Osteological Analysis

Mile End

Pocklington

East Riding of Yorkshire

Site Code: 5.32.2016
NGR: SE 8060 4980

Report No 1418
September 2018

Prepared for

MAP Archaeological Practice Ltd
Showfield Lane
Malton
North Yorkshire
YO17 6BT

Prepared by

Paola Ponce and Malin Holst
York Osteoarchaeology Ltd
75 Main Street
Bishop Wilton
York YO42 1SR

TABLE OF CONTENTS

Summary

York Osteoarchaeology Ltd was commissioned by MAP Archaeological Consultancy Ltd to carry out the osteological analysis of five skeletons recovered during excavations at Mile End, Pocklington, East Riding of Yorkshire (NGR: SE 8060 4980) prior to a housing development. The five burials were buried dispersed across the southwestern side of the excavated area and date to the Iron Age.

The five individuals were buried in crouched positions in a variety of grave types, including plain graves, a round barrow and a square barrow, with Skeleton 424 buried in a chariot, with two horses, a brooch and a number of pig bones indicative of feasting, while Skeleton 303 was interred with eight spear heads and a shield.

Osteological analysis revealed that there were three were adults and two non-adults. Skeleton 274 was a young adult female, Skeleton 303 was a young adult male and Skeleton 424 was a mature adult male. Skeleton 358 was an older juvenile aged seven to eight years and Skeleton 2317 was a late term foetus/perinate.

The perinate did not display any evidence for pathology. The female and juvenile had *cribra orbitalia* in the orbits, a condition associated with poor health and/or poor diet in childhood. The two males displayed evidence of trauma, with Skeleton 303 having sustained two nasal fractures and blunt force trauma to the frontal bone, which may have been incurred in the same incident. Skeleton 424 had a broken rib, a fracture termed *spondylolysis* of the fifth lumbar vertebra and *myositis ossificans traumatica* of the left femur, a condition that is caused by local trauma to a muscle or tendon by an external force. Minor congenital anomalies were observed in the young adult male and juvenile. The young adult male also suffered from chronic sinusitis. Advanced degenerative joint disease in the spine and extra-spinal joints were noted in the mature adult male. This degeneration was likely due to a combination of daily wear and tear and advancing age. This individual is also thought to have suffered from osteoporosis, based on macroscopic analysis of the bones.

Dental plaque concretions were the most common form of dental pathology, followed by periodontal disease. The two young adults had dental enamel hypoplasia, a condition caused by periods of stress, such as malnutrition or disease during the first seven years of childhood.

Acknowledgements

York Osteoarchaeology Ltd would like to thank Paula Ware, Max Greeves and Catherine Chapman from MAP Archaeological Consultancy Ltd for their help and support.

1.0 INTRODUCTION

In August 2018, York Osteoarchaeology Ltd was commissioned by MAP Archaeological Consultancy Ltd to carry out the osteological analysis of five skeletons. The skeletons were recovered during excavations at Mile End, Pocklington, East Riding of Yorkshire (NGR: SE 8060 4980), ahead of a housing development.

Mile End is a multi-period site, with Neolithic and Bronze Age features, Iron Age burials and an Anglo-Saxon enclosure. The skeletons were located on the southwestern side of the excavation area, along The Mile and dated to the Iron Age. The site is located approximately 1km to the north of a recently excavated Iron Age and Anglo-Saxon cemetery at Burnby Lane (Caffell and Holst 2018).

Three of the burials were in plain graves, while one (Skeleton 424) was a chariot burial accompanied by two horses, and another (SK 303) was interred in a round barrow, buried with seven spear heads and a shield (Table 1).

Table 1 Summary of articulated skeletons

Sk No	Burial type	Position	Orientation	Artefacts	Notes
274	Plain	Crouched, lying on left side	N-S	-	Buried facing down with both hands underneath the left side of the face
303	Plain central inhumation in round barrow	Crouched, lying on left side	N.NE-S.SW	Cu Al shield components x4, FE spear heads x5, bone spear heads x3	Buried with both hands close to the face
358	Plain	Crouched, lying on left side	N-S	-	Buried with both hands underneath the left side of the face
424	Square barrow	Crouched, lying on right side	N-S	2 horses, bronze/Cu Al objects, including an Arras type brooch, pig bones	Chariot burial with both hands close to the face
2317	Plain	Partially articulated but badly disturbed by ploughing. Possibly crouched	W-E	Frags of pottery and slag	The skeleton is not in a grave cut and appears to have been buried in a possible industrial/rubbish pit

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 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 5 skeletons is given in Table 2, with a detailed catalogue of skeletons provided in Appendix A.

Table 2 Summary of osteological and palaeopathological results

Sk No	Frag.	SP	Comp. (%)	Age	Age Group	Sex	Dental Pathology	Skeletal Pathology
274	Minimal	1	95	18-25 years	YA	F	Calculus, DEH	Spina bifida, bilateral cribra orbitalia
303	Minimal	2	95	18-25 years	YA	M	Calculus, DEH, PD, impacted 3rd molar, dental fissures	Nasal fractures and possible related blunt force trauma to the frontal bone. Transitional L5 and S1 with neural arch cleft. Maxillary sinusitis
358	Minimal	4	95	7-8 years	OJ	I	Calculus, dental fissures	Cribra orbitalia. L5 with bifid spinous process and separated left lamina from the vertebral body
424	Severe	3	90	46+ years	MA	M	Calculus, PD, abscess, AMTL	Complete bilateral spondylolysis of L5, *myositis ossificans traumatica* of L femur, healing fracture of unsided mid thoracic rib. Osteoporosis. Spinal and extraspinal degenerative joint changes.
2317	Severe	2	60	38 weeks *in utero*	Foetus/perinate	I	-	-

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); Comp = Completeness; Frag = 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; OA = Osteoarthritis; DJC = Degenerative Joint Changes; DEH= dental enamel hypoplasia; PD= periodontal disease

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.

Skeletons 274, 303, and 358 displayed minimal degrees of fragmentation, while Skeletons 2317 and 424 had undergone severe fragmentation. Likewise, surface preservation ranged from very good to poor. Some degree of surface detail was lost in Skeleton 358, whose surface preservation was poor.

The completeness of four skeletons ranged from 90-95%, while only 60% of Skeleton 2317 was represented.

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.

Five mental eminences of the mandible and right proximal femora were present, giving an overall MNI of five individuals at the Mile End, Pocklington.

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 and completeness 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.

There were three adults (Skeletons 274, 303 and 424). Skeletons 274 and 303 were young adults, aged eighteen to 25, while Skeleton 424 was a mature adult, aged 46 years old or older. Skeleton 358 was an older juvenile, aged seven to eight years, while Skeleton 2371 was a foetus or perinate, aged up approximately 38 weeks *in utero* (see Table 2).

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.

Skeleton 274 was female, while Skeletons 303 and 424 were male (see Table 2). It is not possible to assess sex in non-adults.

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*).

The stature was calculated in all three adults. The female was 155.6cm tall. This is slightly shorter than the mean female stature at the nearby Burnby Lane cemetery, where the mean female living height was 163.0cm and female stature ranged from 149.7cm to 171.3cm (4'11" to 5'7½"; Caffell and Holst 2018). The Mile End female height was also shorter than the national mean Iron Age stature for females (162cm; Roberts and Cox 2003, 103).

Male Skeleton 303 was 168.2cm tall, while Skeleton 424 was 173.9cm tall. Male stature at Burnby Lane ranged from 174.9cm to 177.7cm (5'8¾" to 5'10"), with a mean of 176.6cm. In comparison, the mean stature in the Iron Age was 168cm for males (Roberts and Cox 2003, 103).

In addition to the stature, leg measurements were obtained from both femora (for Skeletons 274 and 303) and the right femur for Skeleton (424). These were used to calculate the shape and robusticity of the femoral shaft (*platymeric* index; Bass 1987). The femora of Skeleton 274 were *eurymeric* (rounded), those of Skeleton 303 were *platymeric* (broad and flattened from front to back) and that of Skeleton 424 also *platymeric*.

Leg measurements were also obtained from both tibiae of the three adult skeletons to calculate the shape and robusticity of the tibial shaft (*platycnemic* index) (Bass 1987). The tibiae of Skeleton 274 were *eurycnemic* (broad), those of Skeleton 303 displayed slight variation, as the right tibia was *eurycnemic* and the left was *mesocnemic* (moderate). The right tibia of Skeleton 424 was *eurycnemic,* while the left tibia was *platycnemic* (very flat), however, the measurement on the left tibia was taken on a broken bone that required putting the pieces together which may have led to an unreliable measurement.

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. These were anomalies that would not have affected the individual. Only the results for the adult skeletons are presented here.

It was possible to observe a small number of cranial and post-cranial non-metric traits in the three adult skeletons from Mile End, Pocklington.

In the skull, *ossicles* (additional bones in the sutures) were identified in the lambdoid suture of Skeleton 274 (young adult female). Bennett (1965) has suggested that the formation of *ossicles* in the lambdoid suture may be in response to stresses placed on the growing cranium during foetal life and early infancy. Other cranial *ossicles* included a right asterion and left pterion in Skeleton 303 (young adult male) and a bilateral ossicle at pterion in Skeleton 274. Skeletons 424 (mature adult male) and Skeleton 303 displayed p*arietal foramina* (small holes near the sagittal suture), the former individual in the right parietal and the latter in the left parietal. *Sutural mastoid foramen and extrasutural mastoid foramen* (additional holes located behind the ears for the passage of capillaries) were found in the left mastoid process of Skeleton 303 and bilaterally in Skeleton 424 respectively. Variation in the small holes found in the base of the cranium occurred, with *posterior condylar canal open*, *open foramen spinosum* and *incomplete foramen ovale* being particularly frequent in Skeletons 274 and 303. The first and second traits listed were seen on their right condyles, and right *foramina spinosum*, and the third trait was seen on the right *foramen ovale* of Skeleton 274 and on the left side of Skeleton 303. Skeleton 424 displayed a right

supraorbital notch bridged (small hole in the facial skeleton). In the jaw bones and palate, a bony nodule or *maxillary torus* was observed on the right maxilla of Skeleton 424 and an *accessory lesser palatine foramen* was present on the right maxilla of Skeleton 303.

Several post-cranial non-metric traits were observed, with both Skeletons 274 and 303 having bilateral *lateral tibial squatting facets* (additional facets in the ankle region) in addition to bilateral *medial tibial squatting facets* in Skeleton 303. *Peroneal tubercles* (nodules of bone on the calcaneus) were seen on the right and left ankles of Skeletons 303 and 424 respectively. Also, in the ankle region of Skeleton 303 a bilateral *double anterior calcaneal facet* (variation in the joint between the talus and calcaneus) was observed. In the leg, Skeleton 274 exhibited a left *Allen's fossa* (honeycombed areas of bone on the femoral neck), and Skeleton 424 had a right *Poirier's facet* (extension of the joint surface of the femoral head) and *exostosis* on the left trochanteric fossa (spicules of bone). In the pelvic area, Skeleton 303 had bilateral *accessory sacral facets* (extra articular facets in the sacrum), and an acetabular crease (indentation) on the right acetabulum of the pelvis. Finally, Skeleton 424 displayed bilateral *circumflex sulcus* (a groove in the shoulder blade).

2.7 CONCLUSION

The five skeletons from Mile End, Pocklington, displayed variation in the degree of fragmentation as three out the five skeletons were minimally fragmented, but Skeletons 2371 and 424 were severely fragmented. Completeness ranged between 90-95% in four skeletons, while Skeleton 2371 was only complete by 60%.

With regards to sex and age, it could be determined that the small skeletal assemblage consisted of three adults and two non-adults. Skeleton 274 was a young adult female aged 18-25 years old, Skeleton 303 was a young adult male aged 18-25 years old, and Skeleton 424 was a mature adult male aged 46+ years old. In the non-adult group, Skeleton 358 was an old juvenile aged seven to eight years old and Skeleton 2371 was a foetus/perinate aged up approximately 38 weeks *in utero*.

Stature could be estimated for the three adults, all of whom were shorter than the mean for the nearby Burnby Lane cemetery population. The female was also shorter than national Iron Age mean, while he males were taller than the Iron Age male mean stature.

Finally, a small number of cranial and post-cranial non-metric traits were observed, with the traits in the ankles (*lateral* and *medial squatting facets*) of Skeletons 274 and 303 suggesting that these individuals engaged in habitual squatting.

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. More detailed descriptions of the pathological lesions observed can be found in Appendix A.

3.1 METABOLIC CONDITIONS

Humans require an adequate supply of nutrients during childhood to support normal growth and development. Particular conditions are associated with the lack of specific nutrients, for example scurvy results from a diet lacking in vitamin C (found in fresh fruit and vegetables and marine fish) and rickets from a lack of vitamin D (produced by the body during exposure to sunlight). Diagnosis of nutritional deficiencies in ancient populations is complicated by the fact that the skeletal changes can be difficult to diagnose and that nutritional deficiencies tend not to occur in isolation (a diet deficient in one nutrient is very often deficient in others). In addition, many of the skeletal changes that develop in a child as a response to nutritional deficiency will be largely remodelled by the time the individual reaches adulthood (Ortner 2003, Lewis 2007).

3.1.1 *Cribra Orbitalia*

Cribra orbitalia, or fine pitting of the orbital roof, tends to develop during childhood and often recedes during adolescence or early adulthood. Until recently, it was thought to be related to iron deficiency anaemia, a condition with complex causes linked to the environment, hygiene and diet (Stuart-Macadam 1992). However, a recent study has suggested that other forms of anaemia are more likely causes (Walker *et al.* 2009). These include megaloblastic anaemia, which results following a diet deficient in Vitamin B_{12} (found in animal products) and/or folic acid and haemolytic anaemia (e.g. sickle cell anaemia and thalassemia, found in areas of the Old World prone to malaria). It was also suggested that chronic infections and scurvy (Vitamin C deficiency) may have led to the development of *cribra orbitalia* in Europe (*ibid*). While the exact aetiology of this condition remains contentious (Oxenham and Cavill 2010), it is generally accepted that this pitting relates to unhygienic environments and/or dietary deficiency. *Cribra orbitalia* is commonly observed in archaeological populations, particularly associated with agricultural economies (Roberts and Cox 2003) and is often used as an indicator of general stress (Lewis 2000, Roberts and Manchester 2005).

Skeletons 274 and 358 (young adult female and older juvenile) showed evidence for *cribra orbitalia* in both orbital roofs.

3.1.2 Osteoporosis

Osteoporosis is the loss of bone mineral content and density, which leads to structural changes in the bone architecture and its incapacity to withstand load bearing (Brickley and Ives 2008). It is a multifactorial condition, in other words, its aetiology is linked with a number of variables, one of which is increasing age, as the condition does not manifest before the fifth decade. Furthermore, osteoporosis appears to be sex-biased as females are more frequently affected than males, particularly after menopause (Ortner 2003). Other contributory variables that can play a role are genetics, physical activity, nutrition and lifestyle (Brickley and Ives 2008).

Possible osteoporosis was diagnosed macroscopically in Skeleton 424 by the reduction of weight in bones relative to other bones of the same size, which can be subjective, in addition to the difficulty in differentiating between bone mineral loss as a result of osteoporosis or because of taphonomic processes. However, the long bones of the limbs, the ribs, the spine, and the pelvis of Skeleton 424 appeared to be very light in weight without showing evidence for post-mortem damage. Some of the long bones broken post-mortem showed the medullary cavity displaying an abnormal loss of bone mass. According to Ortner (2003, 410) osteoporosis can be caused by osteomalacia, rickets, hyperparathyroidism, cancer and malnutrition. However, osteoporosis is most commonly associated with hormonal changes associated to ageing. Although more frequent among females undergoing menopause, males after the fifth decade can also suffer from diminished bone mass (*ibid*, 411). Although considered a condition of low prevalence in past populations (*ibid*, 410) osteoporosis is present in palaeopathological examples and individuals that lived sufficiently long enough to acquire the disease. It is possible that Skeleton 424 developed senile osteoporosis due to his advanced age.

Notably, the skull of Skeleton 424 appeared to have suffered from biparietal atrophy or thinning. Barnes (2012, 16) suggests that parietal thinning is a developmental defect of the diploë (the inner layer of the skull). An alternative diagnosis for biparietal thinning in this individual could be the presence of osteoporosis associated with ageing. However, Ortner (2003, 415) argues that the association between parietal atrophy and osteoporosis is problematic.

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 changes 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).

Only Skeleton 424 (mature adult male) displayed evidence for degenerative joint changes. Therefore, the following section will focus on the spinal and extraspinal joint changes observed in this individual.

3.2.1 Degenerative Joint Changes

The most common type of joint disease observed tends to be degenerative joint changes (DJC). Degenerative joint changes are 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).

The spinal areas affected by degenerative joint changes of Skeleton 424 were the superior and inferior bodies of all cervical, thoracic and lumbar vertebrae, except for the second thoracic and fourth lumbar

vertebrae. These changes ranged from mild to severe. In addition to this, the superior, inferior and rib articular facets were also affected by DJC, but only to a mild degree or moderate degree.

The extraspinal joints of Skeleton 424 affected by mild degenerative joint changes (DJC) were the medial aspect of the left clavicle (where the clavicle articulates with the sternum), both shoulders, both wrists, as well as both knees and certain joints of the toes. Moderate and severe degenerative joint changes (DJC) were observed in the pelvis, in both acetabuli (where the hip joint articulates with the femur) and both auricular surfaces (where the hip bone articulates with the sacrum).

3.3 Schmorl's Nodes

Schmorl's nodes are another condition that can affect the spine. They manifest as indentations in the upper and lower surfaces of the vertebral bodies caused by the pressure of herniated vertebral discs (Aufderheide and Rodríguez-Martín 1998). Discs may rupture due to trauma, but vertebrae weakened by infection, osteoporosis or neoplastic disease may be more vulnerable (Roberts and Manchester 2005). Schmorl's nodes are often associated with degenerative changes to the vertebral bodies (Aufderheide and Rodríguez-Martín 1998, Hilton et al. 1976) and are most commonly seen in the lower thoracic vertebrae (Hilton et al. 1976).

Schmorl's nodes were observed in the spines of Skeleton 303 (young adult male) and Skeleton 424 (mature adult male). In the former case, the lesions ranged from mild in the vertebral bodies of five thoracic vertebrae (seventh to ninth and eleventh to twelfth) to moderate in the first lumbar vertebra. In Skeleton 424, the affected vertebrae followed a similar pattern as those described for Skeleton 303, where the ninth to twelfth thoracic and the lumbar vertebrae displayed lesions that ranged from mild to moderate.

3.4 CONGENITAL CONDITIONS

Heredity and environment can influence the embryological development of an individual, leading to the formation of a congenital defect or anomaly (Barnes 1994). The most severe defects are often lethal, and if the baby is not miscarried or stillborn, it will usually die shortly after birth. Such severe defects are rarely seen in archaeological populations, but the less severe expressions often are, and in many of these cases the individual affected will have been unaware of their condition. Moreover, the frequency with which these minor anomalies occur may provide information on the occurrence of the severe expressions of these defects in the population involved (*ibid*), and may provide information on maternal health (Sture 2001).

3.4.1 Transitional Vertebrae

The vertebrae are divided into different groups by 'borders', and during development each group receives instructions governing the type of vertebrae into which they will develop. If these borders move up or down the spine then a vertebra becomes incorporated into an adjacent group, receives the wrong instructions, and takes on the characteristics of the new vertebra type (Barnes 1994, 79). The resulting

vertebrae are termed 'transitional vertebrae'. Border-shifts have the effect of increasing the number of vertebrae in a group but do so by reducing the number present in the adjacent group. The overall number of vertebrae remains the same, which is not the case with genuine additional segments or reductions in the number of segments.

Skeleton 303 (young adult male) displayed a border shift between the lumbar and sacral regions. The fifth lumbar vertebra had adopted features of the first sacral segment.

3.4.2 Cleft Neural Arches

The two halves of the neural arch normally surround and protect the spinal cord, but they can fail to unite during development leaving a cleft in the back of the vertebra. However, the spinal cord remains protected as the gap is bridged by a tough fibrous tissue (Barnes 1994, 117-120). Cleft neural arches are most common at the border regions between the vertebra types, especially in the sacrum where the entire bone may be involved (Barnes 1994, 119-120). Cleft sacral arches have often been termed 'spina bifida occulta' in the palaeopathological literature, but the causes of cleft arches and true spina bifida are quite different, and cleft neural arches are not related to the more severe spina bifida cystica (ibid).

Three of the five skeletons from Mile End displayed some form of cleft neural arches. In Skeleton 303 (young adult male) the spinous process of the first sacral segment was cleft and did not unite in the mid-line of the bone. It is not known if the sacrum was formed of four or five segments, as the bone was poorly preserved and only the first to the third sacral segments survived.

In Skeleton 358 (older juvenile) the spinous process of the fifth lumbar is bifid in the midline where the right and left laminae meet. The union between the laminae occurs between the age of four to five years, but as Skeleton 358 was between seven to eight years old and this trait was only seen in the fifth lumbar vertebra it can be surmised that the anomaly was developmental. The neural arches of the first to the third sacral segments were also cleft but these fuse to their bodies between the age of seven and fifteen and may have fused had the individual lived. Additionally, the left lamina of the fifth lumbar was not united to the left articular process. The union of the arches with the vertebral body starts between the second and third year and completes by the age of four. As stated before, the age at death of Skeleton 358 supports the congenital aetiology of this anomaly.

Plate 1 *Spina bifida occulta* in the sacrum of Skeleton 274

Finally, in Skeleton 274 (young adult female) the laminae of the first to fifth sacral segments appear deformed or absent without development of the spinous processes. The sacrum presented complete cleft neural arches consistent with *spina bifida* (Plate 1). Depending on the severity of the

condition, *spina bifida* can either be '*occulta'* or '*cystica',* based on the extent of failure of the neural arches to close and the potential of the spinal cord and nerve covered by dura mater to protrude outward (*meningomyelocele*; Barnes 2012, 76-80). Differentiating between both types in archaeological cases where these soft tissues do not survive can be challenging. However, the fact that the individual lived to adulthood means that this individual suffered from *spina bifida occulta*, since *spina bifida cystica* would have been incompatible with life in the Iron Age.

3.5 TRAUMA

Obviously, the evidence for trauma in archaeological populations is restricted to that visible in the skeletal remains, unless soft tissue is preserved (Roberts and Manchester 2005, 85-86). Therefore, most of the soft-tissue injuries sustained by archaeological populations will be invisible, although occasionally soft tissue injuries can be inferred though ossification of the tissues at the site of damage, known as *myositis ossificans* (ibid). Much of the evidence for trauma in archaeological populations focuses on fractures to the bones (Roberts and Manchester 2005, 84-85), although long standing well-healed fractures may be hard to detect (Jurmain 1999, 186).

The evidence for trauma from Mile End, Pocklington comes from the two males recovered from the small assemblage of human remains, Skeletons 303 and 424.

3.5.1 Ante-Mortem Cranial Trauma

Skeleton 303 (young adult male) ante-mortem fractures to both nasal bones. The right nasal bone had a fracture line 1.8mm in length and emerged from the internasal suture, just below its nutrient foramen in a medio-lateral direction. On the exact opposite side of the internasal suture, the left nasal bone had sustained a fracture of 10.4mm in length that emerged from the internasal suture and extended the full length of the bone in a medio-lateral direction. The fragment appeared slightly displaced and overlapped (Plate 2).

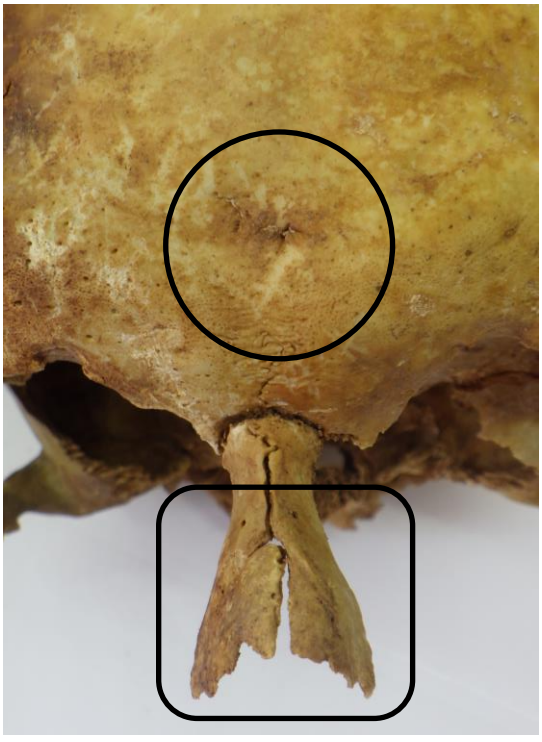

Plate 2 Fractured nasal bones (squared) and possible blunt force trauma in the frontal bone (circled) of Skeleton 303

In addition to this, the frontal bone of this individual showed evidence for healed blunt force trauma, located 17.6mm superiorly from the frontal-nasal suture that measured 8.1mm in length (Plate 2). This lesion was slightly displaced to right side from the midline of the bone. It can be hypothesised that due to its proximity with the nasal fractures, both injuries are linked as they may represent one single episode of trauma.

3.5.2 Ante-Mortem Post-Cranial Trauma

Skeleton 424 (mature adult male) had a fracture of an unsided mid thoracic rib fragment. The fragment displayed an oblique fracture crossing its diaphysis that shows signs of healing at the time of death. Deposits of new woven bone formation held the broken ends together around the fracture line may suggest that despite being fragile, the disorganised woven bone provided sufficient stability at the fracture site (Plate 3). This degree of healing may suggest that the fracture took place more than three weeks prior to death.

Plate 3 Unsided mid thoracic rib of Skeleton 424 with a healing fracture

According to Brickley and Smith (2006), rib fractures have often been interpreted as resulting from direct trauma such as a blow (i.e. while boxing) or a fall against a hard object, but they can also result from interpersonal violence and assault.

In addition to the rib fracture, Skeleton 424 also had a lesion on his left femur indicative of *myositis ossificans traumatica*. The anterior-proximal aspect of the left femoral diaphysis displayed a raised spicule of bone that measured 21.5mm in cranio-caudal length and 11.0mm at its widest point medio-laterally (Plate 4). This was the result of local trauma to the *vastus intermedius* muscle (one of the heads of the *quadriceps femoris*), which led to an inflammatory response and the formation of a small spicule of bone on the affected area.

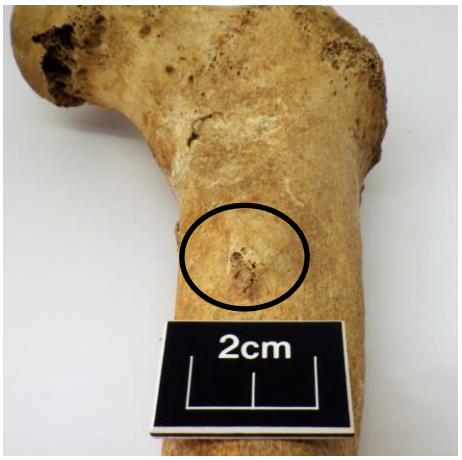

Plate 4 Ossification of *vastus medialis* of Skeleton 424, known as *myositis ossificans*

The fifth lumbar vertebra of Skeleton 424 exhibited a complete separation of its body from the *pars interarticularis,* which is consistent with *spondylolysis*. *Spondylolysis* refers to the separation of the neural arch of a vertebra from the body just beneath the superior articular facets at the pars interarticularis. Debate has focussed on whether the condition is congenital, develops as a result of trauma, or requires a combination of trauma and an underlying developmental weakness (Ortner 2003). It is possible that repeated stress placed on the lower back, for example through bending and lifting, or movements associated with activities such as dancing, gymnastics, weight lifting, kayaking, wrestling, long jumping and playing football may lead to the development of *spondylolysis* (Roberts and Manchester 2005, 106; Galloway 1999, 101). Dandy and Edwards (2003, 433) also indicate that *spondylolysis* may be more common in young, active individuals, particularly athletes. The affected individual may suffer from slight discomfort in their lower back (Roberts and Manchester 2005, 107). Only the left side of the *pars interarticularis* has been recovered.

3.6 INFECTIOUS DISEASE

Infectious disease can involve the skeleton, but since bone cannot respond quickly only evidence for chronic, longstanding infections can be observed in archaeological skeletal remains (Roberts and Manchester 2005, 167). Acute conditions, where the patient either recovers or dies within a short space of time will not be seen. Initial bone formation in response to infection is disorganised (woven bone), but with time, as healing takes place, woven bone is remodelled and transformed into lamellar bone. Consequently, woven bone presence indicates an infection that was active at the time the person died, whilst lamellar bone indicates an infection that had healed; a combination of both suggests a recurring or longstanding infection (ibid). Although specific diseases may cause new bone to be deposited on the skeleton, it is almost always impossible to diagnose these from the bones alone. Hence, evidence for infection is discussed as 'non-specific' infection.

3.6.1 Maxillary Sinusitis

Infection of the maxillary sinuses can result from upper respiratory tract infections, pollution, smoke, dust, allergies, or a dental abscess that has penetrated the floor of the sinus cavity (Roberts and Manchester 2005, 174-176). Skeleton 303 (young adult male) showed evidence bilateral maxillary sinusitis.

3.7 MISCELLANEOUS PATHOLOGY

A number of lesions were observed that either did not fit into the categories discussed above or were ambiguous in terms of what caused them. These included abnormalities observed in the sixth to tenth ribs from the right side of the thorax and the sixth, seventh and ninth ribs from the left side of Skeleton 274 (young adult female). The sternal ends of these ribs appear to be abnormally bent inwards into the thoracic cage. Other ribs with sternal ends present did not exhibit this the malformation, including the right and left eleventh and twelfth ribs. The sternum of this individual looked normal and did not display abnormalities. It is therefore not known if the abnormality in the ribs represents normal variation or is the result of are the results of constriction of the chest, such as from a corset, which would be highly unusual in this period. The abnormalities observed do not appear to be congenital in origin but acquired/developed. Further research would be required into these abnormalities as only a cursory consideration has been possible.

3.8 CONCLUSION

Four of five individuals from Mile End, Pocklington showed manifestations of some form of skeletal pathology. Skeletons 274 (young adult female) and older juvenile (skeleton 358 showed evidence for childhood stress in the form of *cribra orbitalia*. Several minor developmental anomalies were observed, involving the lower part of spine (fifth lumbar vertebra and sacrum) of Skeletons 303, 358 and 424.

Trauma was observed in the two adult males (Skeletons 303 and 424), including two healed nasal fractures and blunt force trauma to the skull of Skeleton 303, as well as soft tissue trauma (*myositis*

ossificans traumatica), a healing rib fracture and complete bilateral *spondylolysis* in the fifth lumbar vertebra of Skeleton 424. Skeleton 303 (young adult male) suffered from chronic sinusitis.

Degenerative joint changes were observed in the spinal and extraspinal joints of mature adult male Skeleton 424. These changes are likely related to daily wear and tear and advancing age. The same skeleton also suffered from likely age-related osteoporosis.

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).

The dentitions at Mile End, Pocklington were well preserved for analysis. Overall, there were 120 tooth positions and 92 teeth preserved for analysis. A total of 25 teeth had been lost ante-mortem and not a single tooth was recorded as not present/unerupted. All the teeth lost ante-mortem came from mature adult male Skeleton 424. Skeleton 2371 (perinate) had no teeth preserved for analysis, so the following section will focus on the dentition of the remaining four individuals that constituted the sample.

4.1 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).

Calculus deposits were observed on the dentitions of all adults (Skeletons 274, 303 and 424) and on older juvenile Skeleton 358. Flecks calculus deposits were seen on 25 teeth of Skeleton 274, 31 teeth of Skeleton 303, ten teeth of Skeleton 358, and four teeth of Skeleton 424. These were more commonly seen on the lingual and buccal surfaces of the maxillary and mandibular teeth. The mesial aspect of mandibular and maxillary molars and premolars of Skeleton 303 and the mesial aspect of mandibular molars and incisors of Skeleton 273 also exhibited flecks calculus deposits.

Slight calculus deposits were only seen in three teeth, on the lingual aspect of second left mandibular premolar of Skeleton 358, on all surfaces of the maxillary left third molar of Skeleton 303, and on the lingual aspect of the mandibular left second premolar of Skeleton 424.

4.2 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).

Slight periodontal disease was present in both sides of the maxilla and mandible of Skeleton 303 (young adult) and is likely associated with calculus deposits seen on the 31 teeth present. Skeleton 424 (mature adult male) had considerable periodontal disease of the maxillae and mandible. The severity of the condition was based on the five teeth present in his dentition which together with the 25 teeth that he had lost ante-mortem suggested long-standing poor oral health.

4.3 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).

No examples of dental caries were observed in the assemblage of 92 teeth observed in the dentition of the skeletons from Mile End, Pocklington. Although difficult to confirm, the large number of teeth lost ante-mortem by Skeleton 424 could have resulted from a cariogenic diet sustained during life by this individual in addition to age-related tooth loss.

4.4 DENTAL ABSCESSES

Dental abscesses occur when bacteria enter the pulp cavity of a tooth causing inflammation and a build-up of pus at the apex of the root. Eventually, a hole forms in the surrounding bone allowing the pus to drain out and relieve the pressure. Abscesses can form as a result of dental caries, heavy wear of the teeth, damage to the teeth, or periodontal disease (Roberts and Manchester 2005).

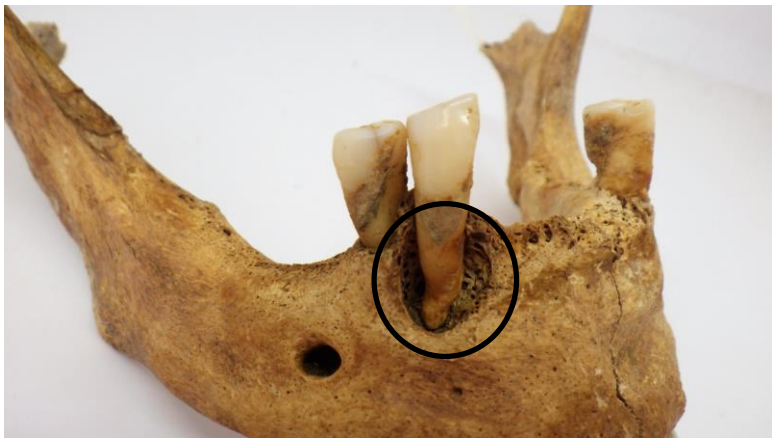

Plate 5 Dental abscess on the right mandibular canine pf Skeleton 424

A very small aperture (approximately 0.8mm in diameter) was present around the

root of the right lower canine of Skeleton 424 (mature adult male; Plate 5). This was a cavity that presented smooth round walls and that would have served to drain puss externally off the oral cavity.

4.5 DENTAL TRAUMA

Vertical fissures in the enamel of teeth are a form of dental trauma. Depending on their severity, these fissures can progress as deep as the pulp chamber, sometimes reaching the periodontal ligament as seen in modern clinical dentistry (Banerji et al 2010). Although their aetiology is multifactorial in origin a few specific and non-specific variables have been associated with their presence.

Two skeletons displayed vertical fissures in their dentition. These were evident in both upper central incisors and the upper right first molar and second premolar of Skeleton 303 (young adult male) and both upper central incisors of Skeleton 358 (old juvenile). In both cases, the fissures could have been produced secondary to mechanical stress resulting from extrinsic factors such as excessive forces applied during mastication, grinding habits, or accident. Similarly, they could have resulted from intrinsic factors inherent to the health status of the general dentition of the individual such as the thickness of the enamel or weak teeth. Coincidentally, the upper central incisors of Skeleton 303 displayed lines of enamel defects (discussed in Section 4.6), which could have weakened the teeth.

4.6 DENTAL ENAMEL HYPOPLASIA

Dental enamel hypoplasia (DEH) is the presence of lines, grooves or pits on the surface of the tooth crown, and occurs as a result of defective formation of tooth enamel during growth (Hillson 1996). Essentially, they represent a period when the crown formation is halted, and they are caused by periods of severe stress, such as episodes of malnutrition or disease, during the first seven years of childhood. Involvement of the deciduous (milk) teeth can indicate pre-natal stress (Lewis 2007). Trauma can also cause DEH formation, usually in single teeth.

DEH was observed in two of the five individuals. Pitted enamel defects were observed in fourteen teeth of Skeleton 274 (young adult female). These were present in all upper molars and premolars and in the three right mandibular molars and the third left mandibular molar. Lines of enamel defects were observed in seven teeth of Skeleton 303 (young adult male), affecting both mandibular canines and the upper left canine as well as both upper central and lateral incisors.

4.7 DENTAL ANOMALIES

Teeth can be absent from the erupted dentition due to a genuine failure of the tooth to develop (congenital absence), or because the tooth develops but fails to erupt (impaction). Full impaction means the tooth remains completely within the jaw, but teeth that erupt at an angle can be considered partially impacted. In well preserved archaeological skeletal remains it is usually impossible to tell without a radiograph whether a tooth has not erupted because it is impacted or because it is congenitally absent. Occasionally, it is possible to observe that a tooth is impacted if post-mortem damage exposes the impacted tooth. Since systematic radiographs were not taken of the jaws from Mile End, Pocklington,

teeth that were absent from the erupted dentition were recorded as 'not present/ unerupted' unless there was definite evidence for impaction. Evidence for impaction was seen in the lower right third molar of Skeleton 303 (young adult male). The tooth was located horizontally within the jaw impacting the adjacent second molar (Plate 6).

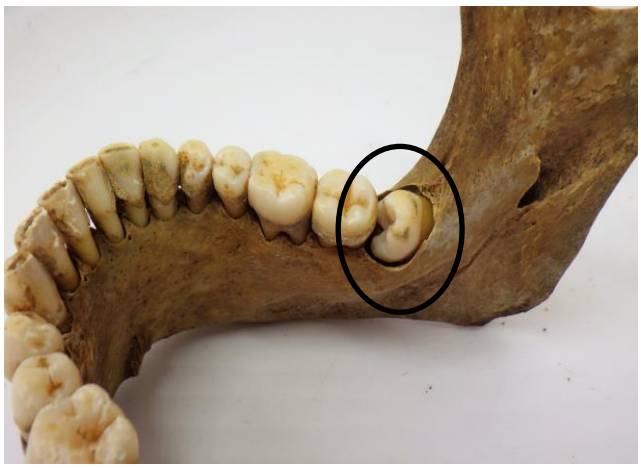

Plate 6 Impacted lower right third molar of Skeleton 303

Teeth with extra cusps are congenital abnormalities of the dentition and although they are not commonly seen in the archaeological record, they are not rare. One example of tooth with an extra cusp was observed in the lower right third molar of Skeleton 274 (young adult female).

4.8 CONCLUSIONS

Four of the five skeletons analysed from Mile End, Pocklington suffered from some form of dental disease. Dental plaque concretions (calculus) were the most common dental condition observed on the dentitions of all individuals analysed. Periodontal disease was present in two individuals. Two dental anomalies were seen in two third molars, impaction and an extra cusp. Dental enamel hypoplasia was seen in two skeletons and was represented as linear and pitting defects, suggesting possible periods of severe stress, such as episodes of malnutrition or disease, during the first seven years their childhood.

5.0 FUNERARY ARCHAEOLOGY

The five burials were across the southwestern side of the excavated area and are thought to date to the Iron Age. Skeleton 303 (young adult male) was buried under a round barrow with a shield, five ferrous and three bone spearheads (see Table 1).

Burial 424 was a 'chariot' or 'cart' burial in which a mature adult male (45+ years old) was buried within a box along with two upright horses and two bronze/copper objects, including an Arras type brooch. Around the skull, a quantity of pig bones were found, indicative of feasting. In Britain, Iron Age cart burials are unique findings of national significance and so far, those reported come almost exclusively from the north-east of England. Just to cite a few examples, Garton-on-the-Wolds, Kirkburn, and Wetwang Slack are all in located in East Riding of Yorkshire (Stead 1991; Jay and Richards 2006). Burials of this type are commonly ascribed to the so-called 'Arras culture' that appeared in the area between the third and second centuries BC (Roberts and Cox 2003). The Arras tradition of burial consisted of the use of square barrows (four-sided ditches) that show connections and similarities to those from La Tène period of northern France (Jay and Richards 2006). At Burnby Lane, Pocklington. ca. 1km to the south of Mile End, a possible male adult aged 25 years old or older was buried in a chariot with two horses. This is the

only other chariot burial with horses excavated in Britain. This individual had calcified pleura and endocranial lesions, potentially indicative of tuberculosis (Caffell and Holst 2018).

Burial practices vary in chariot burials. For instance, at Garton-on-the-Wolds and Kirkburn the bodies were lying on their left sides, whereas at Mile End, the individual was on interred on his right side. Cart burials were frequently buried with pig bones, which was also seen at Mile End. The two bronze/copper objects were not identified at the time of writing this report and for that reason their significance cannot be contextualised in relation to other similar burials.

Similarities between cart burials in East Yorkshire are the crouched position of individuals and the location of the body in the centre of the barrow with a north-south orientation (Pearson 1999). Also, all reported cases of cart burials mostly contain male adults, suggesting, according to Bevan (1997) they were reserved for 'special individuals'. Pearson (1999) suggests that based on their association with fine items and pig bones they are likely to represent graves of elites, although the author did not rule out the possibility of other meanings, such as deviancy or burial in a cart due to being tainted or polluted by a dangerous or unfortunate death. On the other hand, research by Jay and Richards (2006) conducted on carbon and nitrogen isotopic evidence of 62 human samples from Wetwang Slack, which included samples from a chariot burial, revealed no differences between the alleged high-status chariot burial and the remainder of the population.

Burial 303 was a central inhumation within a round barrow rich in grave goods that included four copper alloy shield components, five ferrous spear heads, and three bone spear heads. Three ferrous and one bone spear head were driven into the body, two ferrous and one bone spear heads were placed beside body and one bone spear head was driven into the grave, but not the body. Burials with weapons in Iron Age graves in East Yorkshire often contain a male adult with a single weapon (Stead 1991). Similar examples have been reported in Garton-on-the-Wolds, with burials containing up to fourteen spearheads. According to Stead (1991), they did not represent grave goods, but the remains of a ritual carried out during the burial ceremony. A similar situation was observed at Rudston, where seven iron spearheads and two bone points were scattered among and around the skeleton other than being neatly placed in a particular order (Stead 1991). Skeleton 57 (young adult possible male) at nearby Burnby Lane, Pocklington, was buried in a wooden box with an iron sword across the back and six spear heads (four alongside the back and two possibly piercing the body). However, it must be noted that the box was collapsing and may have shifted the position of the body or the (Caffell and Holst 2018). Two burials contained single spears at Burnby Lane, including the grave of Skeleton 37 (male old middle adult), whose grave also contained a knife, rivet, pot, iron object and buckle. The grave of Skeleton 134 (male mature adult) also included a spear, as well as a knife and a pot.

According to Stead (1991), Iron Age burials in East Yorkshire are commonly represented by single crouched burials, orientated north-south, with the skull on the north and with the skeleton lying on its left side, as seen in Garton-on-the-Wolds and Kirkburn, East Riding of Yorkshire. Three of the five individuals at Mile End followed this orientation and four individuals were buried in crouched positions, with three lying on their left sides (Skeletons 274, 303 and 258) and one (Skeleton 424) was buried on the right side. Skeleton 2317 appeared to have been possibly crouched, but as the remains were badly

disturbed by ploughing it was difficult to determine the exact position from the partially articulated skeleton (see Table 1).

Arm and hand positions varied slightly between the burials. Skeleton 303 and Skeleton 424 had their hands close to the face, while the hands of Skeletons 358 were located underneath the left side of the face. The location of the arms and hands of Skeleton 2317 were not known due to the post-depositional disturbances.

Slightly further north along Mile End at the Pocklington Alleviation Flood Scheme was excavated, revealing contemporary burials. A small skeletal assemblage represented by three adults and two non-adult individuals was found there. The five skeletons were also interred in crouched positions, with two buried on their left sides and three skeletons were orientated north-east (Ponce and Holst 2018). Skeletons lying on their right side are less common in East Yorkshire (Stead 1991), however, at Pocklington Alleviation Flood Scheme three individuals (Skeleton 2, 3, and 5) and Skeleton 424 at Mile End were buried in this position.

No finds were recovered from the graves of Skeletons 274 and 358 at Mile End. The skeleton of perinate 2317 appeared to have been disposed in a possible industrial/rubbish pit with a few fragments of pottery and slag but as the skeleton was badly disturbed by ploughing, little contextual information could be obtained.

As summarised here, a small variation in body orientation and position within the grave is noticed in Iron Age burials even located within a short distance from one another. Indeed, these preferences varied locally and regionally (Harding 2016). One example is Makeshift cemetery at Rudston in East Riding of Yorkshire where the majority of the burials were orientated north-south, but in later phases they followed the east-west pattern (Stead 1991). The interpretation of these variations in the Iron Age is highly speculative, however, the internment of crouched or flexed bodies that mirror the foetal position has been interpreted as a cyclic passage through life (Harding 2016).

6.0 DISCUSSION AND SUMMARY

Five skeletons were recovered from Mile End, Pocklington ahead of residential development. All burials represent single crouched inhumations in a variety of burial orientations and positions. Of special significance are the chariot burial of mature adult male Skeleton 424, who was buried with two horses and the burial of a young adult male (Skeleton 303) with seven spear heads under a round barrow. It is thought that the skeletons were buried in the Iron Age period and belong to the Arras culture due to the similarities in burial practices found in East Yorkshire and Continental France.

The individual buried in the chariot, Skeleton 424 was a male aged 46 years old or older and was of average height for the period. As indicated by his advanced spinal joint disease in many spinal and some extraspinal joints as well as the number of teeth lost ante-mortem, this individual represented the oldest individual. During life he sustained a number of traumatic lesions such as *spondylolysis* (fracture) of the

fifth lumbar vertebra. This suggested that he was physically active and that he possibly engaged in repeated anterior-posterior bending and lifting of the lower back. He also suffered from trauma to the soft tissues of his thigh, as represented by *myositis ossificans traumatica* on his left femur and a broken rib that was healing at the time of death. He suffered from possible osteoporosis, as demonstrated by the reduction of weight in bones relative to other bones of the same size. Indeed, rib fractures in older men with osteoporosis account for 24% (126/522) of all incident non-spine fractures in a clinical study conducted by Barrett-Connor et al (2010), thus suggesting a possible link between the systemic pathology and the traumatic lesion in this individual. Overall, it is not known why Skeleton 424 was interred in a cart/chariot. All it can be surmised is that his burial involved much effort.

Skeleton 303 was a young adult female of average Iron Age height who showed evidence for early childhood stress in the form of dental enamel hypoplasia. He also suffered from chronic sinusitis at the time of death. He had sustained several traumatic lesions. These were represented by two ante-mortem nasal fractures and healed blunt force trauma on the frontal bone. Nasal fractures are relatively common in the face due to their prominent position and their thinness (Brickley and Smith 2006). They are often interpreted as resulting from interpersonal violence, although they may just have represented accidents such as falling. In Skeleton 303, the presence of the nasal fractures in combination with a possible blunt force trauma on the frontal bone may suggest less mundane circumstances of trauma and possibly the use of a weapon, although no evidence for specific weapon-related lesions could be identified. Whether these injuries resulted from activities such as being a warrior cannot be confirmed. Perhaps a more detail analysis of the grave goods found associated with this individual such as whether they represented grave furnishings, indicators of rank, funerary accessories, residues from the funerary or tokens (Harding 2016) may help with the interpretation of this individual.

Skeleton 274 was a young adult female of below average height. She had suffered from early childhood stress, observed in the form of *cribra orbitalia* in her orbits and dental enamel hypoplasia in her teeth. She had a congenital anomaly called *spina bifida occulta*, which meant that the back of her tail bone was open, though the nerves would have been covered in soft tissue.

Skeleton 358 was an older juvenile aged seven to eight years, who had suffered from childhood stress exhibited as pitting in the eye orbits (*cribra orbitalia*). Skeleton 2317 was a foetus/perinate aged found partially articulated due to the badly damage received by ploughing.

7.0 FUTURE RECOMMENDATIONS

Most importantly, AMS dating is recommended to determine the date of the burials. It is suggested detailed carbon and nitrogen isotope analysis is undertaken, as this could provide interesting evidence concerning age of weaning and diet. Analysis of the dental calculus may also reveal pathogen DNA fossilised within the tartar concretions and it may be possible to find traces of occupational debris, such as flax or wool fibres cemented into the calculus. Ancient DNA analysis of the five individuals would also be of great interest to establish familial links between the burials and to confirm/reject the assessed sex of the non-adults.

References

Bass, W. M. 1987. *Human Osteology: A Laboratory and Field Manual* (Columbia)

Barnes, E. 1994. *Developmental Defects of the Axial Skeleton in Paleopathology* (Niwot, Colorado)

Barnes, E. 2012. *Atlas of Developmental Field Anomalies of the Human Skeleton: a Paleopathology Perspective,* Hoboken, NJ.

Barrett-Connor, E, Nielson, C., Orwoll, E., Bauer, D., Cauley, J. 2010. 'Epidemiology of rib fractures in older men: osteoporotic fractures in men (MrOS) prospective cohort study', *British Medical Journal* 340: 1-8

Bennett, K. A. 1965. 'The etiology and genetics of wormian bones', *American Journal of Physical Anthropology* 23: 255-260

Berry, A. C. and Berry, R. J. 1967. 'Epigenetic variation in the human cranium' *Journal of Anatomy* 101: 361-379

Bevan, B. 1997. 'Bounding the landscape: place and identity during the Yorkshire Wolds Iron Age', in A. Gwilt and C. Haselgrove (eds), *Reconstructing Iron Age Societies. New Approaches to the British Iron Age*, Oxbow Monograph 71:181-191

Brickley, M, and Smith, M. 2006. 'Culturally determined patterns of violence: biological anthropological investigations at a historic urban cemetery', *American Anthropologist*, 108(1), 163–177

Brickley, M, and Ives, R. 2008. *The Bioarchaeology of Metabolic Bone Disease* (London).

Brooks, S. T. and Suchey, J. M. 1990. 'Skeletal age determination based on the os pubis: a comparison of the Acsádi-Nemeskéri and Suchey-Brooks methods' *Human Evolution* 5: 227-238

Brothwell, D. R. 1981. *Digging Up Bones* (New York)

Buikstra, J. E. and Ubelaker, D. H. (eds) 1994. *Standards for Data Collection from Human Skeletal Remains* (Fayetteville)

Caffell, A. and Holst, M. 2018. 'Preliminary Osteological Analysis, Burnby lane, Pocklington, East Riding of Yorkshire', York Osteoarchaeology Report No 1018, Unpublished Osteological Report

Cox, M. 2000. 'Ageing adults from the skeleton', in M. Cox and S. Mays (eds), *Human Osteology in Archaeology and Forensic Science* (London): 61-82

Dandy, D. J. and Edwards, D. J. 2003. *Essential Orthopaedics and Trauma* (Edinburgh)

Finnegan, M. 1978. 'Non-metric variation of the infracranial skeleton' *Journal of Anatomy* 125: 23-37

Galloway, A. 1999. 'Fracture patterns and skeletal morphology: The axial skeleton', in A. Galloway (ed) *Broken Bones: Anthropological Analysis of Blunt Force Trauma* (Springfield, Illinois): 81-112

Garland, A. N. and Janaway, R. C. 1989. 'The taphonomy of inhumation burials', in C. A. Roberts, F. Lee and J. Bintliff (eds) *Burial Archaeology: Current Research, Methods and Developments. British Archaeological Reports British Series* 211 (Oxford): 15-37

Harding, D. W. 2016. *Death and Burial in Iron Age Britain* (Oxford)

Henderson, J. 1987. 'Factors determining the state of preservation of human remains', in A. Boddington, A. N. Garland and R. C. Janaway (eds) *Death, Decay and Reconstruction: Approaches to Archaeology and Forensic Science* (Manchester): 43-54

Hillson, S. 1996. *Dental Anthropology* (Cambridge)

İşcan, M. Y. and Loth, S. R. 1986. 'Determination of age from the sternal rib in white females: a test of the phase method' *Journal of Forensic Sciences* 31: 990-999

İşcan, M. Y., Loth, S. R. and Wright, R. K. 1984. 'Age estimation from the rib by phase analysis: white males' *Journal of Forensic Sciences* 29: 1094-1104

İşcan, M. Y., Loth, S. R. and Wright, R. K. 1985. 'Age estimation from the rib by phase analysis: white females' *Journal of Forensic Sciences* 30: 853-863

Janaway, R. C. 1996. 'The decay of buried human remains and their associated materials', in J. Hunter, C. A. Roberts and A. Martin (eds) *Studies in Crime: An Introduction to Forensic Archaeology* (London): 58-85

Jay, M., Richards, M. 2006. 'Diet in the Iron Age cemetery population at Wetwang Slack, East Yorkshire, UK: carbon and nitrogen stable isotope evidence', *Journal of Archaeological Science* 33: 653-662

Kennedy, K. A. R. 1989. 'Skeletal markers of occupational stress', in M. Y. İşcan and K. A. R. Kennedy (eds) *Reconstruction of Life from the Skeleton* (New York): 129-160

Lewis, M. E. 2000. 'Non-adult palaeopathology: current status and future potential', in M. Cox and S. Mays (eds) *Human Osteology in Archaeology and Forensic Science* (London): 39-57

Lewis, M. E. 2007. *The Bioarchaeology of Children: Perspectives from Biological and Forensic Anthropology*. (Cambridge)

Lovejoy, C. O., Meindl, R. S., Pryzbeck, T. R. and Mensforth, R. P. 1985. 'Chronological metamorphosis of the auricular surface of the ilium: a new method for the determination of adult skeletal age at death' *American Journal of Physical Anthropology* 68: 15-28

Mays, S. and Cox, M. 2000. 'Sex determination in skeletal remains', in M. Cox and S. Mays (eds) *Human Osteology in Archaeology and Forensic Science* (London): 117-130

McKinley, J. I. 2004. 'Compiling a skeletal inventory: disarticulated and co-mingled remains', in M. Brickley and J. I. McKinley (eds) *Guidelines to the Standards for Recording Human Remains. IFA Paper No. 7* (Southampton and Reading): 14-17

Miles, A., Powers, N., Wroe-Brown, R. and Walker, D. 2008. *St Marylebone Church and Burial Ground in the 18th to 19th Centuries: Excavations at St Marylebone School, 1992 and 2004-6* (London)

Molleson, T. 1995. 'Rates of ageing in the eighteenth century', in S. R. Saunders and A. Herring (eds) *Grave Reflections: Portraying the Past Through Cemetery Studies* (Toronto): 199-222

Molleson, T. and Cox, M. 1993. *The Spitalfields Project. Vol 2. The Anthropology: The Middling Sort*, CBA Research Report 86 (York)

Moorrees, C. F. A., Fanning, E. A. and Hunt, E. E. 1963a 'Formation and resorption of three deciduous teeth in children' *American Journal of Physical Anthropology* 21: 205-213

Moorrees, C. F. A., Fanning, E. A. and Hunt, E. E. 1963b 'Age variation of formation stages for ten permanent teeth' *Journal of Dental Research* 42: 1490-1502

Moynihan, P. 2003. 'Diet and dental caries', in J. J. Murray, J. H. Nunn and J. G. Steele (eds) *The Prevention of Oral Disease* (Oxford): 9-34

Ortner, D. J. 2003. *Identification of Pathological Conditions in Human Skeletal Remains* (Amsterdam)

Oxenham, M.F. and Cavill, I. 2010. 'Porotic hyperostosis and cribra orbitalia: the erythropoietic response to iron-deficiency anaemia', *Anthropological Science* 118(3): 199-200

Pearson M. 1999. 'Food, sex and death: cosmologies in the British Iron Age with particular reference to East Yorkshire', *Cambridge Archaeological Journal* 9:1, 43-69

Ponce, P. and Holst, M. 2018. 'Osteological Analysis Mile End, Pocklington East Riding of Yorkshire'. York Osteoarchaeology, No 1418

Roberts, C. A. and Cox, M. 2003. *Health and Disease in Britain* (Stroud)

Roberts, C. A. and Manchester, K. 2005. *The Archaeology of Disease (third edition)* (Stroud)

Rogers, J. 2000. 'The palaeopathology of joint disease', in M. Cox and S. Mays (eds) *Human Osteology in Archaeology and Forensic Science* (London): 163-182

Rogers, J. 2001. 'The palaeopathology of joint disease', in M. Cox and S. Mays (eds), *Human Osteology in Archaeology and Forensic Science* (London): 163-182

Saunders, S. R. 1989. 'Non-metric variation', in M. Y. İşcan and K. A. R. Kennedy (eds) *Reconstruction of Life from the Skeleton* (New York): 95-108

Scheuer, L. and Black, S. 2000a. 'Development and ageing of the juvenile skeleton', in M. Cox and S. Mays (eds) *Human Osteology in Archaeology and Forensic Science* (London): 9-22

Scheuer, L. and Black, S. 2000b. *Developmental Juvenile Osteology* (San Diego)

Spriggs, J. A. 1989. 'On and off-site conservation of bone', in C. A. Roberts, F. Lee and J. Bintliff (eds) *Burial Archaeology: Current Research, Methods and Developments. British Archaeological Reports British Series* 211 (Oxford): 39-45

Stead, I. 1991. *Iron Age Cemeteries in East Yorkshire. Excavations at Burton Fleming, Rudston, Garton-on-the-Wolds, and Kirkburn*. English Heritage Report 22

Stuart-Macadam, P. 1992. 'Anemia in past populations', in P. Stuart-Macadam and S. Kent (eds) *Diet, Demography and Disease: Changing Perspectives of Anemia* (New York): 151-170

Trinkhaus, E. 1978. 'Bilateral asymmetry of human skeletal non-metric traits' *American Journal of Physical Anthropology* 49: 315-318

Trotter, M. 1970. 'Estimation of stature from intact long limb bones', in T. D. Stewart (ed) *Personal Identification in Mass Disasters* (Washington DC): 71-83

Ubelaker, D. H. 1989. *Human Skeletal Remains; Excavation, Analysis, Interpretation* (Washington)

Walker, P. L. 1995. 'Problems of preservation and sexism in sexing: some lessons from historical collections for palaeodemographers', in S. R. Saunders and A. Herring (eds) *Grave Reflections: Portraying the Past Through Cemetery Studies* (Toronto): 31-47

Walker, P. L., Bathurst, P. R., Richman, R., Gjerdrum, T. and Andrushko, V. A. 2009. 'The causes of porotic hyperostosis and cribra orbitalia: a reappraisal of the iron-deficiency-anemia hypothesis' *American Journal of Physical Anthropology* 139: 109-125

Zero, D. T. 1999. 'Dental caries process' *Dental Clinics of North America* 43: 635-664

APPENDIX A: OSTEOLOGICAL AND PALAEOPATHOLOGICAL CATALOGUE

Skeleton Number	**274**
Preservation	1 (very good)
Fragmentation	Minimal
Completeness	95% All skeleton complete apart from the coccyx, left pisiform, the right trapezium, 8 right middle and distal foot phalanges and 7 left middle and distal foot phalanges
Age	18-25 years (YA)
Sex	Female
Stature	155.6 cm
Non-Metric Traits	*Ossicle in lambdoid* (left), *ossicle at pterion* (bilateral), *posterior condylar canal open* (right), *incomplete foramen ovale* (right) *open foramen spinosum* (right), *Allen's fossa* (left) *Lateral tibial squatting facet* (bilateral), *double anterior calcaneal facet* (right)
Pathology	*Spina bifida occulta*, bilateral *cribra orbitalia*
Dental Health	Calculus, DEH

	Right Dentition								Left Dentition							
Present	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Calculus	Fd	Fl	Flo	Fl	Fl	Fl	-	-	-	-	Fb	Fb	Fb	Fb	Fb	Fb
DEH	P	P	P	P	P	-	-	-	-	-	-	P	P	P	P	P
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	1	2	3	2	3	2	2	3	3	2	2	3	2	3	2	1
Maxilla	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Mandible	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Present	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Calculus	Fmdl	Fld	Flmd	Fl	Fl	Fl	Fdm	-	-	Flm	-	Flb	Flb	Fbm	Fbmd	Fldm
DEH	P	P	P	-	-	-	-	-	-	-	-	-	-	-	-	P
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	1	2	3	3	2	2	2	2	2	2	2	2	3	3	2	1

Skeleton Number	**303**
Preservation	2 (good)
Fragmentation	Minimal
Completeness	95% Skeleton complete apart from the right pisiform, the right scaphoid, both trapeziums, the left triquetral, a fragment of sacrum, the coccyx, the proximal end of the left fibula, the distal end of the sternal body, and 12 middle and distal foot phalanges
Age	18-25 years (YA)
Sex	Male
Stature	168.2cm
Non-Metric Traits	*Parietal foramen* (left), *ossicle at pterion* (left), *ossicle at asterion* (right), *sutural mastoid foramen* (left), *posterior condylar canal open* (right*), incomplete foramen ovale* (left),*open foramen espinosum* (right), *accessory lesser palatine foramen* (right), *accessory sacral facet* (bilateral), *acetabular crease* (right), *medial tibial squatting facet* (bilateral), *lateral tibial squatting facet* (bilateral), *peroneal tubercle* (right), *double anterior calcaneal facet* (bilateral)
Pathology	Nasal fractures and possible related blunt force trauma to the frontal bone. Transitional 5th lumbar and 1st sacral with neural arch cleft. Maxillary sinusitis on the right maxilla
Dental Health	Calculus, DEH, PD, impacted 3rd molar

	Right Dentition	Left Dentition

Wear	1	2	3	2	2	2	2	4	4	2	2	2	2	-	2	1
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DEH	-	-	-	-	-	-	L	L	L	L	L	-	-	-	-	-
Calculus	Fodb	Fmdl	Fmlbd	Fdm	Fdm	Fd	Fm	Fm	Fld	Fl	Fl	Fl	Fl	-	Fmdb	SdbFol
Present	P	P	P	P	P	P	P	P	P	P	P	P	P	PM	P	P
Maxilla	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Mandible	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Present	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Calculus	Fd	Fmdlb	Fmdlb	Fmd	Fl	Flb	Flb	Flb	Flb	Flb	Flb	Fd	Fmdbl	Fmdbl	Fmdbl	Fa
DEH	-	-	-	-	-	L	-	-	-	-	L	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	1	2	3	3	2	3	4	4	4	4	3	3	2	3	2	1

Skeleton Number	**358**
Preservation	4 (poor)
Fragmentation	Minimal
Completeness	95% All skeleton complete apart from the right zygomatic bone, right hamate, both pisiforms, both scaphoids, both triquetral, right trapezium, the sternum, both medial ends of the clavicles, 3 right metatarsals and 2 left metatarsals, 20 middle and distal foot phalanges
Age	7-8 (OJ)
Sex	-
Stature	-
Non-Metric Traits	*Parietal foramen* (bilateral), *incomplete foramen ovale* (left), *bridging of supraorbital notch* (right), *double anterior calcaneal facet* (right).
Pathology	*Cribra orbitalia* (bilateral). Lumbar 5 with bifid spinous process and separated left lamina from the vertebral body
Dental Health	Calculus

	Right Dentition								Left Dentition							
Present	NP	NP	P(6)	P(E)	P(D)	P(C)	P(2)	P(l)	P(l)	P(2)	P(C)	P(D)	P(E)	P6	NP	NP
Calculus	-	-	Fl	-	-	Fb	-	-	-	-	Fb	Fb	-	Fd	-	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maxilla	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Mandible	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Present	NP	NP	P(6)	P(E)	P(D)	P(C)	P2	P1	P1	P2	P(C)	P(D)	P(E)	P(6)	NP	NP
Calculus	-	-	Fl	Fl	-	Flb	-	-	-	-	-	Flb	Sl	Fl	-	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Skeleton Number	**424**
Preservation	3 (moderate)

Fragmentation	Extreme
Completeness	90% Skull, spine, clavicles, scapular blades, ribs, humeri, radii, ulnae, femora, patellae, tibiae, fibulae, left tarsals, 4th and 5th left metatarsals, 1st and 2nd right metatarsals, 1st sacral segment, both ilia and pubic bones, both capitates, scaphoids, lunates, right trapezium
Age	46+ years (MA)
Sex	Male
Stature	173.9cm
Non-Metric Traits	*Parietal foramen* (right), *mastoid foramen extrasutural* (bilateral*), maxillary torus* (right), *bridging of supraorbital notch* (right), *circumflex sulcus* (bilateral), *Poirier's facet* (right), *exostosis in trochanteric fossa* (left), *peroneal tubercle* (left)
Pathology	Complete bilateral *spondylolysis* of L5, *myositis ossificans traumatica* of L femur, healing fracture of unsided mid thoracic rib. Osteoporosis. Spinal and extraspinal degenerative joint changes.
Dental Health	Calculus, PD, abscess, AMTL

	Right Dentition								Left Dentition							
Present	AM	AM	PM	P	AM	AM	AM	AM	AM	AM	AM	AM	AM	P	AM	AM
Calculus	-	-	-	Flb	-	-	-	-	-	-	-	-	-	Fd	-	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	-	-	6	-	-	-	-	-	-	-	-	-	7	-	-
Maxilla	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Mandible	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Present	AM	AM	AM	AM	P	P	AM	AM	AM	AM	AM	AM	P	AM	AM	AM
Calculus	-	-	-	-	Flb	Flb	-	-	-	-	-	-	Sl	-	-	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	-	-	-	4	4	-	-	-	-	-	-	5	-	-	-

Skeleton Number	**2371**
Preservation	2 (good)
Fragmentation	Moderate
Completeness	60% Skull fragments (70), left scapula, left clavicle, medial aspect of the right clavicle, both humeri, both radii and ulnae, 6 fragments of cervical vertebrae, 5 fragments of thoracics and three fragments of lumbar, left femur, proximal end of right femur, right tibia and fibula 6 metacarpals, left pubis and a fragment of left ilium
Age	Foetus/perinate (ca. 38 weeks *in utero*)
Sex	-
Stature	-
Non-Metric Traits	-
Pathology	-
Dental Health	-

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