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FULL ANALYSIS OF CREMATED HUMAN REMAINS FROM FIELD 259 OF THE A1 WIDENING SCHEME

Introduction

During excavations in 2014, one feature containing cremated bone was identified during excavations by Northern Archaeological Associates in Field 259 (Appendix, Table 1), located to the south-west of Killerby Farm, Killerby, North Yorkshire (SE 2527 9575). Interestingly, a possible bone pin was also recovered from the cremation burial during analysis. This document presents the objectives, methods and results of the analysis of these remains.

Objectives

The skeletal assessment aimed to determine age and sex, as well as any manifestations of disease from which the individuals may have suffered. Additionally, information was sought regarding the cremation techniques.

Methodology

The cremated bone was sieved through a stack of sieves; with 10mm, 5mm and 2mm mesh sizes. The bone recovered from each sieve was weighed and sorted into identifiable and non-identifiable bone. The identifiable bone was divided into five categories: skull, axial (excluding the skull), upper limb, lower limb and long bone (unidentifiable as to the limb). All identifiable groups of bone were weighed and described in detail.

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 remains is assessed subjectively, depending on 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 erosion and very few or no post-depositional breaks, whereas very poor preservation indicated complete or almost complete loss of the bone surface due to erosion and severe fragmentation.

Results

The cremated bone assemblage from Field 259 was in a moderate state of preservation, exhibiting minimal post-mortem breakage, retention of surface detail on larger fragments, and slight abrasion/blunting of fragment edges. Moderate warping and bone cracking, which occurs commonly during the cremation process, was evident, primarily affecting the long bones, and some larger cranial fragments.

The fragment size of cremated bone is frequently attributed to post-cremation processes. This is because skeletal elements retrieved from modern crematoria tend to be comparatively large before being ground down for scattering or deposition in the urn. Bone is also prone to fragmentation if it is moved while still hot (McKinley 1994, 340). For Burial 6888, the greatest proportion of the bone was derived from the 5mm sieve (Appendix, Table 2). This suggests that the bone from these burials was subject to disturbance while hot.

The amount of bone retrieved from the burial (908.2g) weighed significantly less than the average bone weight produced by modern crematoria, which tends to range from 1000.5g to 2422.5g with a mean of 1625.9g (McKinley 1993). Wahl (1982, 25) found that archaeologically recovered remains of cremated adults tend to weigh less (between 250g and 2500g) as a result of the commonly practised custom of selecting only some of the cremated bone from the pyre for inclusion in the burial, thereby representing a symbolic, or token, interment.

The cremated bone was white in colour, indicating that it was very well burnt, causing the complete loss of the organic portion of the bone (Appendix, Table 1). According to McKinley (1989), the body requires a minimum temperature of 500° Celsius over seven to eight hours to achieve complete calcination of the bone. The colouration of the bone in Burial 6888 therefore suggests that the bone had reached sufficient temperatures, and was burnt for long enough, to complete the cremation process.

The majority of identifiable bones were derived from unidentified long bone shaft fragments (Appendix, Table 3). However, fragments of vertebrae, ribs, hand phalanges (bones in the fingers), and shafts of the upper and lower limbs were also identified. Cranial vault fragments were also abundant, which is not surprising as the cranial vault is very distinctive and easily recognisable, even when severely fragmented. Therefore it often forms a large proportion of identified bone fragments in cremated remains (McKinley 1994).

A count of the 'minimum number of individuals' (MNI) recovered from a cemetery is carried out as standard procedure during osteological assessments of inhumations in order to establish how many individuals were 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, such as the hip joints and cranial elements. It is usually not possible to calculate the MNI for cremation burials, because only a token selection of bone from the pyre tends to be buried. Double burials can be identified

only if skeletal elements are duplicated, or if skeletons of different ages are represented in one burial. Interestingly, in Burial 6888 skeletal elements possibly indicative of two individuals of differing age were identified (see below), giving an MNI of two individuals (one adult, and one non-adult).

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 (Lovejoy et al 1985; Meindl and Lovejoy 1989). 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).

The criteria normally used for age determination were absent, as such age determination was based on less reliable criteria. The bone robusticity, and presence of fully formed hand phalanges, suggested that one of the individuals was at least sixteen years old but was likely considerably older. A number of cranial vault fragments were identified that were much thinner than the majority recovered, and were more porous in texture. In addition, a fragment of a lower deciduous canine was also recovered, which appeared to be still in the stages of crown development. Therefore Burial 6888 also potentially contained an infant/young juvenile in addition to the adult individual identified.

Sex determination is usually 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. No skeletal elements diagnostic for sex estimation were present for the adult individual within Burial 6888.

Cremated bone shrinks at an inconsistent rate (up to 15%) during the cremation process and it was therefore not possible to measure any of the bones from this burial.

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). Non-metric traits were not observed in any of the individuals within this burial.

The analysis of skeletal and dental manifestations of disease can provide a vital insight into the health and diet of past populations, as well as their living conditions and occupations. In this case, manifestations of disease were not observed amongst any of the cremated remains.

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Appendix

Table 1 Summary of cremated bone assemblages

Fill No	Feature Type	Period	Artefacts and Inclusions	Bone Colour	Preservation	Weight (g)	Percentage of Expected Quantity of Bone
6888	Pit	Prehistoric?	Charcoal, possible bone pin	White	Moderate	908.2	55.9%

Table 2 Summary of cremated bone fragment size

Burial No	10mm (g)	10mm (%)	5mm (g)	5mm (%)	2mm (g)	2mm (%)	Residue	Weight (g)
6888	179.0	19.7	393.2	43.3	288.4	31.8	47.6	908.2

Table 3 Summary of identifiable elements in the cremation burials

Burial No	Skull (g)	Skull (%)	Axial (g)	Axial (%)	UL (g)	UL (%)	LL (g)	LL (%)	UIL (g)	UIL (%)	Total ID (g)	Total ID (%)	Total UID (g)	Total UID (%)
6888	104.5	11.5	27.5	3.0	91.7	10.1	95.6	10.5	222.9	24.5	542.2	59.7	366.0	40.3