Osteological Analysis
F176 and F179
Catterick
North Yorkshire

Site Code: A1L2B
NGR: SE 22456 99375

Report No 1916
July 2016

Prepared for

Northern Archaeological Associates
Marwood House
Harmire Enterprise Park
Barnard Castle
Country Durham
DL12 8BN

Prepared by

Tessi Loeffelmann & Malin Holst
York Osteoarchaeology Ltd
75 Main Street
Bishop Wilton
York YO42 1SR

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Summary

York Osteoarchaeology Ltd was commissioned by Northern Archaeological Associates to conduct an osteological analysis of the articulated and disarticulated human remains recovered from Fields F176 and F179, near Catterick, North Yorkshire (NGR SE 22456 99375), during archaeological excavations prior to the A1 widening scheme.

The two areas featured 21 contexts containing human remains, the bulk of which were recovered from the subsoil layer of F176 (14 contexts, 157 bone fragments). The only articulated skeleton was that of a neonate (9091) and was located in a likely domestic context, which is common for the Roman period. The neonate skeleton showed evidence of localised inflammatory lesions in the form of greyish new bone formation and pitting on the parietal and right frontal bones. It is likely that this may have occurred during or around birth. The neonate was buried in a pit cutting the foundations of a large building at its northwestern corner. The grave was located at the foot of the north-south running wall.

Disarticulated dentitions were recovered from two contexts, representing an adult and a non-adult. The disarticulated adult mandible included one tooth and showed evidence of caries, calculus, ante-mortem tooth loss, an abscess, and periodontal disease. Poor dental hygiene and a likely cariogenic diet were reflected in the deciduous dentition. This was deemed unusually poor for the Roman period.

Periosteal inflammatory lesions were observed in two disarticulated contexts. Two further disarticulated bones featured evidence of degenerative joint changes and one of these showed evidence for osteoarthritis. It was suggested that all disarticulated human remains were likely of residual and originated from elsewhere.

The MNI for F179 was determined to be three, which included two neonates and one adult. That of F176 was five based on the consideration of two neonatal infants, two adults and one juvenile of unknown exact age. The overall MNI amounted to five individuals.

Acknowledgements

York Osteoarchaeology Ltd would like to thank Lynne Gardiner and Hannah Russ of Northern Archaeological Associates for their help and support.

1.0 INTRODUCTION

In March 2016, York Osteoarchaeology Ltd was commissioned by Northern Archaeological Associates to carry out the osteological analysis of one articulated burial and a number of disarticulated bones. The excavations took place in areas F176 and F179, near Catterick, North Yorkshire (NGR SE 22456 99375) during the A1 extension works in 2015.

In F176, fourteen archaeological contexts produced a total of 157 human bone fragments. In area F179, the excavated remains included one articulated neonate burial recovered from the fifth horizon of excavation in the southern extent of Area D, and seven further contexts yielded ten disarticulated human bone fragments.

The area in question was known to be rich in Roman activity due to the proximity to Roman Dere Street, and exhibited archaeological remains dating from the first century AD onwards. F176 and F179 represent only a small extent of the excavation work in the vicinity and much more evidence has been recovered from other fields, including that of a rural Roman civilian cemetery in F163, to the south of the area discussed in this report. The neonate burial was found in Area B, which contained the defences of the Roman town at Catterick, and was part of one of the latest phases of activity dating to the third to fourth centuries AD.

1.1 AIMS AND OBJECTIVES

The aim of the skeletal analysis was to determine the age, sex and stature of the skeletons, as well as to record and diagnose any skeletal manifestations of disease and trauma.

1.2 METHODOLOGY

The skeletons were analysed in detail, assessing the preservation and completeness, calculating the minimum number of individuals present as well as determining the age, sex and stature of the individuals. All pathological lesions were recorded and described.

2.0 OSTEOLOGICAL ANALYSIS

Osteological analysis is concerned with the determination of the identity of a skeleton, by estimating its age, sex and stature. Robusticity and non-metric traits can provide further information on the appearance and familial affinities of the individual studied. This information is essential in order to determine the prevalence of disease types and age-related changes. It is crucial for identifying sex dimorphism in occupation, lifestyle and diet, as well as the role of different age groups in society. A summary of the osteological and palaeopathological data for the articulated skeletons is given in Table 1, with a detailed catalogue of skeletons provided in Appendix A.

2.1 PRESERVATION

Skeletal preservation depends upon a number of factors, including the age and sex of the individual as well as the size, shape and robusticity of the bone. Burial environment, post-depositional disturbance and treatment following excavation can also have a considerable impact on bone condition (Henderson 1987, Garland and Janaway 1989, Janaway 1996, Spriggs 1989). Preservation of human skeletal remains is assessed subjectively, depending upon the severity of bone surface erosion and post-mortem breaks, but disregarding completeness. Preservation is important, as it can have a large impact on the quantity and quality of information that it is possible to obtain from the skeletal remains.

Surface preservation, concerning the condition of the bone cortex, was assessed using the seven-category grading system defined by McKinley (2004), ranging from 0 (excellent) to 5+ (extremely poor). Excellent preservation implied no bone surface erosion and a clear surface morphology, whereas extremely poor preservation indicated heavy and penetrating erosion of the bone surface resulting in complete loss of surface morphology and modification of the bone profile. Surface preservation could be variable throughout an individual skeleton, so the condition of the majority of bones in the skeleton was taken as the preservation grade for the whole skeleton. The degree of fragmentation was recorded, using categories ranging from 'minimal' (little or no fragmentation of bones) to 'extreme' (extensive fragmentation with bones in multiple small fragments). Finally, the completeness of the skeletons was assessed and expressed as a percentage: the higher the percentage, the more complete the skeleton.

Only one articulated skeleton was excavated in Field 179, Area D, which contained a neonate. The remains were 60% complete, with slight fragmentation and good surface preservation (Appendix A).

Table 1 Summary of osteological and palaeopathological results

Sk No	C (%)	SP	F	Age	Age Group	Sex	Stature (cm)	Dental Pathology	Pathology
9091	60	2	Slight	NB-1mth	Neonate	-	-	-	Pitted new bone on ectocranial surface of parietal and right frontal bone - possible birth trauma

Key: SP = Surface preservation: grades 0 (excellent), 1 (very good), 2 (good), 3 (moderate), 4 (poor), 5 (very poor), 5+ (extremely poor) after McKinley (2004); C = Completeness; F = Fragmentation: min (minimal), sli (slight), mod (moderate), sev (severe), ext (extreme)

Non-adult age categories: f (foetus, <38weeks *in utero*), p (perinate, c. birth), n (neonate, 0-1m), i (infant, 1-12m), j (juvenile, 1-12y), ado (adolescent 13-17y)Adult age categories: ya (young adult, 18-25y), yma (young middle adult, 26-35y), oma (old middle adult, 36-45y), ma (mature adult, 46+y), a (adult, 18+y)

2.2 MINIMUM NUMBER OF INDIVIDUALS

A count of the 'minimum number of individuals' (MNI) recovered from a cemetery is carried out as standard procedure in osteological reports on inhumations in order to establish how many individuals are represented by the articulated and disarticulated human bones (without taking the archaeologically defined graves into account). The MNI is calculated by counting all long bone ends, as well as other larger skeletal elements recovered. The largest number of these is then taken as the MNI. The MNI is likely to be lower than the actual number of skeletons which would have been interred on the site, but represents the

minimum number of individuals which can be scientifically proven to be present.

The MNI from the 157 human bone fragments from F176 was five individuals as indicated by the presence of two right adult femora, two right neonate/infant femora, and one juvenile right distal femur.

The presence of two right neonate humeri and one right adult mandible suggests that in Field 179 from ten human bone fragments and the articulated skeleton the MNI was at least three. Considering that all adult remains come from different stratigraphic layers and areas of excavation, it is likely that more than one adult were present on the site. The overall MNI for both fields was five as well. This included two right adult femora, two right neonate/infant humeri, and one juvenile distal femur.

2.3 ASSESSMENT OF AGE

Age was determined using standard ageing techniques, as specified in Scheuer and Black (2000a; 2000b) and Cox (2000). For non-adults age was estimated using the stage of dental development (Moorrees *et al.* 1963a; 1963b), dental eruption (Ubelaker 1989), measurements of long bones and other appropriate elements, and the development and fusion of bones (Scheuer and Black 2000b). In adults, age was estimated from stages of bone development and degeneration in the pelvis (Brooks and Suchey 1990, Lovejoy *et al.* 1985) and ribs (modified version of methods developed by İşcan *et al.* 1984; 1985 and İşcan and Loth 1986 provided in Ubelaker 1989), supplemented through examination of patterns of dental wear (Brothwell 1981).

The individuals were divided into a number of age categories. Non-adults were subdivided into 'foetuses' (f: where the age estimate clearly fell below 38-40 *weeks in utero*), 'perinates' (p: where the age estimates converged around birth), 'neonates' (n: where the age estimate suggested 0-1 month), 'infant' (i; 1-12 months), juvenile (j; 1-12 years), and adolescent (ad; 13-17 years). Adults were divided into 'young adult' (ya; 18-25 years), young middle adult (yma; 26-35 years), old middle adult (oma; 36-45 years), and mature adult (46+ years). A category of 'adult' (a) was used to designate those individuals whose age could not be determined beyond the fact that they were eighteen or older.

For each skeleton as many criteria as possible (preservation allowing) were used to estimate age. However, it is important to note that several studies (for example Molleson and Cox 1993, Molleson 1995, Miles *et al.* 2008) have highlighted the difficulty of accurately determining the age-at-death of adults from their skeletal remains, with age-at-death frequently being underestimated for older individuals. The categories defined here should be taken as a general guide to the relative physiological age of the adult, rather than being an accurate portrayal of the real chronological age.

The only articulated skeleton was that of a neonate, aged between birth and one month. This was based on the measurement of several complete long bones, which suggested an age very close to the time of birth. The disarticulated neonate right humerus from F179 (8141) provided a measurement indicating an age between birth and six months. This age was also indicated by the left humerus (1577) and the two right femora (1577 and 1710) recovered from F176.

Among the disarticulated remains from F176 and F179 were also bones from at least two adults aged eighteen years or older. This age estimation was based on the skeletal size and development, as well as the dental development of the mandible (8580). One unfused distal right femur (1488) represented an individual of juvenile age (1-12 years), but could not be aged more closely.

2.4 SEX DETERMINATION

Sex determination was carried out using standard osteological techniques, such as those described by Mays and Cox (2000). Assessment of sex involves examination of the shape of the skull and the pelvis and can only be carried out once sexual characteristics have developed, during late puberty and early adulthood. Evidence from the pelvis was favoured as its shape is directly linked to biological sex (the requirements of childbirth in females) whereas the shape of the skull can be influenced by factors such as age (Walker 1995). Measurements of certain bones were used to supplement the morphological assessment.

It was not possible to determine the sex of the two neonates present due to the lack of sexually dimorphic traits in non-adults. The disarticulated adult mandible may belong to a probable male. This assessment was based on the presence of a noticeable gonial flare and a protruding and relatively square mental eminence. A probable male left pelvis was recovered from Context 1429 – the backfill from Professor John Wacher's 1959 trench.

2.5 METRIC ANALYSIS

Stature depends on two main factors, heredity and environment; it can also fluctuate between chronological periods. Stature can only be established in skeletons if at least one complete and fully fused long bone is present, but preferably using the combined femur and tibia. The bone is measured on an osteometric board, and stature is then calculated using a regression formula developed upon individuals of known stature (Trotter 1970). Where possible, bones from the legs were used in preference to those of the upper limb as these carry the lowest error margin (*ibid*).

It was not possible to determine stature for any of the individuals due to the lack of complete adult long bones.

2.6 NON-METRIC TRAITS

Non-metric traits are additional sutures, facets, bony processes, canals and foramina, which occur in a minority of skeletons and are believed to suggest hereditary affiliation between skeletons (Saunders 1989). The origins of non-metric traits have been extensively discussed in the osteological literature and it is now thought that while most non-metric traits have genetic origins, some can be produced by factors such as mechanical stress (Kennedy 1989) or environment (Trinkhaus 1978).

A total of thirty cranial (skull) and thirty post-cranial (bones of the body and limbs) non-metric traits were selected from the osteological literature (Buikstra and Ubelaker 1994, Finnegan 1978, Berry and

Berry 1967) and recorded. The majority of non-metric traits were observed on the skull. These were anomalies that would not have affected the individual.

Non-metric traits were not observed in any of the remains.

2.7 CONCLUSION

Very few human remains were recovered from Field 179 during the excavation and the bulk of disarticulated remains from F176 were found in the subsoil layer (1405). Only one articulated burial of a neonate (9091) was recovered alongside several disarticulated bones. All of the bones were in fairly good condition, with moderate fragmentation. However, only 60% of the neonate was present. A second right neonate humerus, disarticulated adult remains, and a juvenile femora suggested an MNI of five for both fields.

3.0 PATHOLOGICAL ANALYSIS

Pathological conditions (disease) can manifest themselves on the skeleton, especially when these are chronic conditions or the result of trauma to the bone. The bone elements to which muscles attach can also provide information on muscle trauma and excessive use of muscles. All bones were examined macroscopically for evidence of pathological changes. Fuller descriptions of the pathological lesions observed can be found in Appendix A.

3.1 INFECTIOUS DISEASE

Bone tissue cannot respond quickly to an infectious disease, so evidence of any acute illness with a quick resolution (i.e. the patient recovers or dies within a short space of time) will not be seen in the skeleton (Roberts and Manchester 2005). However, bone can respond to the presence of a chronic infection through laying down new bone. Initially, this new bone is disorganised and termed 'woven bone', but with time, as healing takes place, this bone is remodelled and becomes transformed into more organised 'lamellar bone'. The presence of woven bone therefore indicates an infection that was active at the time of death, and lamellar bone indicates an infection that had healed; the presence of both together can suggest a recurring, or long-standing infection (Roberts and Manchester 2005). Although the new bone deposition may have been associated with a specific disease in life, it is almost always impossible to diagnose this from the bones alone.

3.1.1 Periosteal Reactions

New bone deposits on the surfaces of the bones can indicate inflammation of a sheath of tissue (the periosteum) which surrounds all bones (Ortner 2003, 206-207). Inflammation may be due to infection, but low-grade trauma and chronic ulceration can also lead to new bone formation (Roberts and Manchester 2005; Ortner 2003, 206-207). Periosteal reactions are commonly observed in archaeological populations, particularly on the tibiae, and their prevalence has been used as a general measure of stress

in past populations (Ortner 2003, 209). Woven bone deposits are indicative of inflammation that was active at the time of death, while lamellar bone indicates that the inflammation was healing.

On the parietal and frontal bones of the neonate (9091) periosteal reaction was noted in the form of new woven bone formation, which is too severe to indicate normal growth related new bone formation (Plate 1). Due to incomplete nature and fragmentation of the parietal bones, it was not possible to define the exact location of the pitting and new bone layering, apart from the fact that it affected the right orbit on the frontal bone. The pitting (Plate 1) suggests increased vascularity in the area concerned, which may be related inflammation. The new bone formation indicates an attempt to heal the affected area. It is possible that this was caused by a localised infection or, considering the age of the neonate, may be a bony response to birth-related trauma. It is likely that the individual survived for some time because the new bone had time to form before the death of the individual, even though the process is relatively rapid in neonates and infants (Lewis 2007, 168).

Plate 1 Skeleton 9091 parietal fragments with pitting and greyish new bone

Two disarticulated bones showed signs of periosteal reaction in the form of lamellar striae. While these were well integrated into the cortical bone on the medial and lateral aspects of the tibial midshaft (1480), the fibula shaft recovered from Context 1614 was visibly thickened. This may indicate a prolonged inflammation, although it appeared smooth and dense and thus likely healed.

3.2 JOINT DISEASE

The term joint disease encompasses a large number of conditions with different causes, which all affect the articular joints of the skeleton. Factors influencing joint disease include physical activity, occupation,

workload and advancing age, which manifest as degenerative joint disease and osteoarthritis. Alternatively, joint changes may have inflammatory causes in the *spondyloarthropathies*, such as septic or rheumatoid arthritis. Different joint diseases affect the articular joints in a different way, and it is the type of lesion, together with the distribution of skeletal manifestations, which determines the diagnosis (Rogers 2000; Roberts and Manchester 2005).

3.2.1 Degenerative Joint Change

The term joint change encompasses a large number of conditions with different causes, which all affect the articular joints of the skeleton. Factors influencing joint changes include physical activity, occupation, workload and advancing age, which manifest as degenerative joint disease and osteoarthritis. Alternatively, joint changes may have inflammatory causes in the *spondyloarthropathies*, such as sceptic or rheumatoid arthritis. Different joint diseases affect the articular joints in a different way, and it is the type of lesion, together with the distribution of skeletal manifestations, which determines the diagnosis.

Degenerative joint changes (DJC) are the most commonly observed of all the joint diseases. DJC is characterised by both bone formation (osteophytes) and bone resorption (porosity) at and around the articular surfaces of the joints, which can cause great discomfort and disability (Rogers 2001).

Two adult bones had slight DJC present in their joint surfaces. Porosity was observed on the inferior trochlear notch of a disarticulated left ulna, and on the trochlea of a distal left humerus. Both of these were found in Context 1405, the subsoil layer from F176.

3.2.2 Osteoarthritis

Osteoarthritis (OA) is a degenerative joint disease of synovial joints characterised by the deterioration of the joint cartilage, leading to exposure of the underlying bony joint surface. The resulting bone-to-bone contact can produce polishing of the bone termed 'eburnation'. Previously, other features were also associated with degeneration of the joint including osteophytes (bone formation) on the surface or around the margins, porosity on the joint surface and the development of cysts (Rogers 2000; Roberts and Manchester 2005). However, it is now believed that only eburnation alone should be used as a definitive indicator of osteoarthritis (Davina Craps *pers. comm.* 2015). OA is frequently associated with increasing age, but can be the result of mechanical stress and other factors, including lifestyle, food acquisition and preparation, social status, general health and body weight (Larsen 1997; Roberts and Manchester 2005). OA was only recorded as present when eburnation was observed.

Osteoarthritis was observed in the trochlea notch of the ulna from Context 1405.

3.3 CONCLUSION

Pathological analysis revealed that the neonate (9091) suffered from inflammatory lesions, indicating localised inflammation, possible due to birth-related trauma. New bone formation interspersed with hypervascularity suggests that the individual lived long enough for the bone to react. However, this

timespan was likely not extensive due to the fact that the bone of young individuals tends to respond rapidly. Periosteal reactions were also observed in two of the disarticulated bones and two further disarticulated remains (from Context 1405) provided evidence for DJC and osteoarthritis.

4.0 DENTAL HEALTH

Analysis of the teeth from archaeological populations provides vital clues about health, diet and oral hygiene, as well as information about environmental and congenital conditions (Roberts and Manchester 2005).

Only one half of the right mandible of an adult individual was present amongst the disarticulated bone from F176. One tooth was present in the jaw, with most of the dentition damaged post-mortem, and only root stems remained in the sockets. From F176, one loose deciduous left first maxillary molar (1569 AA) was recovered.

4.1 DENTAL WEAR

Dental wear tends to be more common and severe in archaeological populations than in modern teeth. Severity of the dental wear was assessed using a chart developed by Smith (1984). Each tooth was scored using a grading system ranging from 1 (no wear) to 8 (severe attrition of the whole tooth crown). The only remaining permanent tooth showed limited wear on its occlusal surface. This was categorised as stage two. Stage one wear was present on the deciduous molar from F179 (1569 AA).

4.2 CALCULUS

If plaque is not removed from the teeth effectively (or on a regular basis) then it can mineralise and form concretions of calculus on the tooth crowns or roots (if these are exposed), along the line of the gums (Hillson 1996, 255-257). Mineralisation of plaque can also be common when the diet is high in protein (Roberts and Manchester 2005, 71). Calculus is commonly observed in archaeological populations of all periods, although poor preservation or damage caused during cleaning can result in the loss of these deposits from the teeth (*ibid*, 64). The right second molar of the disarticulated adult mandible had calculus deposits present in the form of flecks on the buccal and mesial sides of the crown, as well as in slight form on the lingual aspect. The loose deciduous left first maxillary molar had slight calculus on the medial side.

4.3 PERIODONTAL DISEASE

Calculus deposits in-between and around the necks of the teeth can aggravate the gums leading to inflammation of the soft tissues (gingivitis). In turn, gingivitis can progress to involve the bone itself, leading to resorption of the bone supporting the tooth, and the loss of the periodontal ligament that helps to anchor the tooth into the socket (Roberts and Manchester 2005, 73). It can be difficult to differentiate between periodontal disease and continuous eruption (whereby the teeth maintain occlusion despite

heavy wear) in skeletal material, since both result in exposure of the tooth roots (*ibid*, 74). Evidence for periodontal disease was observed around the socket edges of the disarticulated mandible from F179.

4.4 DENTAL CARIES

Dental caries (tooth decay) forms when bacteria in the plaque metabolise sugars in the diet and produce acid, which then causes the loss of minerals from the teeth and eventually leads to the formation of a cavity (Zero 1999). Simple sugars can be found naturally in fruits, vegetables, dried fruits and honey, as well as processed, refined sugar; since the latter three contain the most sucrose they are most cariogenic. Complex sugars are usually less cariogenic and are found in carbohydrates, such as cereals. However, processing carbohydrates, including grinding grains into fine powders or cooking them, will usually increase their cariogenicity (Moynihan 2003). The single permanent tooth available for analysis (mandibular right second molar) had a small carious lesion on the mesial side of the crown. The loose deciduous left first maxillary molar had a large carious lesion on its distal aspect.

4.5 DENTAL CONCLUSIONS

Analysis revealed that the permanent tooth from F179 showed signs of caries, calculus and periodontal disease. The socket for the mandibular right first molar was slightly pinched in appearance, with a depression on the buccal side, which may be indicative of a healed abscess, indicative of poor dental hygiene. The deciduous molar from F176 showed further evidence of this in the form of calculus combined with a large caries lesion. The fact that the deciduous dentition was already affected by caries and calculus suggested that the dental health was worse than expected for the Roman period (Roberts and Cox 2003).

5.0 MORTUARY PRACTICE

The articulated burial of the neonate (9091) was located in Field 179, in the southern extent of the excavation in Area D, and was part of the fifth horizon, which was dated to the third to fourth centuries AD. The small burial pit was cut into the north-south running foundations [9279] of a red sandstone wall (9215) demarcating the north-western corner of a building, which contained several phases of an oven (9213). The pit was located below several occupation deposits. A melon bead (7061) and the head of a copper pin (7062) were recovered in the immediate surroundings of the burial, but a direct connection with the neonate could not be established. The neonate was buried in southwest-northeast orientation in what appeared to be a flexed position on the back and partly on the left side. The skeleton was tightly flexed on its back and may have been buried in a shroud.

The burial of neonates and infants in domestic contexts was common practice during the Roman period before the fourth century AD (Watts 1989, 372; Millett and Gowland 2015; Moore 2009, 33). It has been argued that Roman perception of the lifecycle led to differential treatment of individuals under a certain age – which is likely reflected in the burial record. In the case of Skeleton 9091 in F179, this is consistent with other sites which show evidence for the same treatment of neonatal infants such as, for example, at

Shiptonthorpe, East Yorkshire and Hayton in Cumbria (Millett and Gowland 2015). At Rudston Villa in East Yorkshire, nineteen infants were found under buildings (Stead 1980), and the Iron Age and Roman site at Wattle Sykes, East Yorkshire (Caffell and Holst 2013). Various reasons have been suggested for the exclusion of neonates and infants from cemeteries, including a reluctance to pay the cost of a formal funeral, a lack of acceptance of the infant as a full member of society, or the possibility that special significance was attributed to infant deaths (Scott 1999, Watts 1989).

Infanticide has been cited as a contributing factor to the number of neonatal deaths seen in Roman Britain (Mays 2000). This could have been practiced as a form of birth control and Mays (2000) has cited documentary evidence, the clustering deaths around 38 to 40 weeks (full term), and the often-observed adult sex imbalance in favour of males as evidence in support of this practice being carried out. However, the period around birth is particularly risky for infants, who will be exposed to being exposed to diseases, extremes in temperature, problems with breastfeeding or possibly unsuitable foods (if not breast-fed), not to mention the hazards of injury associated with birth itself (Scott 1999, Lewis 2007). All of these factors contribute to an increased risk of death around this age.

In F176, the bulk of the disarticulated human remains came from layer 1405, the subsoil layer covering most of the site. It post-dated the Roman activity of the area but the human bone could belong to any phase of activity.

One pelvis fragment from a possible male was recovered from the backfill of Professor John Wacher's 1959 trench in F176 and another layer (1480) post-dating the Roman phase contained a human tibia. Three context within the slope area in F176 yielded evidence of human remains, two of which were part of the collapse of the town wall (1488, 1491). The third layer contained rubble and was likely used to stabilise the eroding slope.

A roadside gully [1530] and a drain (1502) in F176 had fills that contained a frontal bone (1527) and a deciduous tooth (1569) respectively. Like most of the disarticulated bone on this site, these were most likely residual. Several neonate/infant bones were present in a rubble spread (1577) within Horizon 6, and this may indicate the presence of a burial, although this cannot be proven. The same layer featured copper and iron objects, as well as glass and pot sherds. One neonate rib fragment was present in a Roman demolition layer (1571).

Within the deposit around the trough (RF 6320) In F176, which consisted of compacted greenish sandy silt (1614), a fibula shaft fragment was found. In Horizon 6 the archaeologists recovered human bone from two other contexts – a levelling layer (1710) and a metalled surface (1711); these were adult remains and not of primary deposition. In fact, it was determined a likely that most of the remains had been disturbed several times. It is not clear where the bones originated, but most likely from a burial ground in the wider area.

In F179, the disarticulated remains were all recovered from different contexts across the site, from road curbs (9825 = layer likely used to patch road edge, contained partial skull), occupational deposits (8580 = contained partial dentition) and cleaning layers (8141 = contained neonate humerus). This suggests that

burials from elsewhere ante-dating the excavated contexts were disturbed and that the disarticulated material was secondary.

6.0 DISCUSSION AND SUMMARY

Although a total of 167 human bone fragments were recovered from 21 archaeological contexts in F176 and F179, all of these were disarticulated and only one articulated skeleton was found in F179. This belonged to a neonate (9091) who died between birth and one month old. The skull shows evidence for inflammatory lesions, which suggest that this individual suffered from inflammation to the skull or possibly birth related trauma to the skull. The neonate had been buried in a contracted position, with all limbs closely tucked into the body, which may indicate the presence of a cloth or shroud. No grave goods were uncovered, although a melon bead and a shroud pin were located in close proximity to the neonate; it was not possible to prove that these belonged to the burial. The burial itself had been cut into the foundations of the north-western corner of a large building, at the foot of the wall running north-south, in close proximity to a multi-phased oven. It related to one of the latest phases of activity at this site and dates to the third to fourth centuries AD.

The MNI for F176 was five individuals as indicated by the presence of two right adult femora, two right neonate/infant femora, and one juvenile clavicle. The overall MNI for both fields was five. In total, the MNI for F179 including the disarticulated and articulated remains was three. Two neonates were represented by two right humeri and all other disarticulated bone accounted for at least one adult.

In both fields, F176 and F179, the disarticulated human remains were spread out over the site and various phases, which suggests that they were most likely residual and came from burials elsewhere. One adult mandible from F179 with one tooth still present provided evidence of ante-mortem tooth loss, caries, calculus, periodontal disease and an abscess. A deciduous molar from F176 showed evidence for caries, calculus and limited wear, which suggests that dental hygiene was also poor in this individual – worse than the Roman norm (Roberts and Cox 2003) and that their diet was likely cariogenic.

In F176, most disarticulated human remains came from Context 1405, the subsoil layer covering most of the site. This layer also yielded two fragments of bone, which bore evidence for the presence of degenerative joint change and osteoarthritis of the elbow.

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APPENDIX A: OSTEOLOGICAL AND PALAEOPATHOLOGICAL CATALOGUE

Catalogue of Articulated Skeleton

Skeleton Number	**9091**
Preservation	G2; Good. Fragmentation: Slight
Completeness	60%
Age	Neonate; Birth - 1 month
Sex	-
Stature	-
Non-Metric Traits	-
Pathology	Skeleton 9091 has potential evidence for trauma on the parietal and right frontal bone superior of the orbit. There is porous bone present along the edge of the endocranial surface of the parietal, and the area affected is pitted. The pitted area is c. 1 cm in width and more greyish in colour than the rest of the cortical bone, which indicates the presence of new bone. The grey areas are running along the edge like a band and irregularly extend further towards the central area of the parietal. It is possible that this was sustained during birth. There is also slight porous bone present on some rib and long-bone ends, and the margins of the occipital bone. This is likely growth related and not pathological.
Dental Health	All teeth are unerupted and crowns have not fully developed yet. Only cusps present.

	Deciduous Right Dentition					Deciduous Left Dentition				
Present	U	U	-	-	-	-	-	-	U	-
Calculus	-	-	-	-	-	-	-	-	-	-
DEH	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-
Wear	-	-	-	-	-	-	-	-	-	-
Maxilla	**e**	**d**	**c**	**b**	**a**	**a**	**b**	**c**	**d**	**e**
Mandible	**e**	**d**	**c**	**b**	**a**	**a**	**b**	**c**	**d**	**e**
Present	-	-	-	-	-	-	-	-	-	-
Calculus	-	-	-	-	-	-	-	-	-	-
DEH	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-
Wear	-	-	-	-	-	-	-	-	-	-

Catalogue of Disarticulated Human Remains

Field	Context	Bone Element	Bone	Side	% of Bone	SP	No. of Fragments	Age	Sex	Other
176	1405	Complete	MT1	L	100	2	1	Adult	-	
176	1405	Complete	MT2	L	100	2	1	Adult	-	
176	1405	Complete	MT5	R	100	2	1	Adult	-	
176	1405	Complete	MT1	L	100	2	1	Adult	-	
176	1405	Complete	MT2	L	100	2	1	Adult	-	This metatarsal articulates with the above MT1; likely that these belong to same individual
176	1405	Complete	MT3	L	100	2	1	Adult	-	These articulate and likely belong to same individual
176	1405	Complete	MT4	L	100	2	1	Adult	-	
176	1405	Complete	MT5	L	100	2	1	Adult	-	
176	1405	Mid shaft + prox end	MC5	R	60	2	1	Adult	-	
176	1405	Distal end + midshaft	MC3	R	80	2	1	Adult	-	
176	1405	Complete	MC2	R	95	2	1	Adult	-	
176	1405	Prox end	MC1	L	10	2	1	Adult	-	
176	1405	Prox half	MC2	L	50	2	1	Adult	-	
176	1405	Prox half	MC3	L	50	2	1	Adult	-	
176	1405	Prox half	MC5	L	50	2	1	Adult	-	
176	1405	Complete	Capitate	L	95	2	1	Adult	-	
176	1405	Complete	Scaphoid	L	95	2	1	Adult	-	
176	1405	Distal end	Prox hand phalanx	-	10	2	1	Adult	-	
176	1405	Complete	Prox hand phalanx	-	95	2	1	Adult	-	Likely left second prox phalanx
176	1405	Complete	Prox hand phalanx	R	95	2	1	Adult	-	1st prox phalanx
176	1405	Complete	Prox hand phalanx	R	95	2	1	Adult	-	2nd prox phalanx
176	1405	Complete	Prox hand phalanx	R	95	2	1	Adult	-	3rd prox phalanx
176	1405	Complete	Prox hand phalanx	R	95	2	1	Adult	-	4th prox phalanx
176	1405	Midshaft frag	Intermediate hand phalanx	-	60	2	1	Adult	-	
176	1405	Complete	Navicular	R	90	2	1	Adult	-	Cortical defect in central talus articulation
176	1405	Complete	Patella	R	95	2	1	Adult	-	
176	1405	Dist half	Femur	R	35	2	4	YA	-	Growth line still slightly visible at dist epiphysis
176	1405	Distal half	Fibula	L	40	2	2	Adult	-	

176	1405	Mid+distal shaft	Fibula	R	20	2	1	Adult	-	
176	1405	Distal half	Distal foot phalanx	R	80	2	1	Adult	-	
176	1405	Complete	Prox foot phalanx	L	95	2	1	Adult	-	Likely 4th/5th phalanx
176	1405	Complete	Int hand phalanx	-	95	2	1	Adult	-	
176	1405	Complete	Int hand phalanx	R	95	2	1	Adult	-	
176	1405	Inferior apophyseal facets+ spinous process	Lumbar vert	-	40	2	1	Adult	-	
176	1405	Thoracic vert	Thoracic spinous process	-	10	2	1	Adult	-	
176	1405	Unfused	Rib head	R	10	2	1	Adult	-	Central rib, pedicle fused
176	1405		Rib shaft frags	-	5	2	2	Adult	-	
176	1405	Prox articulation facet	Tibia	-	<5	2	1	Adult	-	
176	1405	-	Generic long bone frags	-	<5	2	66	Adult	-	
176	1405	Fragment	Radial head	-	5	2	1	Adult	-	
176	1405	Lateral border of	Scapula	L	10	2	1	Adult	-	
176	1405	Unfused medial epiphysis	Clavicle	-	5	2	1	Juvenile	-	
176	1405	Midshaft frag	Radius	R	10	2	3	Adult	-	
176	1405	Midshaft frag	Radius	L	5	2	1	Adult	-	
176	1405	Prox shaft	Fibula	-	10	2	1	Adult	-	
176	1405	-	Generic pelvis frags	-	<5	2	1	Adult	-	
176	1405	Prox aspect	Ulna	R	20	2	1	Adult	-	
176	1405	Prox aspect	Ulna	L	20	2	1	Adult	-	Slight porosity + eburnation in inferior trochlear notch
176	1405	Midshaft frag	Radius	L	20	2	1	Adult	-	
176	1405	Recently fused partial head	Humerus	?	10	2	1	YA?	-	Fusion line still visible
176	1405	Dist end and dist shaft	Humerus	R	10	2	1	Adult?	-	

176	1405	Dist end	Humerus	L	10	2	1	Adult?	-	Porosity in trochlear notch
176	1405	Almost complete	Tibia	R	80	2	2	Adult	-	
176	1405	Dist shaft frag	Femur	L	10	2	1	Adult?	-	
176	1405	Mostly complete	Talus	R	80	2	1	Adult	-	
176	1405	Mostly complete	Calcaneus	L	80	2	1	Adult	-	
176	1405	Dist half; unfused	Femur	L	40	2	1	N	-	
176	1405	Dist aspect of shaft	Humerus	R	20	2	1	Adult?	-	
176	1405	Midshaft frag	Ulna	L	15	2	1	Adult?	-	
176	1429	Sciatic notch, acetabulum , ilium	Os coxa	L	60	3	1	Adult	M?	
176	1480	Mid-shaft	Tibia	R	40	3	4	Adult	-	Well integrated lamellar bone on medial and lateral aspects
176	1482	Midshaft frag+ prox end	Femur	R	30	3	1	Adult	-	
176	1482	Midshaft frag	Tibia	R	50	2	2	Adult	-	
176	1488	Dist shaft; unfused	Femur	R	30	4	1	Juvenile	-	
176	1491	-	Calcaneus	R	60	2	1	N	-	
176	1527	Central part	Frontal bone	-	50	3	3	Adult	-	Several arachnoid granulations
176	1569 (AA)	Dentition	Deciduous left first maxillary molar	L	70	2	1	Juvenile	-	Calc: Sm; Caries: Ld; Wear: 1
176	1571	Shaft	Rib	L	80	2	1	N	-	
176	1577	unfused	Humerus	L	80	4	1	N/I	-	66mm = NB-0.5
176	1577	Unfused Shaft + prox end	Ulna	L	80	3	1	N	-	
176	1577	Complete shaft; unfused	Femur	R	80	2	1	N	-	82mm= NB-0.5; new bone on shaft, possibly growth related
176	1614	Shaft frag	Fibula	R	30	3	4	Adult	-	Signs of periosteal reaction in the form of lamellar bone; especially pronounced on posterior surface of shaft
176	1710	Unfused	Femur	R	80	2	1	Infant	-	76mm= NB-0.5
176	1711	complete	Prox foot phalanx	R	100	2	1	Adult	-	

176	1961	Midshaft frag	Femur	R	30	3	1	Adult	-	
179	8141	complete – unfused	Humerus	R	90	3	1	N	-	66.9mm: NB – 0.5 years
179	8580	Mid + R side	Mandible	R	60	3	1	A	M?	Tooth: Present;Calc;Car;Wear RM3: - RM2: P; Sa; - ; 2 RM1: AM (abscess) RP2: PM RP1: RO RC: RO RI2: RO RI1: RO LI1: PM LI2: PM LC: RO (broken PM) LP1: PM LP2: PM LM1: - LM2: - LM3: - Abscess at RM1 healed but area around socket depressed, Slight periodontal disease
179	8944	Complete	First metatarsal	R	90	3	1	18+	-	-
179	9021	Complete shaft	Ulna	R	70	5	1	18+	-	-
179	9100 (AA)	Complete	Intermediate hand phalanx	-	90	2	1	N	-	-
179	9100 (AA)	Complete	Distal hand phalanx	-	90	2	1	N	-	-
179	9100 (AA)	Complete	Distal hand phalanx	-	90	2	1	N	-	-
179	9342	-	Unidentified	-	-	-	1	-	-	-
179	9825	Anterior portion of both parietal bones	Skull	L+R	50	2	2	18+	-	Sagittal suture partially obliterated; hypervascularity on ectocranial surface

Key: SP = Surface preservation: grades 0 (excellent), 1 (very good), 2 (good), 3 (moderate), 4 (poor), 5 (very poor), 5+ (extremely poor) after McKinley (2004a); C = Completeness; F = Fragmentation: min (minimal), sli (slight), mod (moderate), sev (severe), ext (extreme)

Non-adult age categories: f (foetus, <38 weeks *in utero*), p (perinate, c. birth), n (neonate, 0-1m), i (infant, 1-12m), j (juvenile, 1-12y), ad (adolescent 13-17y)

Adult age categories: ya (young adult, 18-25y), yma (young middle adult, 26-35y), oma (old middle adult, 36-45y), ma (mature adult, 46+y), a (adult, 18+y)

R – Right; L – Left; DJC – degenerative joint changes; OA - osteoarthritis

Present - Tooth presence; am - ante-mortem tooth loss; pm - post-mortem tooth loss; p - tooth present; - - jaw not present
Caries - Calculus; F - flecks of calculus; S - slight calculus; M - moderate calculus; H - heavy calculus; a - all surfaces; b - buccal surface; d - distal surface; m - mesial surface; l - lingual surface; o - occlusal surface
DEH - dental enamel hypoplasia; l - lines; g - grooves; p - pits
Caries - caries; s - small lesions; m - moderate lesions; l - large lesions

Wear - dental wear; numbers from 1-8 - slight to severe wear
MT – metatarsal; MC - metacarpal