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An Early 20th c. Horse Skeleton from Whitby, North Yorkshire

Melanie Daulby[1] and Polydora Baker[2]

Summary

This report describes the skeleton of a large horse excavated in the area of the formal gardens of the Banqueting House, located to the north of the complex of houses known as Abbey House. These buildings lay to the south of Whitby Abbey. The horse was found within a pit containing pottery of late 19th-early 20th c. date. The horse appears to have been disarticulated to allow the whole of the animal to fit into the pit. The skeleton is relatively complete and well preserved. The animal stood c. 1.7m at the withers and was at least 12 years of age at death. Extensive exostoses and marginal lipping was observed and there is possible evidence for *spondylosis deformans*.

Keywords

Horse
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Pathology
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Introduction

The skeleton of a large horse (context 21496) was discovered during the 2001 excavations at Whitby, which were part of the Whitby Heritage Lottery Fund project (Whitby Abbey HLF 490) (Figure 1). The horse was buried in a large sub-rectangular pit (c. 180cm x 96 cm) in the southwest section of the cobbled courtyard by the banqueting house (Plate 1). The burial of the horse occurred after the laying of the cobblestones in the 1670's, as shown by the cut of the pit through this surface. The "hard" garden was in use until the late 18th c., when it was covered with soil to form a lawn. Unfortunately, the relationship of the pit to the soil overlying the cobble surface is uncertain, because the layer was removed before the disturbance was recognised (P. Busby, pers. comm. 2002). The pottery found in the pit, however, ranges in date from the 14th to the 20th century, so the horse must date to at least the early 20th c. (Sarah Jennings pers. comm. 2002). The presence of insect puparia in the nasal cavity and hair behind the horse's neck found during excavation also suggests that the burial occurred in relatively recent times. Two horse shoes were recovered from the pit but analysis of these is pending.

The skeleton is generally well preserved and almost complete, although some phalanges are severely eroded and recent breakage occurred to many elements, mainly the cranium and ribs. The postion of the bones and cutmarks on some of these show that the horse was disarticulated to allow the whole animal to fit into the pit (Plate 1).

The area of land in which the burial pit had been discovered was until late Victorian times used as a formal garden and in the 1890's became part of Paylors Farm. The farm remained in use until 1933 when it was sold to the Youth Hostel Association. The horse may have been used as a draught animal on the farm and buried there.

The discovery of the horse skeleton adds to our understanding of the more recent history of the site, including the possible use of draught horses at this time. Results of the analysis contribute to our knowledge of postmedieval equids, including size and pathological changes[1].

Methods

The age of the horse was determined by assessing wear on the incisors, referring to Brown (1913), and bone fusion (Silver 1963). Measurements of the main limb bones where taken as recommended in Davis (1992) and von den Driesch (1976). The withers height of the horse was calculated using the multiplication factors of Kiesewalter (1888) in von den Driesch and Boessneck (1974). The pathological changes were recorded in order to assess the horse's state of health. Evidence of weathering, breakage and cutmarks was recorded also.

[1] The study provided the opportunity for the principle author to learn key aspects of zooarchaeological analysis as part of her BSc work programme.

Results

Preservation and recovery

The horse skeleton is well preserved and almost complete, although some caudal vertebrae and carpals are missing. These were probably lost during excavation, which was undertaken by hand. The skull and ribs were largely fragmented mainly due to breakage during excavation and handling. Field notes show that the head and neck were twisted tightly and that the cranium and mandible were in relatively complete form in the burial. The skull fragments include the two zygomatic processes, left and right occipitals and parts of the frontal and temporal lobes, in addition to many small fragments. The mandible and maxilla are broken also, however there were full lower and upper tooth rows except for the first lower left incisor.

The majority of the limb bones and vertebrae are complete and show little post-depositional damage. Some evidence of weathering and erosion are visible on the ventral surface of the axis and on the right humerus. Breakage of the left humerus prevented the taking of some measurements, as did breakage at the proximal end of the right ulna and of the left scapula. A small area of green staining present on the pelvis and part of the cranium may have occurred in the burial environment as a result of leaching from a copper alloy object. The pelvis was visible above the cobble surface before excavation but appears to have sustained little damage, probably because it was buried within the overlying layer of soil. Many cutmarks are visible on the femora, incurred during disarticulation of the hindlegs (see below).

All the phalanges were present but preservation was noticeably poor in comparison to the other bones. In particular the third phalanges were severely eroded and two were almost completely destroyed (Plate 2). The position of the phalanges in the burial was not recorded, however the general position of the limbs suggests that the phalanges were buried rather than exposed above ground level, and so would not have suffered damage through exposure. Furthermore, had the hooves been exposed above ground level, the phalanges would no doubt have become dispersed. Perhaps a separate bacterial environment formed within the horses hooves causing the marked deterioration of the third phalanges.

Age, sex and size

The absence of the canines suggests that the horse was a female as these teeth are usually rudimentary or absent in females. Sex distinction based on the pelvis was not possible due to breakage.

All of the bones are fused indicating that the horse was over three and a half years old. Furthermore, according to Silver (1963, 285) the base of the spines fuse in old horses and ossify or calcify in old age. In our specimen, the sacral vertebrae S1, S2 and S3 are almost completely fused. In all of the incisors the infundibulum was almost completely worn away, with only very small circles visible in the centre of the occlusal surface. According to Brown (1913) this would suggest that the horse was older than twelve years of age.

Measurements of the bones and teeth of our specimen are presented in Appendices 1a-1b. The data were compared to two skeletons of Shire horses, Blaisdon Conqueror (10 years old) and Prince William (22 years old), housed at the Natural History Museum, London (Appendix 2).

The Whitby horse bones are large and robust, suggesting that the animal was a type of "heavy horse" (draught breed). The length measurements of the long bones give withers heights varying between c. 1.64m-1.78m. (16.5-18 hands) (Table 1). The variation may be due to the use of multiplication factors derived from a different type of horse, one with different limb proportions. In this case, the upper fore and hind limb bones (humerus, femur) and lower hind leg (tibia) give higher withers height values than the radius and metapodia. These results suggest that the horse had short foot (lower leg) bones relative to the upper limbs. This variation is also seen in the data from the comparative Shire specimens (see below and Table 1). The presence of relatively short lower legs (foot bones) compared to the upper limbs may be a characteristic of heavy horse breeds. Analysis of a larger sample of different breeds is required in order to understand this variation in size and shape of bones.

Log-ratio analysis was used to compare the individual measurements of both Shires to the Whitby skeleton (application of this method is described in Davis 1996; Payne and Bull 1988). The log-ratio values for the length measurements suggest that the Whitby horse was very similar in height to Blaisdon Conqueror (0 value) and that Prince William was slightly shorter than both (values to the left of 0) (Fig. 2). Breadth and depth measurements, however, suggest that both Shires were stockier animals, in particular Prince William (values to the right of 0).

Pathology

The general condition of the skeleton does not appear to have been affected greatly by any pathology. However, large amounts of marginal lipping and exostoses are present upon the articular edges of almost all bones, especially on the phalanges and vertebrae (Table 2; Plate 3). The formation of this osseous tissue may be a result of both the age of the horse, its use and/or its possible predisposition (genetic make-up) to this type of change. The cranium of the horse also showed signs of osteophytes on the occipital bone, on the edges of the articular condyles of the mandible and along the lower left diastema.

The muscle attachment areas present on the larger bones such as the left and right scapula and upon both tibiae were well developed, which would possibly be expected of a large and older horse. The age of the horse may possibly explain these pronounced natural features.

Eburnation is present on a few phalanges (Table 2), but few other arthritic signs, such as grooving, were observed. Baker and Bothwell (1980, 114) suggest that repeated trauma could lead to the acceleration of the normal ageing process of bones, possibly causing osteoarthritis, and is characteristic of 19th and 20th century draught horses.

Along the entire length of the vertebral column there is a large amount of exostoses and marginal lipping at the edges of the centra and articular processes

(Table 2). In the thoracic vertebrae T7-T8, osteophytes overlap but do not join the centra (Plate 4). In T16 to T18, the extra bone growth around the articular processes has almost joined the vertebrae, and osteophytes almost bridge the centra. In the lumbar vertebrae there is complete fusion between the lateral processes of L2-4 and L5-6. In L5-6, the dorsal processes are also completely fused and the centra are joined by bone bridging the left and right sides of the ventral edge. The dorsal edge of the centra is completely fused, but the intervertebral space is intact. In L2-4, the ventral edges of the centra are linked by a large amount of bone, but again the articular surfaces themselves are not joined (Plate 5). Ossification is more pronounced on the left side in comparison to the right; these changes have caused slight curvature and misalignment of the vertebrae.

The changes may be indicative of *spondylosis deformans*, a condition that has been diagnosed in a range of domestic and wild animals (Harris 1977; Bartosiewicz and Bartosiewicz 2002) and is "characterised by the formation of bony spurs and bridges across the intervertebral spaces" (Harris 1977: 183). The growth of osteophytes may be a reaction to degeneration of the intervertebral discs (Harris 1977; Rothschild and Martin 1993). The condition is similar to that known as ankylosing spondylitis in humans. Levine et al. (2000, quoting Rooney 1997 and Klide 1989) note that in horses, the growth of osteophytes on the vertebrae is not confined to domestic animals and that it may be linked to a normal ageing process and/or congenital defects. It is possible also that fusion of the vertebrae occurred in reaction to loading of the spine, during riding or traction (Bartosiewicz and Barosiewicz 2002). *Spondylosis deformans* and other forms of intervertebral ankylosis have been observed most frequently in male animals including humans, although the differences are not always significant (Bartosiewicz and Bartosiewicz 2002; Harris 1977). Nonetheless, its presence in a female horse is of interest.

Other pathologies and abnormalities were observed on the teeth. There is evidence of uneven wear on the right upper molars M^1 and M^2 and to a lesser extent on the left M^1 and M^2, with corresponding uneven wear in the lower teeth.

In the right mandible, wear on the second and third molars appears very uneven and is extreme on the third molar. The tooth is worn diagonally to below the cingulum. In addition, the root between the second and third cusps has broken completely (Plate 6). On the buccal surface of the mandible, in the area of M_3, the bone surface appears to have become porous due to an infection, possibly resulting from the breakage or extreme wear of the tooth. The teeth also show evidence of caries in particular in the right fourth premolar.

The lower second premolars were examined for possible evidence of bit wear but this was not apparent. According to Anthony and Brown (1991), evidence of bit wear includes marked bevelling at the front of the lower second premolars; spalling of the enamel; enamel folds and dentine worn to the same height. Serjeantson et al. (1992) suggest that grooving in the middle of the P_2s in a medieval horse jaw result from bitting, but this feature is not evident in the Whitby horse. The absence of the above criteria is not secure proof for a lack of bitting, as such wear may in turn be worn away by natural abrasion.

Evidence of Disarticulation

The position and layout of the bones in the burial clearly indicates that the animal was disarticulated (Plate 2). In addition, cutmarks were observed on a number of bones, reflecting the disarticulation process (Table 3). Evidence for heavy chopping was not observed. Although the hooves were present, it is not clear if the hide was removed.

There are many cut marks present on the proximal shaft of the femur and around the lesser and greater trochanter (Plates 7a-d). Cutting around these areas would have allowed for the severing and detachment of the main muscles and ligaments that hold the pelvis and femur together, allowing disarticulation of the hind legs of the horse. Isolated cut marks present on the fovea of the femur and in the capsule of the hip joint may have occurred accidentally during the cutting of the surrounding ligaments.

Cut marks are present on both left and right carpals on the posterior side and appear to align for example between the left 3rd and 4th carpals (Plate 8). These traces suggest a cutting action that would have severed the ligaments to allow straightening of the horses fore legs and manipulation of the feet in the burial pit, or complete disarticulation of the feet. The cuts may result from skinning of the carcass also. A knife mark positioned relatively central on the anterior surface of the left metacarpal may be an accidental cut.

Other animals

Also found in the pit were 28 fragmented bones of other animals, including cattle, sheep, pig, dog and fallow deer. The finds are listed in Appendix 3. Preservation of the finds varies, with some showing evidence of battering and abrasion; one specimen may be water-rolled. The variable state of preservation of the bones is not surprising as all are probably redeposited. The presence of a deep cut on the shaft of the dog femur may indicate disarticulation. On the lateral side, there are a series of fine parallel cuts or scratches, but the cause (human or natural) is uncertain. Fine parallel scratches or cuts were observed on the fallow deer tibia also. The date and original source of the finds are unknown.

Discussion

The horse skeleton excavated in the courtyard of the Banqueting House is probably that of an old large female. There is extensive evidence of exostoses and marginal lipping on most bones and there is possible evidence of *spondylosis deformans* on the thoracic and lumbar vertebrae. Extreme wear and breakage of the right lower third molar probably caused an infection of the gum, resulting in surface changes on the mandible. Dental wear shows that the animal was over 12 years of age, while the absence of canines suggests that it was a female.

The breed of the horse is not known but the size and proportions of the bones are very similar to those of known Shire horses. The Shire horse due to its height and weight is one of the largest agricultural horses known today; it has enormous strength

and was used widely as a draught animal (Kidd 1987, 134-135). Although it is not possible to identify a specific breed or use for the Whitby horse, the similarity in the size and shape to these heavy horses suggests that it was of a similar type, and may have been used for similar purposes. The question of breed is of interest with regards to the bone changes observed in the vertebrae, which resemble a condition known as *spondylosis deformans*. The cause of this condition is not known but it may be related to age, stress or genetic characteristics, and has been observed in domestic and wild animals. It would be of interest to know if this consition is more or less frequent in different breeds, and so possibly related to genetic characteristics. The changes may simply reflect the draught use and old age to which the animal was kept, and so may be indirectly linked to genetic makeup. Fused lumbar vertebrae are not uncommon in horse skeletons, including those from earlier periods, which were clearly of a different size and type (e.g. Cowie and Pipe 1998).

Of interest is the very low incidence of other arthritic traits. Eburnation was observed on only a few phalanges. This may suggest that the animal was well cared for. although it may simply reflect the adaptation of these animals (build and musculature) to their use for heavy labour or weight-bearing. No evidence of arthritis was observed on the skeleton of the Shire horse, Blaisdon Conqueror (10 years). Changes similar to those of the Whitby horse were observed on the skeleton of the Shire horse Prince William (22 years), including some eburnation on the phalanges, and marginal lipping on the articular surfaces of other bones. The vertebrae of the Shires were not available for study. Unfortunately, the lack of data regarding skeletal development in different horse breeds inhibits interpretation of the incidence of bone changes observed in the Whitby skeleton.

The reason for the burial is unclear. The horse may have been a favoured animal and hence carefully buried. Equally, the weight of the animal would have made removal difficult, so burial in the smallest pit possible may have been the next best option[2].

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[2] The horse skeleton was successfully incorporated into a display as part of the outreach project for National Archaeology Days 2002 (Fig. 3), and will be used for a range of educational purposes in the future.

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