Osteological Analysis

30-32 Scarborough Road

Rillington

North Yorkshire

Site Code: 01.11.04
NGR: SE 8551 7441

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Prepared for

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Summary

York Osteoarchaeology Ltd was commissioned by MAP Archaeological Consultancy Ltd to carry out the osteological analysis of a single human skeleton recovered from 30-32 Scarborough Road, Rillington, North Yorkshire (SE 8551 7441). The skeleton had been interred in a crouched position in an east to west orientation. The skeleton was found in the vicinity of a previously excavated Anglian burial and may therefore date to the early medieval period.

Osteological analysis revealed that the skeleton was that of an adolescent, aged twelve to thirteen years. The child suffered from lesions in the eye orbits that are thought to be caused by iron deficiency anaemia. It is possible that the anaemia was associated with periods of stress that had manifested themselves on the child's teeth.

Acknowledgements

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1.0 INTRODUCTION

In April 2006 York Osteoarchaeology Ltd was commissioned by MAP Archaeological Consultancy Ltd to carry out the osteological analysis of a partial skeleton. The skeleton had been recovered in April 2006 during an archaeological evaluation at 30-32 Scarborough Road, Rillington, North Yorkshire (SE 8551 7441) in advance of a residential development.

The skeleton had been interred in a crouched position, with the arms in front of the chest. It was lying with the head to the east and the legs to the west. In 1980, an Anglian burial was excavated in the vicinity (250m distance) and it is possible that this burial also dates to the early medieval period. However, it is currently thought that the recently excavated skeleton dates to the Iron Age (Mark Stephens 28/04/2006 *pers. comm.*)

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 many post-mortem breaks, which can probably be attributed to increased bone fragility due to the effects of ploughing and animal disturbance. This led to the loss of the majority of most of the lower legs, the right hip and the feet, as well as fragments of the majority of other bones. Moderate superficial erosion was also observed. The skull was severely fragmented, and incomplete.

Table 1 Summary of osteological and palaeopathological results

Preservation	**Completeness**	**Age**	**Sex**	**Stature**	**Pathology**
Moderate	60%	12-13	-	-	*Cribra orbitalia*

Because of the moderate preservation and plough damage, the skeleton was only 60% complete (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.

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, the moderate preservation meant that only some ageing criteria survived. The fact that the long bone ends were unfused, with the exception of the distal humerus, suggested that this individual was between nine and fifteen years old. It was not possible to measure any of the long bones, as they were incomplete. However, dental development of the third molars suggested that this was an adolescent, aged between twelve and thirteen years (see Table 1).

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.

Because this individual was immature, it was not possible to establish sex.

2.5 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.

Ossicles in lambdoid (additional bone parts in the cranial sutures) were noted at the back of the skull. *Mastoid foramen extrasutural* (a small hole near the ear) was observed on the left temporal bone. The individual also had *bridging of the supraorbital notch* (a bony bridge at the right eye orbit). None of these traits would have had any affect on the individual.

2.6 CONCLUSION

Osteological analysis of the skeleton established that this individual was a young adolescent, aged between twelve and thirteen years.

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.

The skeleton suffered from fine and coarse pitting of both eye orbits, termed *cribra orbitalia* (Plate 1). The lesions develop during childhood and often recede during adolescence or early adulthood. They are thought to be related to iron deficiency anaemia, which was one of the most common metabolic conditions in the past. Symptoms of iron deficiency anaemia

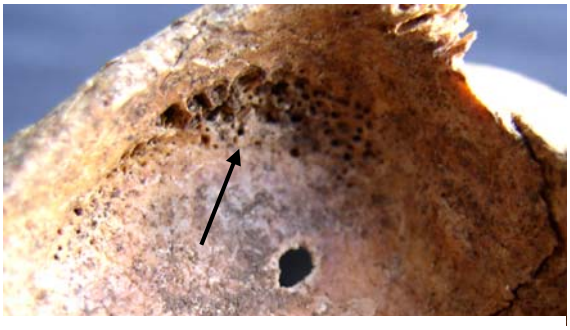

Plate 1 *Cribra orbitalia* lesions in the left eye orbit

include gastro-intestinal disturbance, shortness of breath, fatigue, pallor and palpitations (Roberts and Manchester 1995, 167).

The causes of iron deficiency anaemia are complex, as factors affecting the development of anaemia include environment, hygiene, and diet (Stuart-Macadam 1992, 160). All of these factors can affect the pathogen load (bacteria) in a population, which often contributes to a high prevalence of iron deficiency (*ibid*). In single individuals, other causes of iron deficiency include severe blood loss following injury and destruction of red blood cells (Kent 1992, 2), cancer and parasitic gut infection (Roberts and Manchester 1995, 166).

The lesions were severe and were concentrated at the lateral part of the orbits (Plate 1).

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. Many of the jaws were incomplete as a result of post-depositional factors. A total of 25 permanent teeth and three developing third molar tooth crowns were recovered.

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). Dental wear was largely slight, as expected in an adolescent. However, the wear of the lower anterior teeth, the incisors, was much more severe than that of the other teeth (Plate 2). The fact that the opposing upper teeth had not been affected suggests that the lower teeth had been used for a habitual activity.

Plate 2 Wear and calculus on the anterior teeth f the lower jaw

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 twenty (80%) teeth, and was slight to moderate.

Dental enamel *hypoplasia* (DEH) was observed in seven 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.

A dental anomaly was noted in the left upper second incisor (Plate 3). The tooth was partly divided into two, but only on the lingual (tongue) surface. This is an unusual minor dental anomaly.

Plate 3 Second incisor with division

Despite a lack of cavities, periodontitis or abscesses, the dental health of the person was relatively poor, considering the young age. The presence of

widespread calculus suggests that the adolescent did not practice rigorous dental hygiene. The manifestation of more than one DEH line on each of the teeth implies that the individual had suffered from several episodes of stress during childhood.

5.0 MORTUARY PRACTICE

The single adolescent skeleton had been interred in a crouched position on its left side in an east to west orientation. The arms lay in front of the torso.

The lack of any dating evidence means that it was not possible to determine a date for the burial; however, it is likely that it dates either to the Iron Age, or to the early medieval period.

6.0 DISCUSSION AND SUMMARY

A single skeleton was excavated during an archaeological evaluation at Rillington. The skeleton had been interred in a crouched position. The presence of an Anglian burial that was excavated in 250m distance in 1980 might suggest that this burial dates to the early medieval period. However, based on the burial's position, it may be Iron Age.

Osteological analysis found that the skeleton was an adolescent, aged between twelve and thirteen years. The presence of *cribra orbitalia* lesions in both eye orbits suggests that this child had suffered from iron deficiency anaemia. Furthermore, the individual had experienced periods of physical stress, in the form of malnutrition or childhood disease that had manifested themselves on the teeth. It is possible that the lesions in the orbits and on the teeth had the same cause. Although evidence for cause of death could not be found, it is likely that the episodes of stress, experienced during the first few years of childhood, led to a weakened immune system that may have contributed to the child's death.

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APPENDIX A: OSTEOLOGICAL AND PALAEOPATHOLOGICAL CATALOGUE

Skeleton Number	**5031**
Preservation	Moderate
Completeness	60% parts of all except fibulae, right tibia, feet, right hip
Age	12-13, adolescent
Sex	-
Stature	-
Non-Metric Traits	Ossicle in lambdoid (bilateral), mastoid foramen extrasutural (left), bridging of supraorbital notch (left)
Pathology	*Cribra orbitalia*
Dental Health	calculus on 20/25 teeth, slight to moderate wear, DEH on 7/25 teeth

	Right Dentition								Left Dentition							
Present	E	P	P	P	P	P	P	P	P	P	P	P	P	P	P	E
Calculus	-	Fm	Fa	Sb	Sb	Sb	Sb	-	-	-	-	Sl	Mb	Fb	-	-
DEH	-	-	-	-	L	L	-	-	-	-	L	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	1	3	1	1	1	1	1	2	1	1	1	1	3	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	E	P	P	P	P	P	P	P	P	P	P	P	-	-	-	-
Calculus	-	Fa	Fa	Fa	Sb	Ml	Sl	Sa	Ma	Sa	Sa	Sb	-	-	-	-
DEH	-	-	-	-	L	L	-	-	-	-	L	L	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	1	3	1	1	2	3	4	3	3	2	1	-	-	-	-