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FULL ANALYSIS OF HUMAN REMAINS FROM FIELDS 145 & 143 OF THE A1 WIDENING SCHEME

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Introduction

During excavations in 2014 in Field 145, Bowbridge Lane, Little Holtby, North Yorkshire, Northern Archaeological Associates identified 25 features containing cremated bone. This document presents the objectives, methods and results of the analysis of these remains. Upon analysis, the remains recovered from Field 143 (Context 7043) comprised of, what was believed to be, animal bone, as was Context (10020) from Field 145. As such, these remains have not been included in this report, other than the Appendix.

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.

Results

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.

The majority of cremated bone assemblages from Field 145 were in a moderate to good state of preservation, and exhibited, minimal post mortem breakage and retention of surface detail, only one burial (10022) was in a poor state of preservation. There were no clear trends in the preservation of the cremated bone. Surprisingly, the only urned cremation was not amongst the best preserved, suggesting that the inclusion of a burial within an urn did not contribute to the preservation of the cremated remains. However, the urn appears to have undergone significant post-depositional alteration. In the majority of burials the greatest proportion of the bone was derived from the 5mm sieve. It is possible that post-burning processes, such as raking of the pyre while the bone was still hot, had a greater effect on the bone preservation.

Moderate warping and bone cracking, which occurs commonly during the cremation process, was evident in many of the cremated bone assemblages. 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).

The amount of bone retrieved from all of the burials weighed significantly less than the average bone weight produced by modern crematoria, which tends to range from 1,000.5g to 2,422.5g with a mean of 1,625.9g (McKinley 1993). Wahl (1982, 25) found that archaeologically recovered remains of cremated adults tend to weigh less (between 250g and 2,500g) 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. Indeed, some of the inclusions of cremated from within the features in Field 145 may not have been intentional deposits at all.

The cremated bone assemblages varied widely in terms of colour, under half of the burials were very well burnt, causing the complete loss of the organic portion of the bone and producing a white colour in all but one of the assemblages (Appendix, Table 1), while the majority were incompletely calcined. 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 variation in the colour of a number of burials suggests that the bone had either not reached sufficient temperatures, or been allowed to burn for long enough, alternatively the pyre may not have been well constructed and prevented adequate air flow for optimal burning.

The majority of identifiable bones were derived from unidentified long bone shaft fragments, but also included recognisable fragments of thoracic and lumbar articular facets, rib fragments, distal foot phalanx (bones in the toes), and femoral and tibia shaft fragments. It is surprising that skull fragments were not the most abundant skeletal element in any of the cremated bone assemblages, since the cranial vault is very distinctive and easily recognisable, even when

severely fragmented. As such, it often forms a large proportion of identified bone fragments in cremated remains (McKinley 1994). However, the tiny quantity of bone present in most of the cremated bone assemblages, meant that very few burials could be positively identified as human, with reliance on the appearance of the surface texture alone in many cases.

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 burials 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 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. No double burials were identified in any of the cremated assemblage.

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 all but one of the burials, the criteria normally used for age determination were absent. As such, age determination was based on less reliable criteria. The bone robusticity suggested that all but one of the individuals with identifiable bone fragments were at least sixteen years old, but may have been considerably older. Burial (10120) appeared to contain the remains of a juvenile, consisting of a single fragment of unfused long bone.

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. None of the burials contained any diagnostic skeletal elements.

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 these burials.

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.

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

Field No	Fill No	Feature Type	Period	Artefacts and Inclusions	Bone Colour	Preservation	Weight (g)	% of Expected Quantity of Bone
143	7043	Pit	-	Pot, calcined bone, charcoal	-	-	-	Not human bone
145	10002	Cremation pit	-	Urned	White & blueish grey	Moderate	354.1	21.8%
145	10006	Pit	-	Fired clay, charcoal, charred cereal grain	White & black internal surfaces	Good	4.1	0.3%
145	100007	Pit	-	Pot, , flint, charcoal, carbonised grain	White & blueish grey	Moderate	2.6	0.2%
145	10011	Pit	-	Pot, charcoal, carbonised grain	black	Moderate	11.1	0.7%
145	10015	Buried soil	-	Pot, flint, charcoal, carbonised cereal grain	White	Moderate	0.6	0.04%
145	10016	Pit	-	Fired clay, charcoal	White	Moderate	3.1	0.2%
145	10018	Pit	-	Fired clay, charcoal, carbonised cereal grain, charred nutshell	White	Moderate	1.7	0.1%
145	10020	Pit	-	Pot, flints, charcoal, calcined bone	-	-	-	Not human bone
145	10022	Pit	-	Fired clay, charcoal	White	Poor	1.1	0.7%
145	10040	Pit	-	Flint, charcoal, charred cereal grain	White	Good	2.3	0.1%
145	10048	Stony layer	-	Pot	White	Moderate	0.3	0.02%
145	10050	Pit	-	Pot, fired clay, charcoal, charred nutshell	White	Good	0.4	0.02%
145	10064	Pit	-	Flint, charcoal, charred nutshell	White & grey	Good	0.5	0.03%
145	10066	Pit	-	Pot, charcoal	White, some grey internal surfaces	Good	2.2	0.1%
145	10079	Pit	-	Fired clay	White	Good	0.3	0.02%
145	10081	Palisade	-	Pot, flint	White & black	Moderate	11.2	0.7%
145	10087	Pit	-	Fired clay, charcoal	White & black internal surfaces	Good	1.2	0.1%
145	10097	Post hole	-	Bone, calcined bone, charcoal	White & black internal surfaces	Good	0.9	0.1%
145	10103	Palisade	-	Pot, bone	White & blueish grey	Moderate	0.9	0.1%
145	10116	Ditch	-	Pot, flint, fired clay, bone, charcoal, carbonised cereal grain	White & blueish grey	Moderate	8.7	0.5%
145	10120	Ditch	-	Pot, glass, carbonised grain	White	Good	0.3	0.02%
145	10122	Pit	-	Pot, charcoal	White & blueish grey	Good	0.6	0.04%
145	10126	Pit	-	Pot, fired clay, charcoal, carbonised cereal grains	White	Good	1.8	0.1%
145	10132	Pit	-	Fired clay, charcoal, carbonised cereal grains	White & grey	Good	1.8	0.1%
145	10135	Post hole	-	Fired clay, bone, carbonised cereal grain	White	Good	0.2	0.01%

Table 2 Summary of cremated bone fragment size

Burial No	10mm (g)	10mm (%)	5mm (g)	5mm (%)	2mm (g)	2mm (%)	Residue	Weight (g)
10002	112.5	31.8	177.0	50.0	60.8	17.1	3.8	354.1
10006	2.5	61.0	0.9	22.0	0.7	17.1	-	4.1
100007	0.0	0.0	2.15	82.7	0.45	17.3	-	2.6
10011	2.5	22.5	4.8	43.2	3.8	34.2	-	11.1
10015	0.0	0.0	0.5	83.3	0.1	16.7	-	0.6
10016	0.0	0.0	1.5	48.4	1.6	51.6	-	3.1
10018	0.0	0.0	0.0	0.0	1.7	100	-	1.7
10022	0.0	0.0	0.9	81.8	0.2	18.2	-	1.1
10040	0.0	0.0	0.9	39.1	1.4	60.9	-	2.3
10048	0.0	0.0	0.0	0.0	0.3	100	-	0.3
10050	0.0	0.0	0.3	75.0	0.1	25.0	-	0.4
10064	0.0	0.0	0.4	80.0	0.1	20.0	-	0.5
10066	0.0	0.0	0.9	40.9	1.3	59.1	-	2.2
10079	0.0	0.0	0.1	33.3	0.2	66.7	-	0.3
10081	3.1	27.7	6.1	54.5	2.0	17.9	-	11.2
10087	0.0	0.0	0.5	41.7	0.7	58.3	-	1.2
10097	0.0	0.0	0.5	55.5	0.4	44.4	-	0.9
10103	0.0	0.0.	0.9	100	0.0	0.0	-	0.9
10116	0.0	0.0	5.6	64.4	3.1	35.6	-	8.7
10120	0.0	0.0	0.3	100	0.0	0.0	-	0.3
10122	0.0	0.0	0.6	100	0.0	0.0	-	0.6
10126	0.0	0.0	1.1	61.1	0.7	38.9	-	1.8
10132	0.0	0.0	0.5	27.8	1.3	72.2	-	1.8
10135	0.0	0.0	0.0	0.0	0.2	100	-	0.2

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 (%)
10002	44.0	12.4	19.3	5.5	133.2	37.6	34.2	9.7	69.2	19.5	299.9	84.7	54.2	15.3
10006	0.0	0.0	0.0	0.0	0.5	12.2	2.5	61.0	0.6	14.6	3.6	87.8	0.5	12.2
100007	0.6	23.	0.1	3.8	0.0	0.0	0.2	7.7	1.5	57.7	2.4	92.3	0.2	7.7
10011	0.5	4.5	1.3	11.7	0.0	0.0	0.0	0.0	7.4	66.7	9.2	82.9	1.9	17.1
10015	0.1	16.7	0.0	0.0	0.0	0.0	0.0	0.0	0.5	83.3	0.6	100	0.0	0.0
10016	0.1	3.2	0.1	3.2	0.0	0.0	0.5	16.1	1.9	61.3	2.6	83.9	0.5	16.1
10018	0.2	11.8	0.2	11.8	0.0	0.0	0.0	0.0	0.3	17.6	0.7	41.2	1.0	58.8
10022	0.1	9.1	0.0	0.0	0.0	0.0	0.0	0.0	1.0	90.9	1.1	100	0.0	0.0
10040	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	95.7	2.2	95.7	0.1	4.3
10048	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	33.3	0.1	33.3	0.2	66.7
10050	0.1	25.0	0.0	0.0	0.0	0.0	0.2	50.0	0.0	0.0	0.3	75.0	0.1	25.0
10064	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	100	0.5	100	0.0	0.0
10066	0.3	13.6	0.3	13.6	0.0	0.0	0.0	0.0	1.4	63.6	2.0	90.9	0.2	9.1
10079	0.1	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.2	66.7	0.3	100	0.0	0.0
10081	0.0	0.0	1.6	14.3	1.4	12.6	0.9	8.0	3.7	33.0	7.6	67.9	3.6	32.1
10087	0.0	0.0	0.1	8.3	0.0	0.0	0.0	0.0	0.9	75.0	1.0	83.3	0.2	16.7
10097	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	88.8	0.1	22.2
10103	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	55.6	0.5	55.6	0.4	44.4
10116	0.5	5.7	0.0	0.0	2.5	28.7	1.7	19.5	2.2	25.4	6.9	79.3	1.8	20.7
10120	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	100
10122	0.0	0.0	0.2	33.3	0.0	0.0	0.0	0.0	0.4	66.7	0.6	100	0.0	0.0
10126	0.0	0.0	0.1	5.6	0.7	38.9	0.3	16.7	0.4	22.2	1.51	83.3	0.3	16.7
10132	0.1	5.6	0.2	11.1	0.0	0.0	0.0	0.0	1.0	55.6	1.3	72.2	0.5	27.8
10135	0.0	0.0	0.1	50.0	0.0	0.0	0.0	0.0	0.1	50.0	02	100	0.0	0.0