial activity coincides with the appearance of domestic animals, in the form of cattle, sheep, goat, pig (almost certainly domestic) and dog. The possible presence of horse is discussed below.

The identification of wild cattle – the aurochs – and domestic cattle is discussed in the Area 6 early

Table App 3.2 Summary of the animal bone from Pleistocene to early Bronze Age phases

	Cattle	*Sheep/goat*	*Pig*	*Deer*	*Other*	*Identified*	*Total*	*Areas*
Pleistocene							1	(Ex1-3)
Mesolithic	2			12	beaver 1	15	36	Ex1-3, (Eval.)
Mesolithic/Neo	2		1			3	12	(Ex1-3, NW, A3A5)
A6 early Neolithic	258	71	34	16	badger 1	380	1207	A6
Other early Neolithic	105	13	14	12	horse 2, dog 4, beaver 10, fox 1, sm mamm. 3	164	268	Ex1-3, A10, A3A5, (A16)
E to M Neolithic	30	6	8	26	brown bear 1	71	278	Ex1-3, A6, (NW)
M Neolithic	13	1	2			16	20	A10, (A6, A16)
Neolithic + Pr Neo	47	11	11	14	horse 1, beaver 2, fox 1, badger 3	90	267	A6, (A3A5, Ex1-3, A10, NW)
Total Neo excl LNeo	453	102	69	68	29	721	2040	
Late Neolithic	3	1	59	10	small mamm. 10	83	378	A16, NW, A6, WB
LN/EBA	37	2	64	19		122	249	Ex1-3, WB, (NW, A3A5)
Early Bronze Age	28	6	6	16	horse 2, bird 1	59	227	A16, Ex1-3, (A4, A6)
Total, all phases	525	111	199	125	43	1003	2943	

Areas where there were less than 10 identified bones are shown in parentheses; sm. mamm. – small mammal. In addition (not included in totals) were 1 shark tooth (Pleistocene, Ex1-3); 4 bones from pike (2 E Neo., Ex; 1 M Neo, A6, 1 pr Neo, A6); 2 toad and 1 frog/toad (l Neo pit 16023, A16).

Table App 3.3 Identifications of wild, 'wild or domestic' and domestic cattle

	Cattle	*N meas.*	*Wild*	*Wild/dom*	*Dom.*	*'Large'*
Mesolithic/Neo.	2	2	1		1	
A6 early Neolithic	258	35	4	5	26	8
Other early Neolithic	105	13		1	12	1
E to M Neolithic	30	4		2	2	2
M Neolithic	13	2		1	1	
Neolithic + Pr. Neo	47	4	1	1	2	6
Total Neo, excl. LNeo	453	58	5	10	43	17
Late Neolithic	3	0				
L Neo/EBA	37	0				3
Early Bronze Age	28	3	1		2	2
Total, all phases	525	63	7	10	46 1	22

The categories wild, wild/domestic and domestic are based on the measurement study, see Table 5.29. 'Large' bones were not measurable, but were unusually large. 1 – Of these 46, 14 were larger than any in ABMAP 2001 but well below the wild Ullerslev 'standard' cow.

Neolithic section (see Chapter 5), and is summarised in Table App 3.3. Of 63 cattle bones with measurements, only seven bones were interpreted as being from aurochs, with ten either wild or domestic. A further 22 bones were not measurable but were noticeably large, and some of these are certainly from aurochs. The latest evidence for aurochs comes from the Bronze Age, with one wild and two 'large' from the early Bronze Age, and one exceptionally large bone from the late Bronze Age. A few very large bones were also found in palaeochannel contexts, in broadly Iron Age layers but which include disturbed earlier deposits. The aurochs appears to have become extinct in Britain during the Bronze Age, with the latest radiocarbon dates falling in the period 1900 to 1390 cal BC (Legge 2010).

Most cattle, from the early Neolithic onwards, were domestic. In comparison with Iron Age cattle, the earliest period for which there is a large comparative dataset (ABMAP 2001), the Neolithic cattle were somewhat larger. Most were within the size ranges of Iron Age cattle but above the Iron Age average. A third were above the Iron Age ranges while still being well below the size of the Ullerslev 'standard' cow (see Table 5.29).

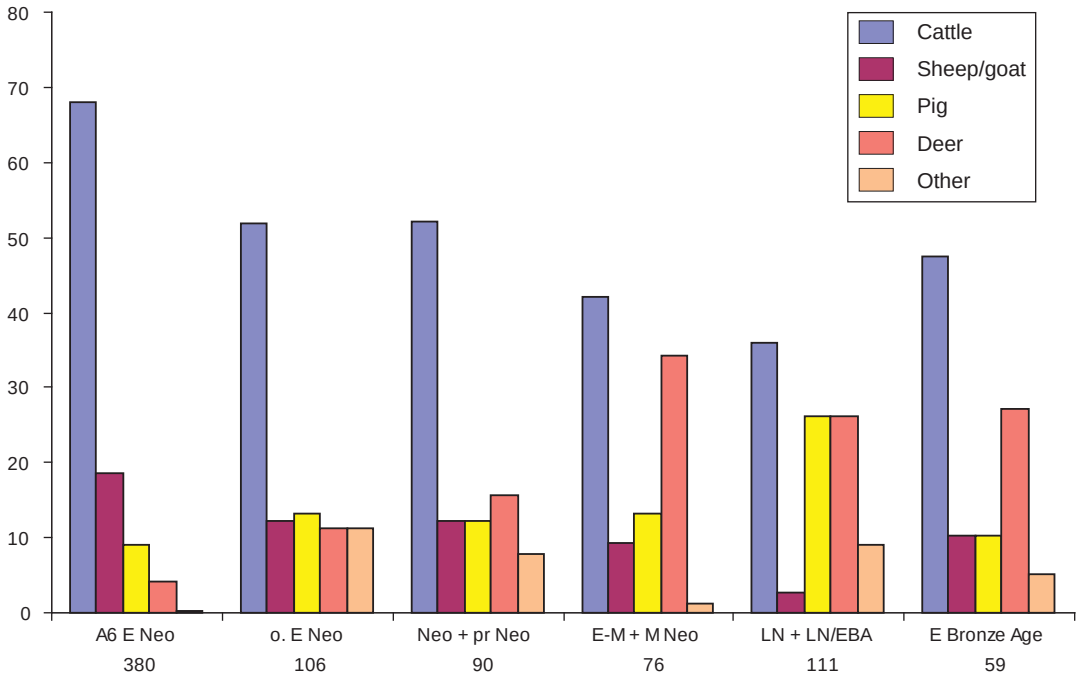

Fig. App 3.1 The proportions of species in the Neolithic to early Bronze Age phases (E – early; o – other; M – middle; pr – probably; L – late)

Table App 3.4 The proportions of species in the Neolithic to early Bronze Age

	Cattle	*Sheep/goat*	*Pig*	*Deer*	*Other*	*N excl. skel.*
A6 early Neolithic	67.9	18.7	8.9	4.2	0.3	380
Other early Neolithic	51.9	12.3	13.2	11.3	11.3	106
Neolithic and pr. Neolithic	52.2	12.2	12.2	15.6	7.8	90
E-m and middle Neolithic	42.1	9.2	13.2	34.2	1.3	76
Late Neo and LN/EBA	36.0	2.7	26.1	26.1	9.0	111
Early Bronze Age	47.5	10.2	10.2	27.1	5.1	59
						821
Neolithic excl. LNeo.	60.1	15.6	10.6	10.4*	3.2	652

Totals count each partial skeleton as one bone (3 cattle, 3 pig and 1 beaver). * 24% of these were antler not bone.

In all phases, cattle predominated (Fig. App 3.1; Table App 3.4), with sheep/goat and pig present in all phases. Numbers of the smaller animals are probably affected by the poor conditions of preservation of the floodplain deposits. In the Area 6 early Neolithic sample, for example, the proportion of bones of sheep/goat and pig was much higher for bones from the main body than from bones from the head or feet. Even in the late Neolithic, once bones from partial skeletons of pig are counted as single bones, cattle were more frequent than pig. However, the late Neolithic is the phase with the highest proportion of pig bones, at 26%. In the early Bronze Age, the proportion of pig bones declined and those of sheep/goat increased.

The proportion of wild species was quite variable, with the lowest percentages in the early Neolithic in Area 6. In the other early Neolithic areas of the site, a quarter of bones found were from wild species: red deer and roe deer (mainly bones not antler; Table App 3.5), beaver, fox, water vole and mole. The highest proportion of deer were from the early to middle Neolithic groups, where there were more bones from deer than sheep/goat and pig combined. The other wild species from this phase was a fragmentary scapula from a brown bear, a rare find. Layers which could be dated to the Neolithic or probable-Neolithic also indicate the importance of red deer. Overall, for the Neolithic layers (excluding the late Neolithic), 10.4% were from deer, which is below the average for European sites of the 4th millennium BC of 14.4% (11.9% red deer and 2.5% roe; Boyle 2006). At Eton, deer continued to be of importance in the late Neolithic and early Bronze Age, though by this time, half of finds from deer were antler not bone.

Table App 3.5 Summary of the red deer and roe deer, showing the number of antlers

	Red deer		*Roe deer*	
	No.	*Antler*	*No.*	*Antler*
Mesolithic/Neolithic	12	11		
A6 early Neolithic	15	4	1	
Other early Neolithic	9	3	3	1
E-M and middle Neolithic	25	2	1	
Neolithic and pr. Neolithic	13	6	1	
Late Neo and LN/EBA	29	14		
Early Bronze Age	16	6		
All phases	119	46	6	1

Red deer counts include 8 antler pieces and 2 bones identified as 'cf. red deer'

There were many groupings of bone from the different areas, and since sample sizes were mostly small the differences found were difficult to evaluate. One example is the early to middle Neolithic group in Area 6 (8022, 8020, 8040 and tree-throw hole11041), where there were bones from red deer (17, all bone not antler), two from large cattle (wild/domestic), and two from very large pig, in 33 identified bones. This seems to represent a very different relative importance of domestic to wild animals than the group from the early Neolithic hollows. There was an unusual group from the channel in Area Ex1 (early Neolithic, 692, see Chapter 6), where nine species were present in a sample of just 29 identified bones. Remains from cattle, pig, red deer, roe deer, sheep/goat, and pike were probably food remains; also present were a beaver partial skeleton, fox and a human bone. It may reflect a particular availability of meat to those present at the site, or, given the human bone, may indicate that the bones deposited here were specifically selected, rather than the chance product of activities nearby. Another unusual group was an early Neolithic layer with well-preserved bones from the channel in Area 5, which included 14 cattle bones, four of which were left scapulae, one complete and the others more than half complete. These may have been stored for later use as bone tools.

In addition to deer, the wild mammals consisted of brown bear (see Area Ex2), badger, fox, beaver, mole, water vole, and field vole. Badger (one bone from Area 6, early Neolithic, and three, probably one individual, from Area 6, 11200) may be later

intrusions, given the badger's burrowing habits. The two fox bones (and one of the dog bones) were studied, and the identifications checked, by K Clark. One, from Area 16, bore a cut mark, suggesting skinning or dismemberment.

Beaver bones were found in seven contexts at the site, ranging in date from the Mesolithic to the early Iron Age. Two were from the early Neolithic, one of them a partial skeleton from the palaeochannel (see chapter 6 and the discussion of beaver in Chapter 3). The latest were from an early Iron Age context in Area 1.

The small mammals consisted of mole and water vole (from the Area 10 early Neolithic hollow) and field vole (from the Area 16 late Neolithic pit with the piglets, the whole of which was sieved). All small mammals are probably natural occurrences.

Bones from bird were absent from these Mesolithic to early Bronze Age layers, the only bird identification being from fowl (Area 16, early Bronze Age) which is presumed to be intrusive. Such a complete absence, in a thousand identified bones, suggests that little use was made of wildfowl, perhaps indicating a lack of skill or of tradition, although it may be borne in mind that the preservation on the floodplain was poor and that bird bones may easily be washed away in channel deposits. Bird bones were present in only one of thirty early Neolithic sites quoted by Pollard (2006).

Remains from fish were also very few. Two bones from pike (Esox lucius) came from early Neolithic layers in the channel (Areas Ex1-3), and single bones of pike were found in the middle Neolithic grave 5588 and probable Neolithic layer 12200 (both Area 6).

Cattle

The size of the cattle has been referred to, and is presented in much more detail in the Area 6 early Neolithic section in Chapter 5. Evidence for age at death was fairly limited, but suggests a generalised pattern with some juvenile deaths. It is not, however, sufficient to indicate that all bull calves were slaughtered in their first year. A greater number were slaughtered in their second or third year, and a few reached adulthood (see Chapter 5 and the web archive). The organic residue analysis presents the evidence for dairying.

Three partial skeletons from cattle were found in Neolithic contexts. The most complete was from the palaeochannel in Area Ex3 (10190) and was early Neolithic (radiocarbon dated). It was female, aged about 30-36 months at death, and with a partially healed rib fracture. There were no butchery marks. It was certainly domestic, not wild, being 80% of the size of the Ullerslev 'standard' cow. The other two bone groups were from Area 10, one from the early Neolithic layer 6882 (a few vertebrae and two long bones). The other (6915) was from the middle Neolithic (radiocarbon dated) and included the lower spine and ribcage, laid on its right side, with several long bones which probably belong, and indicate an animal of about two years at death, and large, either a domestic bull or a wild cow (see Area 10, Chapter 5). Cattle burials become a feature in the middle Neolithic, and not usually before this, so the early Neolithic case is noteworthy (Noe-Nygaard et al. 2005).

Further cattle and sheep burials were found in Bronze Age contexts at the Eton Rowing Course, and are described in Volume 2.

Sheep/goat

Both sheep and goat appear to have been present from the early Neolithic. One skull bone was identified as sheep and three teeth were probably sheep (early Neolithic Areas 6 and 10). One pelvis was identified as goat (Area 5, 3839, early Neolithic, a very well-preserved specimen), the only identification of goat from Neolithic layers. One late Neolithic third phalanx was probably sheep, and there was one goat horncore from the early Bronze Age (Area 16 ring ditch).

In the early Neolithic groups, sheep/goat were present in all areas, and in Area 6 they were more common than pig or deer. Thereafter, although present in most bone groups, percentages were lower. During the early to middle Neolithic, they were less common than pig or deer. In the late Neolithic and late Neolithic/early Bronze Age samples, only three bones were found amongst 205 identified bones (or 111, counting skeletons as single bones). However, in the early Bronze Age (a small sample), sheep/goat formed 10% of the identified bones (15% of the cattle, sheep/goat and pig bones). Since numbers of sheep/goat were small, age and size data are presented in the area reports and the web archive.

Pig

In the early Neolithic of Area 6, pig formed only 8.9% of identified bones. It was present in the earliest layer (Area 6, 11202), but absent in six of the sixteen Area 6 features. Bones from the main body were found to be more common than bones from the head, which is an unusual finding for animal bone samples, but one which was also found in the much better preserved sample from Area 3 and 5 (only seven bones, but all from the main body), and has been observed at late Neolithic Durrington Walls (Albarella and Serjeantson 2002). The proportion of pig bones increased to about 13% in the other Neolithic groups, with no large groups of pig from the middle Neolithic, as was found at nearby Runnymede (Serjeantson 2006).

In the late Neolithic, partial skeletons of pigs were found in two areas. In Pit 16023 in Area 16, bones from two very immature, probably newborn, piglets were recovered, with a few other bones of pig, red deer and one cattle bone. Given the usual time of farrowing, it is likely that the pit was filled in March or April. The other partial skeleton was from a layer in the Watching Brief of the palaeochannel. Although

Table App 3.6: Comparative measurements for red deer antlers

	Circumference of burr Mean, range and sample size	*Length*	*Length to trey*	*Length of brow tine*	*Circumference of beam*
Eton Neo to EBA	207, 249	790, 925	195, 255, 258	292, 358	lwr 137.3; 136-141; N4
Eton all phases	201.4; 146-249; N14	617; 420-925; N7	242.8; 180-297; N15	243.6; 122-358; N8	lwr 123.8; 91-151; N19
Grimes Graves LNeo	212.97; 133-280; N274		243; 160-410; N234	163; 0-300; N272	upr 146; 90-200; N228
Durrington Walls LNeo	198.5; 103-260; N311		222; 85-330; N207	123; 0-270; N276	upr 143; 100-200; N203
Scottish, mature deer		average 826, record 1156			lwr 'fair thickness' 102-127

For Grimes Graves and Durrington Walls, see Clutton-Brock 1984, for Scottish deer, see de Nahlik 1959. Circumference of the burr takes de Nahlik measurement 4 (=von den Driesch measurement 39) as equivalent to Clutton-Brock measurement 1; lwr – lower beam, upr – upper. Length to trey taken to centre of base of trey at Eton, and to the angle between trey and upper beam at GG and DW.

sub-adult, many bone elements were fused and could be measured. Results indicate that the pig could be wild (see Chapter 8), but it is more likely to be domestic. It is larger than the average, but within the range, in comparison with late Neolithic pigs from Durrington Walls (Albarella and Payne 2005).

Dog

Remains from dog were rare. All were from early Neolithic layers in the palaeochannel, three (probably one individual) being a large dog from Area 5, and a single bone from Ex1. Other evidence for dogs were slight. Just three bones showed signs of having been gnawed by dogs, one from the early Neolithic and two from the early Bronze Age. However, the poor preservation of most bones means that gnawing marks will not have survived.

Horse

There were three identifications of horse from early phases: two from layers considered to be early Neolithic (Area 10, 6331, a complete metacarpal, and 6654, an upper cheek tooth); and one from a probable early Neolithic layer (Area 6, 11058, a fragmentary cheek tooth). Two fragments from horse were found in the fill of a tree-throw hole apparently cut by early Bronze Age ring ditch 9233 (Area 16, 10412, part of a pelvis and a proximal femoral epiphysis).

At present, no finds of Neolithic horse in the UK have been confirmed, so without individual radiocarbon dating, the status of these three bones is uncertain. The wild horse appears to have died out in the early Mesolithic in the UK, and was not re-introduced until the late Neolithic/early Bronze Age, the earliest radiocarbon dated bone being from Grimes Graves (Bendrey 2010; Clutton-Brock and Burleigh 1991). The horse bones from tree throw-hole 10410 may genuinely be of early Bronze Age date, but neither was radiocarbon-dated. The only certainty in the dating of the ring ditch is that it predates a human burial dated 1210-840 cal BC, so the bones may instead date to the middle Bronze Age or even to the start of the late Bronze Age.

Deer

Red deer antlers were found in various areas of the site (Table App 3.5), the earliest being the Mesolithic mattock from Area Ex3. Two other antlers, from early Neolithic layer 11200 in Area 6, were worked, but most antlers were not. Eight from Mesolithic to early Bronze Age deposits were complete enough to measure, with a further 18 from Bronze Age to Iron Age layers, some of which

Table App 3.7 Measurements of antler from all areas, of Mesolithic to early Bronze Age date

Area	*Context*	*Phase*	*Side*	*If shed*	*(7) No of tines*	*(1) Length*	*(2) Brow L*	*Bey L*	*(3) Trey L*	*(4) circ burr*	*(5) lwr beam circ*
EX3	10160 SF62039	Meso	R								136
Area 5	3842 SF46599	Neo	L	shed			292		299		136
Area 3	3362	ENeo	R	shed	7	790		290		207	136
Area 3	3362	ENeo	R						470		
WB 96	7005 SF45000	MNeo 1	L	shed	9	925	358	353	328	249	141
WB 97	12129	LNeo	L								
Area 11	10530 SF90817	EBA	?	shed							
Area 11	10530 SF90740	EBA	?	not shed							

Measurements follow de Nahlik 1959 and von den Driesch 1976; b. d. – basal diameter; circ – circumference. 1 – radiocarbon dated.

may be from disturbed earlier layers in the palaeochannel. The measurements for the site as a whole are therefore shown together here (Tables App 3.6-7). The largest and most complete was from a stag of 18 points, with a total length of 925mm and a circumference (of the lower burr) of 141mm, from the Watching Brief, which was middle Neolithic (radiocarbon dated).

Several measurements from the large study of late Neolithic antlers from the Grimes Graves (GG) flint mines and the Durrington Walls (DW) henge are shown on Table App 3.6. For burr circumference and length to the trey tine, measurements are comparable. For the brow tine length, only the maximum value is relevant, as the GG and DW were mainly worked antlers. The size of red deer in the UK reduced during the Holocene (Lister 1996), so it is not unexpected that in comparison with modern Scottish red deer, the Eton antlers are larger (see the circumference of the lower beam, which is higher in the Eton antlers – which include animals which are immature- than in the mature, Scottish red deer).

Table App 3.8 Numbers of shed red deer antlers, and left and right sides

	Shed; not shed	*Left or right side*
Eton Neo to EBA	4; 1 3; 3	
Eton all phases	24; 4 17; 12	
Grimes Graves LNeo	223; 51	151; 132
Durrington Walls LNeo	272; 39	169; 161

For Grimes Graves and Durrington Walls, see Clutton-Brock 1984

The number of measurable post-cranial bones of red deer were fewer, and are presented in the web archive. Typically, measurements were at the lower end of ranges in comparison with Star Carr Mesolithic red deer, and at the upper end of the ranges from modern red deer from Rhum (Legge and Rowly-Conwy 1988).

As at Grimes Graves and Durrington Walls, most antlers were shed, not from hunted individuals (Table App 3.8).

(6) upr beam circ	*Max. b. d. of burr*	*Min. b.d. of burr*	*(41) circ. above burr*	*L to trey*	*L to crown*	*L of crown*
			201	258		
124	70.2	62	185	195	445	350
149						
133	85	72	210	255	495	430
131						
			60			
			125			