Osteological Analysis

89 The Mount

York

NGR: SE 5945 5102

Report No 0908
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Prepared for

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Summary

In April 2008 York Osteoarchaeology Ltd was commissioned by Mike Griffiths and Associates to carry out the osteological analysis of a single skeleton (5077). The skeletal remains were recovered during an archaeological excavation at 89, The Mount, York (NGR SE 5945 5102). An additional nine inhumations were excavated, some of which were recovered from the vicinity of the sarcophagus.

The skeleton had been interred in a gritstone sarcophagus with a plain lid, which was filled with soil to the top, above a thin irregular layer of gypsum. The coffin contained disarticulated human remains, as well as animal bone, a copper alloy item and numerous fragments of animal bones and teeth. Many of the human bones were found throughout the soil fill of the coffin, but the legs, parts of the hip and parts of the skull were found beneath the gypsum. The skeleton was that of a middle-aged or mature woman. During the first few years of childhood, she had suffered from several episodes of either malnutrition or disease, which caused temporary cessation of the development of her teeth. In later life, she suffered from inflammation to her shins, which was receding at the time of death. Both of her big toes displayed evidence for mild osteoarthritis and she also had degenerative joint disease in her hips and spine.

Acknowledgements

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1.0 INTRODUCTION

In April 2008 York Osteoarchaeology Ltd was commissioned by Mike Griffiths and Associates to carry out the osteological analysis of a single skeleton (5077). The skeletal remains were recovered during archaeological excavations in spring 2005 at 89 The Mount, York (NGR SE 5945 5102).

The skeleton had been placed in a gritstone sarcophagus with a plain lid, which was filled with soil. The majority of the skeletal remains were found under a thin layer of gypsum on the base of the sarcophagus. However, disarticulated human remains, Roman pottery, animal bones and teeth and also a copper alloy item were recovered from the soil above the gypsum. Most of the human bones recovered were foot bones. Once the gypsum was carefully removed, a partial and partly disarticulated skeleton was revealed (Plate 1). The remains consisted of parts of the legs and skull. It is likely that the skeleton was laid in the coffin in a supine extended position with the head at the north-western end and the feet at the south-eastern end of the coffin.

Plate 1 Skeleton 5077 after removal of gypsum and soil

The excavations at 89 The Mount produced a total of ten skeletons. Notably, at the adjacent Roman cemetery at Mill Mount, another sarcophagus was excavated, which contained the articulated remains of an adolescent (Holst 2007).

1.1 AIMS AND OBJECTIVES

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

1.2 METHODOLOGY

The skeleton was analysed in detail, assessing the preservation and completeness, as well as determining the age, sex and stature of the individual (Appendix 1). 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 gender dimorphism in occupation, lifestyle and diet, as well as the role of different age groups in society.

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. Preservation of human skeletal remains is assessed subjectively, depending upon the severity of bone surface erosion and post-mortem breaks, but disregarding completeness.

Preservation was assessed using a grading system of five categories: very poor, poor, moderate, good and excellent. Excellent preservation implied no bone surface erosion and very few or no breaks, whereas very poor preservation indicated complete or almost complete loss of the bone surface due to erosion and severe fragmentation.

The skeleton was in a moderate condition (Table 1). It had suffered from moderate post-mortem fragmentation, and some bone erosion.

Table 1 Summary of osteological and palaeopathological results

Preservation	**Completeness**	**Age**	**Sex**	**Stature**	**Pathology**
Moderate	50%	36+	Female	158.97cm ± 3.66cm	Periosteal flammatory lesions on tibiae, osteoarthritis in first metatarsals, DJD in hips, spinous processes of lumbar and throacic vertebrae

The skeleton was 50% complete, including parts of the skull, teeth, legs, the feet, the first cervical vertebra and parts of the lower spine (see Table 1).

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 bones from the soil fill and those recovered from underneath the gypsum were os the same individual, as it was possible to compare the size and shape of opposing bones, which had been found in the different layers of the sarcophagus. No bone elements were duplicated, suggesting an MNI of one individual.

2.3 ASSESSMENT OF AGE

Age was determined using standard ageing techniques, as specified in Scheuer and Black (2000a; 2000b) and Cox (2000). Age estimation relies on the presence of the pelvis and uses different stages of bone development

and degeneration in order to calculate the age of an individual. Age is split into a number of categories, from foetus (up to 40 weeks in *utero*), neonate (around the time of birth), infant (newborn to one year), juvenile (1-12 years), adolescent (13-17 years), young adult (ya; 18-25 years), young middle adult (yma; 26-35 years), old middle adult (oma; 36-45 years), mature adult (ma; 46+) to adult (an individual whose age could not be determined more accurately as over the age of seventeen).

In this instance, it was difficult to assess the individual's age, as the majority of skeletal characteristics which are used for age determination were not present. As a result, ageing relied solely on the teeth, which often under-ages the skeleton. From the dental wear, the skeleton was aged between 36 and 45 years old, though considering the skeletal pathology, it is possible that this individual was in fact in the mature adult category. It is therefore suggested that this individual was aged 36 years or older.

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 in both males and females relies on the preservation of the skull and the pelvis and can only be carried out once sexual characteristics have developed, during late puberty and early adulthood.

The very wide sciatic notch and pronounced preauricular sulcus suggested that this individual was female.

2.5 METRIC AND NON-METRIC ANALYSIS

Stature depends on two main factors, heredity and environment. However, stature 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. This individual was 158.97cm tall. This was taller than three of the four other females from 89 The Mount and taller than the mean stature from the site (154.8cm). However, this is only slightly taller than the Roman mean stature for females (157.4cm) calculated by Caffell (1997) and is well within the Roman stature range, which runs from 131.2cm to 172.5cm.

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).

The individual had only one post-cranial non-metric trait: a squatting facet on the left tibia (a small extension of the joint surface of the distal tibia). These types of traits are often observed in people who habitually squat.

2.6 CONCLUSION

Osteological analysis of the skeleton established that this individual was a middle aged or mature adult female. The preservation was moderate, and was almost entirely complete. The skeleton had a single non-metric trait, which suggested that she carried out habitual activities that involved 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.

3.1 INFECTION

Evidence for infection was observed on the shins of Skeleton 5077 in the form of superficial inflammatory lesions on the surfaces of the tibiae; tibiae are the most likely bones to show evidence for inflammation because they are more vulnerable to knocks than other parts of the body. The type of skeletal lesion (lamellar bone) on the skeletons' shin bones suggested that the inflammation was receding.

Inflammatory lesions on human bones can be indicative of infectious diseases, such as leprosy and syphilis, and of non-specific localised infection, such as varicose veins, leg ulcers or trauma to the shins. However, the lesions only form in the bone if the inflammation is chronic and long-standing (Roberts and Manchester 1995, 125). Evidence for infection was common before the introduction of antibiotics and is therefore frequently observed in populations derived from archaeological contexts.

Plate 2 Striated bone indicating receding inflammation of the shin

3.2 DEGENERATIVE 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 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.

3.2.1 DJD

The most common type of joint disease observed tends to be degenerative joint disease (DJD). DJD 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 2000).

DJD was noted in two of the vertebral articular facets, including 1 lumbar and one thoracic joint. The lesions were relatively mild. The intervertebral discs are the 'shock absorbers' of the spine, but these can degenerate as a result of gradual desiccation, which then causes transmission of the stress from the vertebral discs to the articular facets and ligaments (Hirsh 1983, 123). Spinal osteophytes (outgrowths of bone) form in response to the constant stress that is placed on the spine as a result of human posture (Roberts and Manchester 1995, 106)

to compensate. Increasing stress or activity can therefore lead to increased size and prevalence of osteophytes (*ibid*). Spinal joint disease was common in the Roman period, affecting 14% of the population (Roberts and Cox 2003, 145).

DJD was also noted in the hips in the form of marginal osteophyte formation at the acetabuli.

3.2.2 Osteoarthritis

Osteoarthritis is a degenerative joint disease 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', which is the most apparent expression of osteoarthritis. Osteoarthritis can be the result of mechanical stress and other factors, including lifestyle, food acquisition and preparation, social status, sex and general health (Larsen 1997, 179).

The distal first metatarsal joint (big toe) of both feet showed evidence for osteoarthritis in the form of eburnation, porosity and osteophytes. It is probable that both age and possible trauma had contributed to the onset of this condition. Modern studies have found no correlation between the expression of osteoarthritis and the severity of pain (Cockburn *et al* 1979). It is therefore not clear, whether this man would have suffered discomfort as a result of the lesion in his toe.

Osteoarthritis was also observed in three of the skeletons excavated from 89 The Mount and two skeletons from Mill Mount. Skeleton 1441 from the latter site showed evidence for the condition in the same joints as Skeleton 5077.

3.3 TRAUMA

Occasionally, it is possible to infer trauma to the soft tissue on the bones, in the form of ligamentous or muscular trauma. This is expressed through the formation of bony processes (*enthesopathies*) at the site of ligament attachments. Additionally, it is possible to observe bone defects at the site of muscle insertions, which are the result of constant micro-trauma and are usually activity-related (Hawkey and Merbs 1995, 334).

Muscle trauma in the form of *enthesopathies* on the attachment site of the *soleus* muscle was noted on both tibiae and on the tibiae. These muscles cause the tip of the foot to move downwards, an action required for walking, climbing and squatting.

3.4 CONCLUSION

This middle aged to mature woman had suffered from degenerative joint disease in the spine and hips. This is a condition, which is usually age-related and the result of general wear and tear. Both her big toes showed osteoarthritis lesions, which are often secondary to trauma. It is possible that these were painful. She had also suffered from inflammation on both shins, which was receding at the time of death.

4.0 DENTAL HEALTH

Neither the upper, nor the lower jaw was recovered and only eleven of the usual 32 permanent teeth were found. Additionally, a deciduous maxillary first molar was found, which this individual had probably retained. This is relatively unusual, but does occur from time to time.

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 dental wear was moderate, reflecting the individual's middle to mature age.

Calculus (dental plaque) is commonly observed in archaeological populations whose dental hygiene was not as rigorous as it is today. Calculus mineralises and forms concretions on the tooth crowns, along the line of the gums. Calculus was observed in all but one of the teeth (91.7%), and was slight to moderate.

Dental cavities are multifactoral in origin, but develop as a result of aggressive bacterial attack in the presence of sucrose (Hillson 1996, 282) and fermentable carbohydrates (Roberts and Manchester 1995, 47). The skeleton suffered from a very large cavity, affecting the chewing surface of the deciduous molar and a moderately sized cavity in the left third maxillary molar.

Dental enamel hypoplasia (DEH) lesions were observed in two of the teeth. DEH is the manifestation of lines, grooves or pits on the crown surface of the teeth, which represent the cessation of crown formation. The defects are caused by periods of severe stress during the first to seventh year of childhood, including malnutrition or disease. DEH was observed in five of the nine other skeletons recovered from 89 The Mount and was also common at Mill Mount, observed in between 13% and 20.9% of all teeth (Holst 2005a and 2006). The reported prevalence for the Roman period was 9.1% (Roberts and Cox 2003, 140).

The dental health of this woman was relatively poor, with widespread plaque and two cavities.

5.0 FUNERARY RITUAL

The skeleton was buried in a gritstone sarcophagus, very similar to a sarcophagus excavated recently at the adjacent site of Mill Mount. The burials are part of a large, elongated cemetery, which runs from Blossom Street along the Roman road from York towards Tadcaster. Burials have been found along the road over the past two centuries and large cemeteries have been discovered at Trentholme Drive, to the south of 89 The Mount, at Mill Mount and on the opposite side of the road at Driffield Terrace. Even far outside the city of York, at Dringhouses, Roman burials have been excavated at the Starting Gate public house (42–50, Tadcaster Road) (Holst 2008), which lies about 1.5 miles outside the city (Jones 1984, 35).

Finds in some of the cemeteries along the Mount include fragments of monuments and tomb stones, thought to derive from high status burials (Jones 1984, 35). The majority of burials form this elongated cemetery are inhumations, but cremation burials have also been found, including 53 cremation burials at Trentholme Drive (Wenham 1968). There is evidence for the cemetery having been in use from the late 1st or early 2nd century

AD, one epitaph from the Mount and another from Micklegate have provided evidence of the *legio IX Hispania* (Jones 1984, 36). It is likely that the Mount cemetery stayed in use throughout the Roman period.

The fact that this individual and the adolescent from Mill Mount had been buried in sarcophagi suggests high status, as both the labour involved in carving the stone coffin, as well as the transportation to the site required much greater effort than, for example, the burial in wooden coffins, which appears to have been the norm at Mill Mount and was the choice of burial container for two individuals at 89 The Mount.

It is likely that many sarcophagi were disposed of following their excavation in the past three centuries. However, there are 50 known examples from York, most of which have been found in the area of the railway station or The Mount (Morrison *pers. comm.* 25/04/2008).

The inscribed sarcophagi contained a mixture of women and men and some children. A sandstone sarcophagus from Castleford, West Yorkshire, for example, contained the remains of a mature female covered with a layer of gypsum (Holst 2005b). However, in the late Roman or early post-Roman period, some of these sarcophagi were re-used for the burial of men (Morrison *pers. comm.* 25/04/2008), such as in a stone sarcophagus from Dalton Terrace (Alcock 1996, 50). This sarcophagus originally contained 27 year old Aelia Severa (found in 1859); her remains were removed and a man was buried in the coffin and was covered with gypsum, while the lid was the recycled tombstone of Flavia Augustina (RCHMY1, 121).

At the junction of Love Lane and Driffield Terrace, two further stone sarcophagi were found beneath a house, but the sex of their occupants is unknown (RCHMY1, 97-98). Two sarcophagi were excavated at Trentholme Drive (Wenham 1968, 4), one of which was also made from gritstone thought to derive from West Yorkshire (*ibid*, 40). The bones are thought to have belonged to a boy aged fourteen years (*ibid*, 41), though how the child's sex was established is not known.

At 89 The Mount and Mill Mount, both the female skeleton and the adolescent were covered by a layer of gypsum. In both cases, it is clear that the gypsum was poured onto the skeleton once the body was decomposed. In 89 The Mount case, only the hips, femora and skull remained *in situ*. The tibiae were found beneath the gypsum, but these were not located in the anatomical position. Gypsum burials were also found at the nearby cemetery at Trentholme Drive and dated to the 4th century AD.

According to Ramm (1971, 190), gypsum burials are the burial style of choice at this time of the Roman period in York. About 60 gypsum burials are known from York (Morrison *pers. comm.* 25/04/2008), seventeen of which are thought to date to the fourth century (Ottaway 2004, 138). Different interpretations for the use of gypsum in burials have been put forward. Some researchers suggest that this was done to preserve the body for the afterlife (Salway 1981, 731), while others think that it was carried out to prevent grave robbing (Alcock 1996, 45). While some scholars suggest that gypsum burial was a Christian practice, others believe that it was simply a fashionable manner of burial for the rich, with no religious associations (Salway 1981, 731).

The fact that many of the bones from this individual were distributed throughout the soil coffin backfill above the gypsum suggests one possible scenario: the sarcophagus was probably robbed following skeletonisation of the body and the bones were partly removed from the sarcophagus during the robbing. It is possible that the bones which remained within the sarcophagus were subsequently covered in gypsum by family or community

members of the deceased, perhaps to avoid further robbing of the coffin. Any displaced bones, grave goods and pottery were then replaced in the coffin with some soil. This could account for the presence of bones only belonging to this individual, as well as the presence of animal bone and pottery in the coffin soil fill.

6.0 DISCUSSION AND SUMMARY

A skeleton was recovered from a gritstone sarcophagus from a Roman family plot off one of the major Roman roads leading from York to Lincoln. Parts of the skeleton lay beneath a thin layer of gypsum in the base of the coffin, which was filled to the top with soil. Disarticulated bones from the same skeleton, as well as animal bones, teeth, Roman pottery and a copper alloy item were recovered from the soil fill.

Osteological analysis found that the skeleton was a middle aged or mature adult female, aged 36 years or older. She was slightly taller than the average Roman woman.

She had suffered from several episodes of malnutrition or disease during early childhood, which caused temporary cessation of her dental development. During later adulthood, she developed degenerative joint disease in her hips and spine as a result of general wear and tear. She also suffered from a relatively severely inflammation of both her shins, which was, however, receding at the time of death. Whether this was caused by varicose veins, ulcers, trauma, diabetes or other causes could not be determined. She had osteoarthritis in both her big toes, which is often secondary to trauma. It is not clear whether she suffered pain as a result of these lesions.

The woman's dental health was relatively poor. She had retained one milk tooth, which exhibited heavy wear and also a large cavity, while one of her permanent molars also showed a cavity. She suffered from widespread plaque concretions, indicative of poor dental hygiene and it is likely that this would have caused periodontitis, although this could not be checked due to the loss of the jaw bones. Her dental wear was very mixed, ranging from almost none to severe.

The skeletons from the 89 The Mount cemetery and the adjacent Mill Mount cemetery showed similar pathology to this woman. Evidence for malnutrition or disease in childhood, leading to cessation of dental development was widespread at both cemeteries. Several of the more mature individuals also suffered from degenerative joint disease and there were a number of men and women with osteoarthritis, including a male with identical big toe lesions. The evidence suggests that neither the woman's health, not her height differentiate her from her cemetery group, suggesting that something else must have warranted the expensive burial in a stone sarcophagus.

Notably, the only sarcophagus burial of the adjacent Mill mount cemetery was that of an adolescent with a skeletal dysplasia that caused abnormalities in the child's growth and development.

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APPENDIX A: OSTEOLOGICAL AND PALAEOPATHOLOGICAL CATALOGUE

Skeleton Number	**5007**
Preservation	Moderate
Completeness	50%
Age	36+, middle or mature adult
Sex	Female
Stature	158.97cm ± 3.66cm
Non-Metric Traits	Lateral squatting facet (left)
Pathology	Periostitis on tibiae, osteoarthritis in both distal first metatarsals, DJD in thoracic and lumbar vertebral articular facets and in acetabuli
Dental Health	

	Right Dentition								Left Dentition							
Present	-	P	P	P	P	P	P	P	-	P	P	P	P	P	P	-
Calculus	-	-	Mb	-	-	-	-	-	-	-	-	-	-	Mb	-	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	1	2	2	2	2	2	3	-	2	2	2	2	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	-
Calculus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	SO	-	-
Wear	-	1	2	2	2	2	3	3	3	3	3	2	2	2	1	-

KEY:
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