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3 Driffield Terrace, York: Vertebrate remains analysis

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Cover photograph: Urn 150 containing remains of domestic fowl [Context 4161]

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Summary

An archaeological excavation undertaken by York Archaeological Trust at 3 Driffield Terrace, York (centred on NGR SE 593 510), during 2004, produced a small assemblage of vertebrate remains recovered from a number of Roman features, including a massive pit, a ditch and a number of post-holes and other cut features, together with inhumation and cremation graves from one of York's principal Roman cemeteries. Pottery and artefactual evidence suggested the activity dated between the 1st and the 4th centuries AD.

The vertebrate material included several chicken skeletons, recovered from urns or grave fills which were likely to have been food offerings associated with ritual and funerary activities. Horse remains were prevalent and hind limb skeletal elements representing single individuals (one of which was articulated in situ) *were identified. Despite the close association of horse and human remains, a ritual aspect to the deposits cannot be confirmed and the disturbance and redepositing of refuse as graves were dug and backfilled seems a plausible explanation for the presence of the horse bones.*

Keywords: 3 Driffield Terrace; York; technical report; Roman; 1st to 4th century; Roman cemetery; vertebrate remains; domestic fowl; horses

Excavation in progress on the site at 3 Driffield Terrace.

Introduction

An archaeological excavation was undertaken by York Archaeological Trust at 3 Driffield Terrace, York (centred on NGR SE 593 510), by York Archaeological Trust during 2004, in advance of a housing development.

The site lies to the south of the Roman *colonia* and the medieval walls of the city, close to a major Roman road leading south-west from York to Tadcaster. Previous excavations and chance discoveries in the area had encountered parts of an extensive and prestigious Roman cemetery which had existed along the line of this road. The 2004 excavations at the site revealed deposits relating to the Roman cemetery and later post-medieval activity. The features were of Roman (late 1st century to late 4th century) date, including a massive pit, a ditch and a number of post-holes and other cut features, together with inhumation and cremation graves from one of York's principal Roman cemeteries.

Dating provided by both pottery and the analysis of the stratigraphic relationships between archaeological features and layers allowed the construction of the following chronological framework for the Roman deposits:

Phase 2: early Roman
Phase 31: late 1st/early 2nd century
Phase 32: late 2nd/early 3rd century
Phase 33: late 3rd/early 4th century
Phase 34: late 4th century/later

The assessment of the hand-collected vertebrate remains assemblage (Carrott *et al*. 2005), undertaken by Palaeoecology Research Services (PRS) in 2005, recorded remains associated with graves, with significant quantities also being recovered from the pit fills (including the large pit), ditch and gully fills. The vertebrate remains from the Roman deposits were considered to have potential for further analysis to provide additional information regarding activity at the site and the wider context of the cemetery as a whole. This report presents the results of the additional study of the remains from the Roman deposits.

Methods

All of the hand-collected animal bone from the selected deposits was examined and semi-quantitative information recorded concerning fragment size, the state of preservation, colour, and the appearance of broken surfaces ('angularity'). Additionally, information was also recorded (for all bones) concerning dog-gnawing, burning, butchery and fresh breaks.

Identifications were made via comparison with modern reference material at PRS and published works (e.g. Schmid 1972). Where possible, fragments were identified to species or species group. Fragments that could not be identified to species were grouped into a number of categories: large mammal (assumed to be cattle, horse or large cervid), medium-sized mammal 1 (assumed to be caprovid, pig or small cervid), medium-sized mammal 2 (assumed to be dog, cat or hare) and totally unidentified.

Selected elements were recorded using the diagnostic zones method described by Dobney and Rielly (1988). Minimum number of individuals (MNI) was also estimated using the zones method, but numbers were too small for detailed interpretation. Fragments which could confidently be refitted have been counted as one bone. Distinctions between sheep and goat

bones were undertaken using comparative material and with reference to Boessneck (1969).

Evidence of butchery was noted where present, as were any pathological conditions or non-biometrical traits. Measurements (unless otherwise specified) followed von den Driesch (1976). Withers height for horses was estimated using calculations devised by Kiesewalter (in von den Driesch and Boessneck 1974) and are quoted in 'hands' (hh), where each 'hand' is equivalent to four inches (approximately 100 mm). A record of all measurements taken can be found in the Appendix.

There were no teeth available for providing age-at-death information. Mammal bones were described as 'juvenile' if the epiphyses were unfused and the associated shaft fragment appeared spongy and porous. They were recorded as 'neonatal' if they were also of small size. Where discussed in the text, epiphyseal fusion data were assigned to age categories outlined by Silver (1969).

Nomenclature for mammals follows Corbet and Southern (1977).

Results

The excavation produced a small assemblage of vertebrate remains comprising two boxes (each of approximately 20 litres) of bone. A total of 644 bones (including three chicken skeletons and two articulated horse limbs) representing 109 deposits (Table 2) relating to the Roman funerary deposits were selected and examined. The majority of these were derived from deposits from Phase 33 (late 3rd/early 4th century). Many of the bones were from grave fills (54%) and pits (34%); some of latter may have been graves which were dug and remained unused or in which the human remains had not survived. The remainder of the bones were recovered from the fills of ditches and gullies (9%), together with a few from cremation deposits and unidentified features. Details of the vertebrate assemblage follow, grouped by phase. Table 1 provides summary details of the contexts from which material was examined, Table 2 details the vertebrate remains by phase, with percentages and frequencies by phase shown in Table 3. Details of the remains by feature type can be found in Table 4, whilst horse withers heights are listed in Table 5.

Phase 2 – early Roman

The remains from Phase 2 were derived from five ditch fills (Contexts 4051, 4076, 4108, 4437 and 4455), with the bulk of the material coming from Contexts 4051 and 4076. As can be seen from Table 1, just 29 fragments were recovered, most being small pieces which could not be identified or could only be categorised by size (in this case mainly as large mammal). The six fragments identified to species represented cattle, sheep/goat, pig and horse. A few of the bones showed evidence of butchery, including chops and cuts to ribs which may have occurred during evisceration. Two of the fragments may have been chewed by dogs but the evidence was not clear-cut. Differential preservation was noted on fragments from the fill of ditch 4056 (Context 4051), which may indicate a fluctuating moisture level in this feature. The poor condition of some of the fragments may also signify a potential loss of material through diagenetic processes. Much of the material from all of the deposits was extensively damaged by fresh breakage.

There were no mandibles present to provide age-at-death data. Epiphyseal fusion was noted on only four of the fragments, providing evidence for a pig younger than two years old and a cow less than two to two and a half years in age (Silver 1969).

Phase 31 – late 1st to early 2nd century

The assemblage from this phase consisted of a total of 121 fragments recovered from 14 deposits. Most of the remains were associated with inhumations, although a smaller component (approximately 15%) came from pit fills. Distribution of the material was very sparse and none of the deposits (with the exception of Context 4161) gave more than nine fragments. Preservation was good to moderate, with much less fresh breakage than was seen in the Phase 2 material. Material from some contexts (4143, 4351, 4473 and 4511) was in markedly poorer condition, while variable preservation recorded on bones from grave fills 4164 and 4427 and pit fill 4510 suggested a degree of residual or redeposited material. Several horse bones were recovered, most of which were terminal limb elements (from Contexts 4351, 4473, 4510 and 4511); a near complete pelvis was also found in an early fill of Pit 4488 (Context 4516). A few skeletal elements from the other major domesticates were present: cattle bone comprised metacarpal fragments (one of which had been chewed at the distal end) and a piece of a small calcaneum which may have been from a calf; three fragments of pig mandible and maxilla were found in the fill of Grave 4110 (Context 4109) and a canine from a male pig from Grave 4475 (Context 4473) showed an unusual area of erosion which may have been an anthropogenic modification rather than natural wear; caprovid remains were limited to radius fragments (including an unfused distal epiphysis identified as sheep) and an isolated tooth. Only four of the bones showed signs of butchery; these included split long bone fragments and a small chop mark on a fragment of pig mandible.

No tooth rows were present for age-at-death data, but complete fusion on two of the horse bones (1st phalanges from Context 4510) suggested animals more than thirteen to fifteen months old.

The assemblage from Grave 4160 (Context 4161) consisted of an almost complete skeleton of an adult domestic fowl (Context 4161) which was found associated with funerary urn 150. Spurs on the tarsometatarsi suggested that it was a male bird. Although the skull was not recovered, the synsacrum and fragments of the sternum were present; these, together with several rib fragments, thoracic and cervical vertebrae and a few phalanges suggested that the carcass was deposited whole.

Phase 32 – late 2nd to early 3rd century

The assemblage from this phase consisted of a total of 158 fragments recovered from 31 deposits. Almost all of the material was found in association with inhumations or in pits, with just two unidentified fragments recovered from ditch fills. Most deposits gave fewer than eight bones, with higher fragment counts in Contexts 4431 and 4508 being due in part to poorer preservation and severe fresh breakage. Most fragments could not be identified or could only be assigned to the large or medium-sized mammal categories. Species which could be identified included horse, cattle, dog, pig and caprovid, with a significant proportion of the identified material as a whole derived from the remains of two chicken carcasses.

Mandibles useful for age-at-death estimation were restricted to two horse mandibles from Contexts 4255 and 4409. Unfortunately, the incisors were not present but examination of the cheek teeth (3rd premolar to 3rd molar) showed very worn crowns with little of the root remaining, indicating aged animals. Although these mandibles were from left and right sides, the discrepancy in their sizes showed that they were from two different horses. Epiphyseal fusion on all of the horse bones was complete, including late-fusing epiphyses such as the proximal tibia, suggesting that all of the horses represented were mature individuals. The horse remains also included a collection of articulated left hind limb elements comprising a tibia, calcaneum, astragalus and metatarsal with accessory metapodials (splint bones) from Grave 4407 (Context

4447). Both the proximal end of the tibia and the tuberosity of the calcaneum had been chewed off. The lateral length of the metatarsal allowed an approximate withers height of 1295 mm (12.3 hh) to be calculated. An unassociated tibia from this context was calculated to be from a horse approximately 1399 mm (13.3 hh) at the withers.

A near-complete chicken skeleton was found in Grave 4142 (Context 4155). Skeletal elements recorded included left and right humeri, ulnae, tibiotarsi and femora, with a radius, scapula, synsacrum and other indeterminate fragments. No skull or phalanges were present, suggesting a degree of preparation of the carcass before deposition, although taphonomic processes may account for the non-recovery of more fragile elements. The bones were porous with unossified ends signifying an immature bird, and a pathological condition in the form of extra bone growth was present on one of the tibiotarsi. The second chicken skeleton was recovered from an urn (Urn 247) which had been deposited in Pit 4141 (Context 4140). It was not as complete as that from Grave 4142, the skeletal elements present being mostly limb bones from the right side of the bird, and there was no evidence of the sternum or pelvis. The single tarsometatarsus present was broken mid-shaft, but a small piece of bone growth at the juncture of the break suggested the presence of a spur, indicating that the bird was probably male. A few undiagnostic fragments of calcined bone were also recovered during excavation of the urn contents.

A small assemblage of vertebrate remains was recovered from the lower fills of a very large pit (Pit 4488), approximately five metres in width and excavated to a depth of three metres. Six contexts (4460, 4464, 4467, 4507, 4508 and 4509) gave a total of 33 bones. Severe fragmentation (the result of fresh breakage for the material from Context 4508) meant that most of these were unidentified or could only be categorised by size. Bones identified to species were generally of small, robust elements and were limited to a cattle astragalus and a horse second phalanx and broken incisor; caprovid remains consisted solely of two pieces of metatarsal which, although unable to be refitted, probably represented the same bone. The shaft of a dog tibia was also present. A few of the large mammal long bone fragments appeared to have been split (possibly as a result of processing for marrow extraction) and three deep cuts were noted on an unidentified fragment, also from a large mammal. However, on the whole, butchery evidence was largely absent.

Phase 33 – late 3rd to early 4th century

The deposits from this phase produced the most bone, with a total of 287 fragments being recovered from 41 deposits. Half of the material was associated with graves and a third was recovered from pit fills, including the upper fills of the very large pit, Context 4488. A further, smaller collection was found in the fills of ditches or gullies. However, there were no substantial concentrations of material, and none of the individual deposits gave more than 20 fragments. Variable preservation was recorded on material from a number of grave fills (Contexts 4114, 4118, 4129, 4162 and 4349). Preservation was also noted as being variable or poor on bone from the upper fills of the large pit (4488), suggesting the presence of an element of residual or redeposited material. Almost a third of the bones were identified to species, whilst a high proportion of the remainder consisted of small fragments that were completely unidentifiable, the rest being derived from large and medium-sized mammals. Identified bones included a dog humerus and tibia (from Contexts 4196 and 4411, respectively), six fragments of pig and seven caprovid bones (including two identified as sheep). Amongst the slightly larger assemblage of horse remains (34 bones) were several articulating left hind limb elements from the fill (Context 4251) of a feature which may have been a pit or gully (4436). These consisted of a near complete hock joint comprising the astragalus, calcaneum and three tarsals, together with the metatarsal and two accessory metapodials (splint bones). Calculations derived from the measurement of the metatarsal estimated this horse to have been approximately 1386 mm high

at the withers (13.2 hh). Several other horse bones were recovered from this feature including a metacarpal which gave an estimated height of 1250 mm (12.1 hh). The remainder of the horse bones from this phase were distributed fairly evenly within the fills of graves and ditches/gullies with no apparent concentrations. Smaller, robust elements had survived undamaged but long bones and pelves were more fragmented. A pathological condition was noted on a horse calcaneum from pit fill 4488 (Context 4505); the tuber calcis displayed bone growth to the posterior aspect which may have been caused by trauma. Tooth scoring from a scavenging animal could still be observed on a badly damaged horse femur caput recovered from the fill (Context 4421) of a grave. Bird remains from this phase were restricted to two goose wing bones (a distal humerus and a digit from Contexts 4201 and 4205, respectively) and six chicken bones, including four limb bones from a grave fill (Context 4111).

Approximately 13% of the Phase 33 assemblage showed butchery evidence, with a small concentration from the fill of Grave 4258 (Context 4205), but there was no indication that any of these bones were the remains of food offerings. Chop marks to cattle bones were focused around the joints (e.g. to carpals/tarsals and the ends of long bones) and the pelvis, which probably related to division of the carcass, while a chopped atlas possibly indicates decapitation. Butchery was also noted on bones of the large mammal assemblage, with chop marks to rib fragments, which may be evidence of an attempt to reduce them to 'pot-size', and several split long bone shafts which may represent processing for marrow extraction. In addition, butchery marks were noted on the remains of smaller animals, including possible filleting damage to the shaft of a pig radius (Context 4129) and cuts to rib fragments which may have been sustained during skinning or evisceration. A cut mark was also recorded on the distal articulation of the goose humerus.

No tooth rows were present but epiphyseal fusion was recorded on a number of the bones. With the exception of a distal tibia from a pig of under two years old, all had undergone fusion. On the whole, surviving skeletal elements were those which fuse early such as metapodials and phalanges, but a proximal cow tibia (indicating an animal of over three and a half to four years in age) and a fragment of proximal horse femur (from an animal over three to three and a half years old) were also present.

Phase 34 – late 4th century/later

The assemblage from this period was rather smaller, consisting of a total of 49 fragments recovered from 18 deposits, and characterised by small amounts of unidentified material from most of the contexts. The remains were recovered from the fills of graves and pits, with a few found in association with cremation burials. No contexts gave more than ten fragments each and most contained only one or two. Preservational differences could not be reliably assessed for most of the deposits, although it was noted that a certain amount of differential preservation was apparent in material from the fill of Grave 4029 (Context 4017). This deposit did, however, contain most of the identified bone, including a cattle carpal, a piece of caprovid metacarpal and a fragment of pig femur (slightly dog-gnawed), together with a pig canine (possibly from a female). A fragment of roe deer pelvis with cuts to the iliac shaft was also recovered from this fill. This was the only firm evidence of wild mammal remains from the Roman phases of the excavation. None of the bone from the cremation deposits was burnt and, with the exception of a horse 2nd phalanx from Context 4299, most were small fragments which were not identifiable to species. The only other bones that could be identified were a caprovid tooth (from Context 4101), a pig lower incisor (Context 4126) and a very large upper canine (Context 4091) which may be from a wild boar. No mandibles were present to give information on age-at-death and the only element with fusion evidence was the horse phalanx, which was fused proximally and represented an animal over 12 months old.

In addition to the cuts on the roe deer pelvis, much of the material assigned to the large mammal category showed chop marks to ribs and vertebrae and split long bone fragments. It could be assumed, therefore, that at least some of the fragmentation of material from this phase was the result of butchery prior to deposition.

Discussion

Vertebrate remains were recovered from inhumation and cremation deposits, pit fills and ditches relating to five phases of Roman activity at the site at 3 Driffield Terrace, York. Although the assemblage was of moderate size, the bones themselves had been subjected to fragmentation in antiquity and during excavation, resulting in approximately 60% of the material remaining unidentified or categorised only by size. Preservation was variable in several of the deposits, indicating reworking of the material as features were excavated and backfilled. The incidence of dog gnawing to the bones was sparse, suggesting that the majority of the fragments had been incorporated quickly into the deposits and were therefore not accessible to scavengers.

Identified fragments were almost exclusively representative of domestic species, with the most common being chicken; however, this relatively high count was because of the presence of three part skeletons. Horse remains were the next most prevalent, with a few bones each of cattle, pig, sheep/goat and dog. Apart from the chickens, the only other evidence for birds was from two goose bones. Non-domestic species were almost wholly absent; one fragment of roe deer pelvis bearing cut marks was the only definite identification, but a very large pig canine may have been from a wild boar.

Much of the domestic mammal material appeared to be derived from primary butchery waste. There was some evidence for jointing and marrow processing indicated by chops and splits to the bones but these were not common and the presence of primary butchery waste was also inferred by biases in skeletal elements. A large proportion of the material, including the bone assigned to the ‘large mammal’ category, was composed of skeletal elements normally discarded during initial carcass preparation, for example, metapodials, carpals/tarsals and phalanges. This was especially apparent in the material from the large pit (Pit 4488), which also included occasional dog and horse bone, suggesting that the remains of these non-food animals was being disposed of in much the same way as general refuse. However, there was no evidence from the horse and dog bones from this feature to suggest that they had been processed before deposition. A small concentration of butchered bone (mostly of cattle and large mammal) was present in the fill of Grave 4260 (Context 4205) but none of this material was typical of the remains of food offerings. There were no pig bones, which, with chicken, are commonly associated with ‘meals for the dead’ from this period, and no other medium-sized mammal proximal upper limb bones that might suggest joints. It is possible that cuts of beef were also deposited as offerings for the deceased, but, as has been pointed out, these were much more likely to have been prepared as filleted meat rather than ‘on the bone’ (Lauwerier 1983). It is therefore probable that these remains represent a dump of butchered material which had become unintentionally incorporated into the grave fill.

Dental evidence for age-at-death was sparse. Very worn crowns to the cheek teeth of two horse mandibles suggested elderly animals, but the only mandibular material from cattle, sheep and pigs was a small fragment (of pig) with no teeth *in situ*. Any isolated teeth recovered were mostly damaged or maxillary. However, epiphyseal fusion data showed a significant bias towards fused elements. This would seem to indicate that most animals had been slaughtered when skeletally mature, although taphonomic processes may have led to a loss of porous and fragile elements

from younger animals, resulting in an assemblage biased towards more robust bones from older individuals. For example, over half of the pig bones recovered were teeth or mandible fragments. Pigs were typically slaughtered when skeletally immature, but the presence of these denser elements suggests preferential preservation and implies that the more vulnerable skeletal elements from juvenile animals have been lost to diagenetic processes.

Three domestic fowl skeletons, in various stages of completeness, were found, two with urns and one interred with a human burial. The most complete skeleton was that of a male bird found in association with a broken vessel (Urn 150) in a Phase 31 burial (4160). With the exception of the skull, most of the body parts were represented (including some foot bones) suggesting the deposition of a whole carcass. A second urn (Urn 247) containing a chicken skeleton was found interred in a Phase 32 pit (Context 4140). Here, surviving skeletal elements were mostly confined to limb bones from the right side of the body. A carcass from a skeletally immature bird recovered from a Phase 32 grave deposit was also nearly complete, with only the head and feet missing. The absence of the heads suggests that the remains were of dressed carcasses, possibly cooked. By contrast, four chicken limb bones from a Phase 33 grave fill (Context 4111) may represent the remains of feasting, perhaps at the grave side, although they could equally be scattered bones which had fallen into the grave as it was dug.

Domestic fowl and pig bones are the most common animal bones in Roman graves; where these occur they are usually interpreted as food offerings for the dead (Barber and Bowsher 2000; Dobney and Jaques 1994; Lauwerier 1983, 1993, 2002, 2004). Chicken bones associated with 2nd to 3rd century grave deposits were recorded at nearby Trentholme Drive (Fraser and Ryder 1968), some of these being found in urns. A 2nd century inhumation near Grantham, Lincolnshire, also contained a chicken skeleton (Dobney and Jaques 1994), with the carcass interred beneath the knees of the (possibly female) skeleton. The chicken bones represented the remains of a single individual, with some (but not all) limb bones present as well as a number of vertebrae and phalanges. Excavations at the Eastern Cemetery in London produced several instances of chicken skeletons (representing both male and female birds) found with inhumation deposits, including one example of limb bones in a pot (Barber and Bowsher 2000). Further afield, Lauwerier (1993) discusses numerous examples of birds as offerings in Roman graves from The Netherlands. The perception of chicken as an appropriate grave offering could be related to the status of the cockerel as sacred to the god Mercury and a symbol of the sun and rebirth (Lentacker *et al*. 2004). Alternatively, these remains could be an example of a luxury meal for the deceased (Lauwerier 1988), or may simply be a reflection of food ordinarily consumed in that particular community.

While there seems little doubt that the chicken skeletons represent grave offerings for the dead, the articulated horse limbs are more ambiguous. Distinguishing between ritual deposition of animal remains and casual disposal of refuse is difficult. Criteria for identifying ritual deposits have been proposed and characteristics include: differential fragmentation and preservation in comparison to normal bone refuse; the presence of articulated elements or complete skeletons; the species of animal (although this is seen as more complex when the animals are regarded as inedible); careful placing of the bones; location within certain features and association with other finds (Groote 2008). Several bones from the hind limb of a horse were found in association with a Phase 32 burial (Grave 4407, Contexts 4408 and 4447) and were felt by the excavator to have been deliberately interred as part of the funerary rites, although they were not recorded as articulated. The hind limb bones from Context 4447 were well preserved and unfragmented and not found in association with remains from other species, and would initially seem to fit the criteria for a ritual deposit. However, distinct evidence of dog-gnawing to the calcaneum and tibia casts doubt upon this interpretation as it seems unlikely that dogs

would be allowed to chew an item intended as a grave offering. Also, the presence of a second tibia from a different, larger horse and a less well preserved humerus from an associated fill (Context 4408) seems to point to a disturbed horse burial, with the animal remains being redeposited as the grave was backfilled.

The second horse limb was not found in a grave but in the fill of a Phase 33 ditch or gully (Context 4251). The bones were thought to be ritually significant by the excavator and, from excavation photos, some were clearly found in articulation. Measurements from a metacarpal and metatarsal allowed estimated withers heights of 1249 mm (12.1 hh) and 1385 mm (13.2 hh) to be calculated, indicating two separate individuals. Horse remains were found to be common in the grave ditches at the Roman cemetery at Tiel-Passewaaij, in The Netherlands (Groote 2008), with the preferred elements being heads and hind limbs. At this site, the bones were interpreted as the remains of animals slaughtered specifically as part of the funerary rites.

There are few undisputed parallels for ritual deposition of horse remains in Roman period graves in Britain. Some of the burials at Trentholme Drive (Fraser and Ryder 1968) also had horse bones associated with them but there was no evidence that the bones had been deposited in an articulated condition and they may have represented reworked material. Horse remains from an excavation at nearby 6 Driffield Terrace (Foster and Jaques 2011) also showed signs of being the redeposited remains of a multiple horse burial disturbed during grave digging, with the only articulated elements being several columns of vertebrae (although other parts of the body were represented). Observations of modern carcass decay have suggested that vertebrae are the last parts of the body to disarticulate (Hill 1979; Hill and Behrensmeyer 1984, quoted in Lyman 1994).

Archive

All material is currently stored by Palaeoecology Research Services (Unit 4, National Industrial Estate, Bontoft Avenue, Kingston upon Hull), along with paper and electronic records pertaining to the work described here.

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References

Barber, B. and Bowsher, D. (2000). *The Eastern cemetery of Roman London excavations 1983–1990.* Museum of London Archaeology Service Monograph **4**. London.

Boessneck, J. (1969). Osteological differences between sheep (*Ovis aries* Linné) and Goat (*Capra hircus* Linné), pp. 331–358 in Brothwell, D. and Higgs, E. S. (eds), *Science in Archaeology.* London: Thames and Hudson.

Carrott, J., Mant, J., Akeret, Ö., Jaques, D. and Gardner, S. (2005). Evaluation of biological remains from excavations at 3 Driffield Terrace, York (site code: YORYM 2004.354). *PRS* **2005/53**.

Corbet, G. B. and Southern, H. N. (1977). *The Handbook of British mammals*. 2nd edition. Oxford: Blackwell.

Dobney, K. and Rielly, K. (1988). A method for recording archaeological animal bones: the use of diagnostic zones. *Circaea* **5**, 79–96.

Dobney, K. and Jaques, D. (1994). The remains of a chicken from a Roman grave at Saltersford water treatment plant, near Grantham, Lincolnshire. *Reports from the Environmental Archaeology Unit, York* **94/30**.

Foster, A. and Jaques, D. (2011). Technical report: Vertebrate remains from excavations at 6 Driffield Terrace, York (site code: YORYM 2005.513). *PRS* **2011/65**.

Fraser, F. C. and Ryder, M. (1968). *Animal bones,* pp. 104–109 in Wenham, L. P., The Romano-British cemetery at Trentholme Drive, York. *Ministry of Public Building and Works Archaeological Reports* **5**. London.

Groote, M. (2008). *Animals in ritual and economy in a frontier community: Excavations in Tiel-Passewaaij.* Amsterdam: Amsterdam University Press.

Hill, A. (1979). Disarticulation and scattering of mammalian skeletons. *Paleobiology* **5**, 261–274.

Hill, A. and Behrensmeyer, A. K. (1984). Disarticulation patterns of some modern East African mammals. *Paleobiology* **10**, 366–376.

Lauwerier, R. C. G. M. (1983). A meal for the dead: animal bone finds in Roman graves. *Palaeohistoria* **25**, 183–93.

Lauwerier, R. C. G. M. (1988). *Animals in Roman times in the Dutch eastern river area* (Nederlandse Oudheden 12). ‘s-Gravenhage, Amersfoort.

Lauwerier, R. C. G. M. (1993). Bird remains in Roman graves. *Archaeofauna* **2**, 75–82.

Lauwerier, R. C. G. M. (2002). *Animals as food for the soul*, pp. 63–71 in Dobney, K. and O’Connor, T. (eds.), Bones and the Man: Studies in honour of Don Brothwell. Oxford: Oxbow.

Lauwerier, R. C. G. M. (2004). *The economic and non-economic animal: Roman depositions and offerings*, pp. 66–72 in Jones O’Day, S., Van Neer, W. and Ervynck, A. (eds), Behaviour behind bones: the zooarchaeology of ritual, religion, status and identity. Proceedings of the 9th ICAZ conference, Durham 2002. Oxford: Oxbow.

Lentacker, A., Ervynck, A and Van Neer, W. (2004). *The symbolic meaning of the cock: The animal remains from the Mithraeum at Teinen (Belgium),* pp. 57–80 in Martens, M. and De Boe, G. (eds), Roman Mithraism: the evidence of the small finds. *Archeologie in Vlaanderen Monografie* **4**.

Lyman, R. L. (1994). *Vertebrate Taphonomy.* Cambridge: Cambridge Manuals in Archaeology.

Schmid, E. (1972). *Atlas of animal bones for prehistorians, archaeologists and quaternary geologists*. Amsterdam: Elsevier.

Silver, I. A. (1969). The ageing of domestic animals, pp. 282–302 in Brothwell, D. and Higgs, E. (eds) *Science in Archaeology* (2nd edition). London: Thames and Hudson.

von den Driesch, A. and Boessneck, J. (1974). Kritische anmerkungen zur widerristhöhenberechnung aus Längenmassen vor- und frühgeschichtlicher Tierknochen. *Säugetierkundliche Mitteilungen* **22**, 325–48.

von den Driesch, A. (1976). A guide to the measurement of animal bones from archaeological sites. *Peabody Museum Bulletin* **1**. Cambridge Mass.: Harvard University.

Table 1 3 Driffield Terrace, York: Summary details of the contexts from which the hand-collected vertebrate remains were examined. Key: Frags = total number of fragments.

Context	Phase	Date	Context description	Frags
4006	32	late 2nd/early 3rd	Fill of grave 4002	1
4017	34	late 4th/?later	Fill of grave 4029	9
4028	34	late 4th/?later	Fill of grave 4027	4
4047	33	late 3rd/early 4th	Fill of grave 4045	2
4050	34	late 4th/?later	Disturbed upper part of cremation	1
4051	2	early Roman	Fill of ditch 4056	14
4066	34	late 4th/?later	Fill of grave 4064	2
4076	2	Early Roman	Fill of ditch 4063	8
4085	33	late 3rd/early 4th	Fill of grave 4087	7
4091	34	late 4th/?later	Fill of grave 4093	1
4099	33	late 3rd/early 4th	Fill of 4121	11
4101	34	late 4th/?later	Fill of small pit/post hole 4102	2
4104	33	late 3rd/early 4th	Fill of 4105	10
4108	2	early Roman	Fill of ditch 4056	4
4109	31	late 1st/early 2nd	Fill of grave 4110	5
4111	33	late 3rd/early 4th	Fill of grave 4113	14
4114	33	late 3rd/early 4th	Fill of grave 4116	9
4118	33	late 3rd/early 4th	Fill of pit 4121	8
4125	33	late 3rd/early 4th	Fill of grave 4149	12
4126	34	late 4th/?later	Fill of grave 4127	2
4128	32	late 2nd/early 3rd	Upper fill of grave 4142	7
4129	33	late 3rd/early 4th	Fill of grave 4131	10
4132	33	late 3rd/early 4th	Fill of pit 4133	6
4136	32	late 2nd/early 3rd	Fill of ?empty grave 4137	2
4140	32	late 2nd/early 3rd	Fill of vessel SF247	24
4143	31	late 1st/early 2nd	Fill of pit 4154	3
4144	32	late 2nd/early 3rd	Fill of grave 4142	3
4146	33	late 3rd/early 4th	SK in fill of 4149	1
4155	32	late 2nd/early 3rd	Fill of grave 4142	22
4161	31	late 1st/early 2nd	Fragments of pot and animal bone SF150	75
4162	33	late 3rd/early 4th	Fill of grave 4166	14
4164	31	late 1st/early 2nd	SK in fill of 4110	6
4165	33	late 3rd/early 4th	SK in fill of 4166	1
4173	34	late 4th/?later	Fill of intrusion 4176	5
4177	33	late 3rd/early 4th	Fill of grave 4182	2
4179	34	late 4th/?later	Fill of cremation deposit 4190	1
4180	34	late 4th/?later	Fill of cremation deposit 4181	1
4184	33	late 3rd/early 4th	Fill of ditch/gully 4185	3
4185	33	late 3rd/early 4th	Fill of gully	1
4193	34	late 4th/?later	Fill of grave 4195	3
4196	33	late 3rd/early 4th	Fill of grave 4218	6
4201	33	late 3rd/early 4th	Fill of grave 4200	11
4205	33	late 3rd/early 4th	Fill of grave 4260	19
4222	33	late 3rd/early 4th	Fill of ?empty grave 4223	5
4226	33	late 3rd/early 4th	Fill of pit 4227	1
4229	33	late 3rd/early 4th	Fill of ditch/gully 4230	9
4231	33	late 3rd/early 4th	Fill of pit 4237	1
4232	32	late 2nd/early 3rd	Fill of grave 4283	1
4233	32	late 2nd/early 3rd	Fill of grave 4235	1
4234	32	late 2nd/early 3rd	SK from grave cut 4235	5
4251	33	late 3rd/early 4th	Fill of ditch/gully 4195	17
4252	32	late 2nd/early 3rd	Fill of grave 4254	3
4255	32	late 2nd/early 3rd	Fill of grave 4257	5

Context	Phase	Date	Context description	Frags
4261	34	late 4th/?later	Fill of pit/post hole 4262	1
4268	34	late 4th/?later	Fill of pit 4269	2
4274	33	late 3rd/early 4th	Fill of large pit 4488	13
4275	33	late 3rd/early 4th	Fill of grave 4288	6
4277	33	late 3rd/early 4th	Fill of large pit 4488	10
4278	33	late 3rd/early 4th	Fill of large pit 4488	8
4282	32	late 2nd/early 3rd	SK in fill of grave 4283	1
4292	33	late 3rd/early 4th	Fill of pit 4302	1
4299	34	late 4th/?later	Cremation deposit in fill of 4300	2
4305	32	late 2nd/early 3rd	Fill of pit 4308	1
4310	34	late 4th/?later	Cremation deposit, fill of 4311	1
4312	33	late 3rd/early 4th	Fill of pit 4316	1
4317	33	late 3rd/early 4th	Fill of pit 4322	1
4324	32	late 2nd/early 3rd	SK from grave cut 4352	1
4325	34	late 4th/?later	Fill of pit 4326	6
4327	32	late 2nd/early 3rd	Fill of ditch/gully 4328	1
4334	34	late 4th/?later	Fill of pit/post hole 4335	5
4336	32	late 2nd/early 3rd	Fill of ?empty grave 4338	2
4349	33	late 3rd/early 4th	Fill of grave 4350	19
4351	31	late 1st/early 2nd	Fill of ?empty grave 4369	9
4357	32	late 2nd/early 3rd	Fill of pit 4370	1
4358	33	late 3rd/early 4th	Fill of irregular feature 4359	1
4361	31	late 1st/early 2nd	Fill of grave 4372	3
4366	33	late 3rd/early 4th	SK in grave cut 4350	1
4379	33	late 3rd/early 4th	Fill of grave 4350	2
4385	32	late 2nd/early 3rd	SK from grave cut 4387	1
4389	34	late 4th/?later	Fill of pit 4390	1
4399	32	late 2nd/early 3rd	Fill of pit 4404	2
4408	32	late 2nd/early 3rd	Fill of grave 4407	1
4409	32	late 2nd/early 3rd	Fill of grave 4407	1
4411	33	late 3rd/early 4th	Fill of large pit 4488	16
4421	33	late 3rd/early 4th	Fill of grave 4439	5
4423	31	late 1st/early 2nd	Fill of pit/post hole 4426	1
4427	31	late 1st/early 2nd	Fill of grave 4449	2
4431	32	late 2nd/early 3rd	Fill of grave 4490	28
4437	2	early Roman	Fill of ditch 4458	1
4438	33	late 3rd/early 4th	SK from grave 4439	2
4441	32	late 2nd/early 3rd	Fill of ditch/gully 4442	1
4447	32	late 2nd/early 3rd	Fill of grave 4407	7
4455	2	early Roman	Fill of ditch 4456	2
4460	32	late 2nd/early 3rd	Fill of large pit 4488	3
4464	32	late 2nd/early 3rd	Fill of large pit 4488	7
4467	32	late 2nd/early 3rd	Fill of large pit 4488	2
4470	32	late 2nd/early 3rd	SK from grave 4490	3
4473	31	late 1st/early 2nd	Fill of grave 4475	4
4474	31	late 1st/early 2nd	SK from grave 4475	2
4477	31	late 1st/early 2nd	Fill of grave 4494	1
4504	33	late 3rd/early 4th	Fill of large pit 4488	1
4505	33	late 3rd/early 4th	Fill of large pit 4488	9
4506	33	late 3rd/early 4th	Fill of large pit 4488	11
4507	32	late 2nd/early 3rd	Fill of large pit 4488	1
4508	32	late 2nd/early 3rd	Fill of large pit 4488	18
4509	32	late 2nd/early 3rd	Fill of large pit 4488	2
4510	31	late 1st/early 2nd	Fill of large pit 4488	5
4511	31	late 1st/early 2nd	Fill of large pit 4488	4
4516	31	late 1st/early 2nd	Fill of large pit 4488	1

Table 2 3 Driffield Terrace, York: Hand-collected vertebrate remains, by phase.

Species		**2**	**31**	**32**	**33**	**34**	**Total**
Canis f. domestic	dog	–	–	1	2	–	**3**
Equus f. domestic	horse	1	6†	19	34†	1	**61**
cf. *Equus* f. domestic	?horse	–	1	–	1	–	**2**
Sus f. domestic	pig	2	4	1	6	4	**17**
Capreolus capreolus L.	roe deer	–	–	–	–	1	**1**
Bos f. domestic	cattle	2	3	4	18	1	**28**
Ovis f. domestic	sheep	–	1	–	2	-	**3**
Caprovid	sheep/goat	1	3	3	5	2	**14**
Homo sapiens	human	–	–	–	2	–	**2**
Anser sp.	goose	–	–	–	2	–	**2**
Gallus f. domestic	chicken	–	75*	37**	6	–	**118**
Sub-total		6	93	65	78	9	**251**
Large mammal		10	12	23	57	11	**113**
Medium-sized mammal 1		3	1	16	31	6	**57**
Medium-sized mammal 2		–	–	2	3	1	**6**
Frog/toad		–	–	–	1	–	1
Chicken-sized bird		–	–	–	1	–	**1**
Unidentified bird		–	–	–	2	–	**2**
Unidentified		10	15	52	114	22	**213**
Sub-total		23	28	93	209	40	393
Total		**29**	**121**	**158**	**287**	**49**	**644**

* = one skeleton
** = two skeletons
† = includes articulated limb bones

Table 3 3 Driffield Terrace, York: Fragment counts – NISP (number of identified specimens) values and frequencies for the (positively identified) main domestic mammals and fowl, by phase.

	Phase 2		Phase 31		Phase 32		Phase 33		Phase 34	
	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%
horse	1	17	6	6.5	19	30	34	48	1	12.5
pig	2	33	4	4.5	1	1.5	6	8.5	4	50
cattle	2	33	3	3	4	6	18	25	1	12.5
sheep/goat	1	17	4	4.5	3	4.5	7	10	2	25
chicken	-	-	75	81.5	37	58	6	8.5	-	-

Table 4 3 Driffield Terrace, York: Main domesticates and unidentified material from Pit 4488, grave fills, pit fills and ditches/gullies by phase.

		Pit 4488					Inhumations					Pit fills					Ditches/gullies				
Species		**2**	**31**	**32**	**33**	**34**	**2**	**31**	**32**	**33**	**34**	**2**	**31**	**32**	**33**	**34**	**2**	**31**	**32**	**33**	**34**
Canis f. domestic	dog	-	-	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Equus f. domestic	horse	-	-	2	5	-	-	1	15	10	-	-	5	2	1	-	1	-	-	18	-
Sus f. domestic	pig	-	-	-	1	-	-	4	1	5	4	-	-	-	-	-	2	-	-	-	-
Bos f. domestic	cattle	-	-	1	6	-	-	1	1	8	1	-	2	2	4	-	2	-	-	-	-
Caprovid	sheep/goat	-	-	1	1	-	-	3	1	3	1	-	-	-	1	1	1	-	-	-	-
Ovis f. domestic	sheep	-	-	-	1	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-
Anser sp.	goose	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Gallus f. domestic	chicken	-	-	-	1	-	-	75	22	5	-	-	-	15	-	-	-	-	-	-	-
Large mammal		-	-	10	10	-	-	8	8	30	4	-	3	4	12	5	10	-	1	5	-
Medium-sized mammal 1		-	-	5	8	-	-	-	10	16	2	-	-	1	7	2	3	-	-	-	-
Unidentified		-	-	11	33	-	-	5	27	56	8	-	9	13	17	9	10	-	1	7	-
Total		**-**	**-**	**31**	**67**	**-**	**-**	**98**	**85**	**137**	**20**	**-**	**19**	**37**	**42**	**17**	**29**	**-**	**2**	**30**	-

Table 5 3 Driffield Terrace, York: Estimated horse withers heights in mm, by context.

Phase	Context	Id no.	Species	Element	Measurement description	Measurement (in mm)	Withers height (mm)	Height in hands
33	4251	426	horse	metacarpal	LI	195	1249.95	12.1
33	4251	420	horse	metatarsal	LI	260	1385.80	13.2
32	4447	571	horse	tibia	LI	321	1399.56	13.3
32	4447	568	horse	metatarsal	LI	243	1295.19	12.3

Appendix

Measurements archive by species, skeletal element and context

Measurement descriptions follow von den Driesch 1976. Measurements are in mm.
Key: Id no. = number unique to each bone.

Horse measurements

Context	Phase	Id no.	Element	BFd	GB	GH	LmT
4099	33	201	astragalus	55.97	63.58	-	-
4251	33	421	astragalus	52.89	62.67	58.57	59.64
4447	32	566	astragalus	-	59.96	57.98	57.12

Context	Phase	Id no.	Element	GB	DS	GL
4251	33	422	calcaneum	49.56	-	-
4447	32	565	calcaneum	48.06	34.81	-
4505	33	694	calcaneum	45.69	-	96.61

Context	Phase	Id no.	Element	GL	LI	SD	Bp	Bd	Dd
4447	32	567	tibia	-	-	35.95	-	70.54	45.18
4447	32	571	tibia	355	321	41.91	98.17	75.92	49.51

Context	Phase	Id no.	Element	GL	GLI	LI	SD	Bp	Dp	Bd
4251	33	426	metacarpal	203	200	195	29.64	45.79	31.34	46.36
4411	33	532	metacarpal	-	-	-	-	-	-	44.42

Context	Phase	Id no.	Element	GL	GLI	LI	SD	Bp	Dp	Bd
4251	33	420	metatarsal	267	262	260	29.39	50.67	41.78	51.98
4447	32	568	metatarsal	-	247	243	27.63	48.5	44.3	47.78
4511	31	626	metatarsal	-	-	-	-	40.06	32.41	-

Cattle measurements

Context	Phase	Id no.	Element	Bp	Dp
4473	31	587	metacarpal	48.1	29.79

Sheep/goat measurements

Context	Phase	Id no.	Element	Bd	GLI	GLm
4274	33	444	astragalus	15.50	22.78	22.16

Context	Phase	Id no.	Element	Bp
4464	32	579	metatarsal	19.22

Pig measurements

Context	Phase	Id no.	Element	BFp	Bp
4129	33	277	radius	25.03	25.14

Dog measurements

Context	Phase	Id no.	Element	Bd	Dd	SD
4411	33	531	tibia	22.90	16.66	12.67

Goose measurement

Context	Phase	Id no.	Element	Bd
4201	33	382	humerus	23.31

Chicken measurements

Context	Phase	Skel no	Id no.	Element	Bp	Bd	Dd	GL	La	Dp	Lm	L	Did	Dip	Dic	SC
4111	33	-	242	femur	15.1	-	-	-	-	-	76.01	-	-	-	-	6.62
4111	33	-	243	carpometacarpus	11.95	-	-	38.91	-	-	-	35.97	7.37	-	-	-
4111	33	-	243	ulna	8.55	-	-	-	-	-	-	-	-	12.91	-	-
4140	31	5	666	scapula	-	-	-	-	-	-	-	-	-	-	11.15	-
4140	31	5	668	ulna	-	-	-	-	-	-	-	-	9.83	-	-	4.44
4140	31	5	669	radius	-	6.43	-	64.56	-	-	-	-	-	-	-	3.1
4140	32	5	659	tibiotarsus	-	10.91	11.36	-	-	-	-	-	-	-	-	-
4140	32	5	661	tarsometatarsus	12.52	-	-	-	-	-	-	-	-	-	-	6.41
4140	32	5	664	humerus	18.89	14.31	-	71.7	-	-	-	-	-	-	-	6.5
4140	32	5	665	coracoid	-	-	-	-	-	-	52.47	-	-	-	-	-
4161	31	2	632	coracoid	-	-	-	-	-	-	60.39	-	-	-	-	-
4161	31	2	634	scapula	-	-	-	-	-	-	-	-	-	-	14.14	-
4161	31	2	636	humerus	21.13	16.15	-	78.74	-	-	-	-	-	-	-	7.62
4161	31	2	638	ulna	9.45	-	-	78.56	-	-	-	-	10.56	13.5	-	4.96
4161	31	2	640	radius	-	7.29	-	71.16	-	-	-	-	-	-	-	2.72
4161	31	2	642	carpometacarpus	12.46	-	-	41.49	-	-	-	38.42	8.19	-	-	-
4161	31	2	644	femur	16.31	15.68	13.18	87.25	-	11.57	82.02	-	-	-	-	7.48
4161	31	2	646	tibiotarsus	-	12.04	12.81	126.96	121.65	-	-	-	-	20.46	-	6.72
4161	31	2	648	tarsometatarsus	13.16	14.4	-	87.25	-	-	-	-	-	-	-	6.66