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Skeleton of an Early-Middle Bronze Age dog with *spondylosis deformans* from the Babraham Road Park and Ride site, Cambridge, U.K.

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ABSTRACT: During the excavation of a prehistoric ritual site near Cambridge (Cambridgeshire, U.K.) the skeleton of a fairly large dog dating from the Early-Middle Bronze Age was found in a ditch terminal. This animal is amongst the largest recovered thus far from the period in Britain and displays spinal pathology.

KEYWORDS: DOG, EARLY-MIDDLE BRONZE AGE, CAMBRIDGE, PATHOLOGY

RESUMEN: Durante la excavación de un contexto ritual prehistórico próximo a Cambridge (Cambridgeshire, Reino Unido) se recuperó en una zanja el esqueleto de un perro de relativamente elevado tamaño procedente del Bronce Inicial-Medio. Este hallazgo representa a uno de los mayores perros recuperados hasta la fecha en el Reino Unido y presenta una patología espinal.

PALABRAS CLAVE: PERRO, BRONCE INICIAL-MEDIO, CAMBRIDGE, PATOLOGÍA

INTRODUCTION

Excavations conducted by Cambridgeshire County Council Archaeological Field Unit in 1998 at the Babraham Road Park and Ride site, Cambridge (Figure 1) uncovered a series of features constituting a unique prehistoric ritual landscape dating from the Late Neolithic period into the Iron Age. The site is located on a flat chalky plain surrounded to the south, north and east by a crescent of the Gog Magog hills and in the vicinity of the previously identified causewayed enclosure at Littletrees Hill (Neolithic/Bronze Age), Wandlebury Camp (Iron Age and earlier), the War Ditches (Iron Age and earlier) and the settlements at Rectory Farm (Late Bronze Age and Iron Age) and New Addenbrooke's Hospital (Iron Age) (Figures 2 and 3).

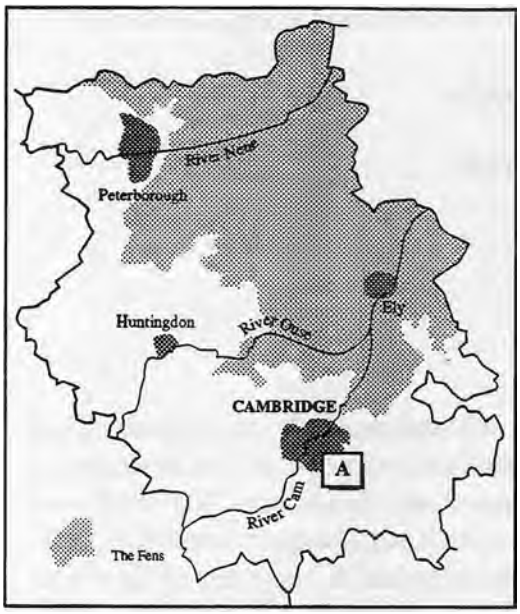

FIGURE 1
Site Location.

The Late Neolithic/Early Bronze Age features primarily consist of pits and deep ritual shafts with radiocarbon dates ranging from cal [2 N] 2619-1690 BC. The fauna from these earliest features is dominated by pig but also includes cattle, sheep/goat, aurochs, beaver and pine marten. Human inhumation burials dated to cal [2 N] 2205-1895 BC with an associated spread of animal bones, mostly domestic cattle but including aurochs, and pig, were excavated in the southernmost part of the site. Two large steeply sided ditches, M100 and M300, have fills dated to between cal [2 N] 1755-1127 BC. The faunal remains from these ditches primarily consist of domestic cattle but sheep, pig and horse are also present (Baxter, 1999; Hinman, 1999).

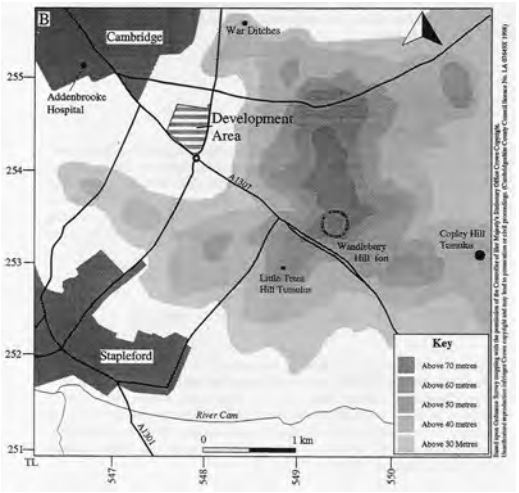

FIGURE 2
Site Location in relation to local topography and previously known prehistoric archaeological sites.

THE DOG SKELETON

The substantially complete and partially articulated skeleton of a large dog was found in the terminal of ditch M300 (Figure 4). Faunal associations from this feature predominantly comprise domestic cattle together with relatively infrequent sheep and pig. The dog was a powerful animal similar in size to a modern Retriever with one of the largest skulls yet recovered in Britain from a Bronze Age context (Figure 6). The shoulder height was approximately 54 cm based on the mean of five measurements (Table 1). Mid-shaft diameter indices of its long bones range between 8.3-9.6 suggesting that it was more robust and powerful than any of the animals included in Harcourt's seminal survey of early British dogs (Harcourt, 1974). The considerable sagittal crest, together with the form of the nuchal crest and basioccipital suggests that this dog was male (The

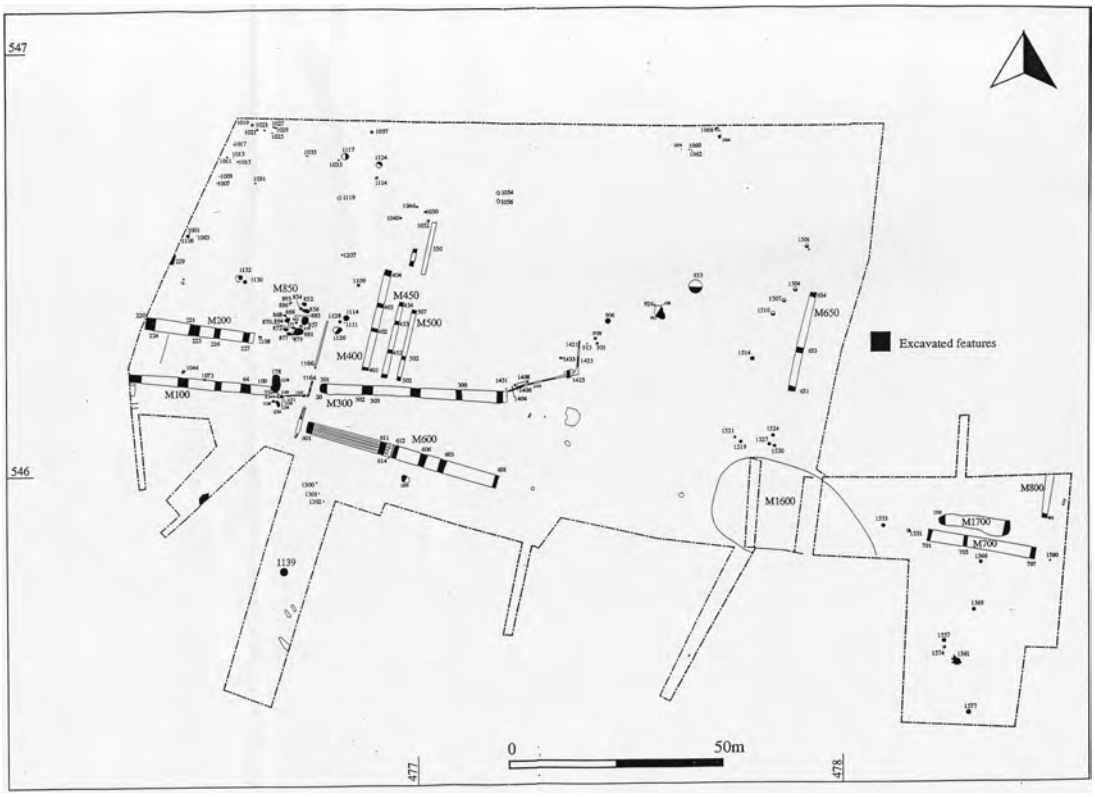

FIGURE 3
Plan of the site. The dog skeleton was found in the terminus of ditch M300.

& Trouth, 1976). The teeth are worn indicating a mature, but not aged, adult that was a habitual bone cruncher. Five of the thirteen thoracic vertebrae are affected by an arthritic condition, *spondylosis deformans* (TV2-6 at stage 3 *sensu* Harris), which would have caused rigidity in the shoulder region caused by osteophytes overlapping the adjacent vertebrae (Morgan *et al*., 1967; Harris, 1977) (Figure 5). The dog skeleton was recovered from the same level as bone radiocarbon dated to cal [2 N, 95% probability] 1755-1415 BC (Beta-119801).

No marks indicative of cause of death or cut marks suggestive of dismemberment were noted, but from *in situ* photographs and drawings the dog was clearly only partly articulated at the time of burial. Possibly the carcass was disturbed by scavengers sometime between deposition and burial or after burial. Although the precise relationship between dogs and humans at this period has been considered by some authors to be obscure (Harcourt, 1974), animals such as these would have been useful as watch dogs, hunting dogs and herding dogs (Burgess, 1980: 262; Pryor, 1998: 96-100).

FIGURE 4
The dog skeleton lying amidst cattle bones in the ditch terminal.

Cranium and mandible (Harcourt, 1974)

I	Occipital protuberance to anterior margin of the incisor alveoli	202.7
II	Occipital protuberance to junction of nasal and frontal bones	112.1
III	Posterior junction of the nasal bones to anterior margin of the incisor alveoli	97.7
IV	Bizygomatic breadthe	110.0
IX	Palatal length	96.1
X	Palatal breadth	68.4
XI	Maxillary cheek tooth row length	69.0
XII	Width of snout between the outer margins of the canine alveolie	44.4
XV	Mandibular cheek tooth row length	97.7

Cranial Indices

Cephalic Index (IV.100/I)	54.3
Snout Index (III.100/I)	48.2
Snout Width Index (XII.100/III)	45.4
Palatal Index (X.100/IX)	71.2

Cranium (Driesch, 1976)

1)	202.7	18)	20.9	34)	71.3
2)	188.5	18a)	12.1	35)	40.4
3)	177.3	19)	21.5	36)	e44.4
4)	-	20)	13.2	37)	-
5)	-	20a)	15.9	38)	59.8
6)	105.9	21)	7.0	39)	59.0
7)	101.0	21a)	10.2	40)	44.6
8)	97.7	22)	26.8		
9)	113.1	23)	68.4		
10)	69.4	24)	-		
11)	-	25)	38.1		
12)	80.0	26)	-		
13)	96.1	27)	18.7		
13a)	93.1	28)	14.7		
14)	-	29)	62.5		
14a)	-	30)	e110.0		
15)	69.0	31)	42.4		
16)	19.1	32)	e57.0		
17)	52.8	33)	e37.8		

Mandible (Driesch, 1976)

1)	e148.5	9)	70.0	15a)	-
2)	-	10)	38.3	16)	-
3)	e141.3	11)	39.5	16a)	-
4)	128.9	12)	34.3	17)	14.0
5)	122.4	13)	24.0	18)	-
6)	-	13a)	9.5	19)	28.4
7)	82.0	14)	22.6	20)	24.2
8)	75.7	15)	10.4		

TABLE 1

Measurement, in mm, of the dog skeleton.

Postcrania (Driesch, 1976)

Axis

LCDe	LAPa	BFcr	BPacd	BPtr	SBV	BFcd	H
51.7	49.0	32.5	-	43.8	24.2	19.0	40.0

Sacrum (3 segments)

GL	PL	GB	BFcr	HFcr
41.4	38.9	49.6	27.0	11.1

Humerus

GL	Dp	MSD	Bd
166.2	45.8	14.8	36.3

Radius

GL	Bp	MSD	Bd
161.0	19.5	14.7	26.7

Tibia

GL	Bp	MSD	Bd
179.3	37.4	14.8	25.2

Astragalus

GL
27.2

Calcaneum

GL	GB
44.4	19.5

«e» = within 0.5 mm

TABLE 1 (cont.)

CRANIAL MORPHOLOGY

The Babraham road skull has been compared with that of a large canid found at Staines Road Farm, Shepperton, Surrey in a late Neolithic ritual feature. This animal has features in common with both wolves (*Canis lupus*) and domestic dogs (*Canis familiaris*) and it has been suggested that it may be evidence of hybridization between the two species (Clark, 1996, 2006). The measurements the two animals have in common are presented as a chart in Figure 7. They are particularly close in respect to maximum palatal width (measurement 2), width at the canine alveoli (4), and length of the mandibular canine alveolus (6). Staines Road Farm is larger than Babraham Road in the distance from nasion to prosthion or muzzle length (1), length of the maxillary cheektooth row (3), maxillary premolar row length (7) and mandibular premolar row length (8). Babraham Road is larger in terms of mandibular cheektooth row (5). The length of the upper carnassial in wolves exceeds the sum of the lengths of the two molars, while in dogs the summed molar lengths exceed or are equal to the length of the carnassial (Clutton-Brock, 1963). In the Staines Road Farm animal the carnassial length exceeds the molar length by 1.8 mm or 9.6% of the summed molars (Clark, 1996: 214). In the Babraham Road specimen the carnassial is 0.7 mm or 3.4% larger than the summed

FIGURE 5
Selection of affected vertebrae. Scale in cm.

molars. The major differences between the two crania lie in the length of the muzzle and its relative width. The snout width index (Breadth at canine alveoli x 100/Length from nasion to prosthion) of Staines Farm Road is 39.5 while for Babraham Road it is 45.4. The Babraham Road animal thus departs considerably from the condition to be expected in wild canids in this regard.

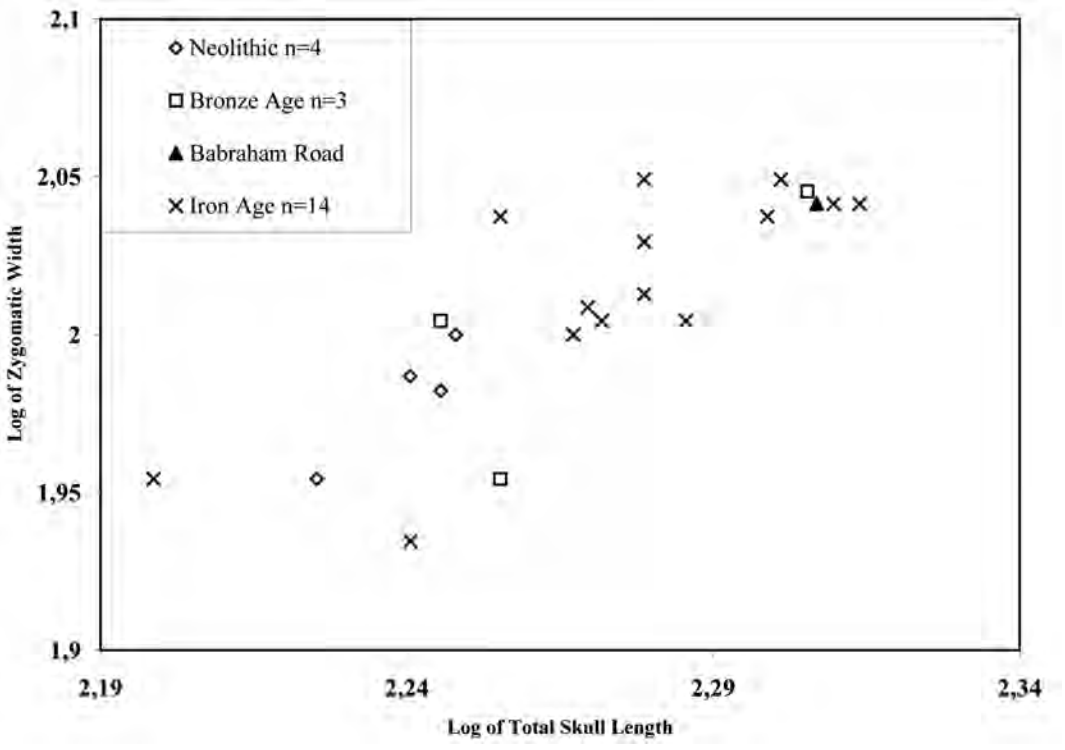

FIGURE 6

Scatter plot of Logarithms (base 10) of Prehistoric Dog Cranial Measurements. Comparative material based on Harcourt (1974).

POSTCRANIAL MORPHOLOGY

All of the postcranial long bones are robust. Midshaft diameter indices (msd.100/tl) are 8.9 for humerus, 9.1 for radius and 8.3 for tibia. With the exception of chondrodystrophic dwarves, which are atypical (Baxter, 2006), these are higher values than any for Romano-British dogs found in Leicester and Thistleton (Rutland). An 18th century Mastiff in Leicester City Museums collections has an msd index of 8.8 for the humerus. The msd index ranges for Neolithic dogs in Harcourt's (1974) study is 6.3-8.5 and for Bronze Age dogs 6.7-8.3. The Babraham Road dog was evidently a heavy and powerful animal at the top of its range.

PATHOLOGY

Spondylosis deformans is a non-inflammatory degenerative disease affecting a wide variety of vertebrates from lizards to primates (Lanting n.d.; Rothschild & Martin, 1992). Although the precise aetiology of the disease is uncertain, it is believed that there is a hereditary disposition and a high-calcium diet may be contributory factors. Males are more susceptible than females and become more liable to develop the condition with increasing age. In canids the condition is generally a relatively benign disorder and the osteophytes only rarely grow upward or in such a way as to pinch the spinal cord or otherwise cause neurological

signs (Lanting op. cit.). The affected region will be stiff with restricted movement. In the Babraham Road dog, as we have seen, the area is the shoulder affecting the 2nd to 6th thoracic vertebrae, which would have caused rigidity in the shoulder region due to osteophytes overlapping the adjacent vertebrae. There is a thickness of up to 0.5 cm bone growth fusing the vertebrae along their ventral border. The articular surfaces of the centra display no degenerative changes associated with conditions such as osteoarthritis however (Figure 5).

CONCLUSION

The Babraham Road dog was a large and robust animal standing approximately 54 cm high at the shoulder. While the cranium displays shortening of the muzzle typical of domestic dogs, the upper carnassial is large relative to the corresponding molars, a trait typical of wolves. The animal suffered from rigidity in the shoulder region caused by osteophytes overlapping the adjacent thoracic vertebrae and is an early example of the condition known as *spondylosis deformans* in a domestic dog.

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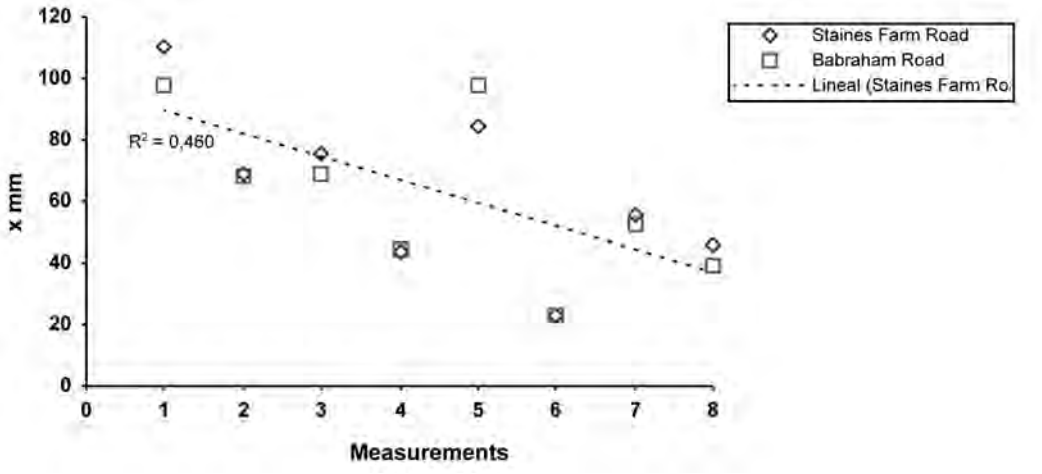

FIGURE 7

The Babraham Road skull compared with that from Staines Road Farm (based on Clark, 1996). 1: nasion-prosthion; 2: maximum palatal width; 3: maxillary cheektooth row; 4: width at canine alveoli; 5: mandibular cheektooth row; 6: length mandibular carnassial alveolus; 7: maxillary premolar row length; 8: mandibular premolar row length. For the purposes of this chart the left and right values for Staines Road Farm measurement 7 are presented as a mean.

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