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FULL ANALYSIS OF HUMAN REMAINS FROM FIELD 172 OF THE A1 WIDENING SCHEME

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Introduction

Excavations conducted by Northern Archaeological Associates between 2014 and 2015 identified a discrete area of funerary activity in the southern half of Field 172, Catterick, North Yorkshire. Within this area six cremation burials were aligned in a shallow arc, cut into a layer of buried soil, which may represent the remnants of a Roman round barrow. Two of the burials were believed to be bustum burials [6790] and [6782], a further two contained cremation urns [6783] and [6785] and the remaining two burials appeared to be placed in simple pits [6723] and [6729]. All the cremation burials are believed to date to the Roman period.

A small quantity of disarticulated burnt and unburnt bone was also recovered from a number of pit and ditch fills, most of which could not be positively identified as human. Two contexts (6798) and 6191) each contained a small quantity of cremated human bone. Notably, upon analysis it was discovered that deposits from intercutting features [25124] and [25148] both contained fragments of the same skull. A single deciduous left lateral maxillary incisor was recovered from the upper fill of Ditch [25173].

This document presents the objectives, methods and results of the analysis of these remains. A list of the findings is included in the appendix.

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. Additionally, information was sought regarding the cremation techniques.

Methodology

The inhumed bone was analysed in detail, assessing the preservation and completeness, as well as determining the age, sex and stature of the individuals, where possible. All pathological lesions were recorded and described.

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.

Osteological Analysis

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). 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, of the inhumations, 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. 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.

The fragmentary remains of an inhumed skull recovered from Contexts (25123) and (25149) survived in a good state of preservation (grade 2), with minimal abrasion of the bone cortex.

Preservation of the cremated bone 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. Cremation Burials [6790] and [6723] both survived in excellent condition, while the bone from Cremation Burial [6785] was in very good condition. The bone from the remaining three cremation burials and deposits (6798) and (6191) was in good condition (see Table 1). Comparisons between the preservation of the urned and unurned cremated bone assemblages suggests that the inclusion of a burial within an urn was not a contributing factor to bone preservation. Instead, it is likely that post-burning processes, such as raking of the pyre while the bone was still hot, soil conditions and later truncations had a greater effect on the bone preservation.

Moderate warping and bone cracking, which occurs commonly during the cremation process, was evident amongst the bone from all six burials. 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 bone from all six cremations was relatively fragmented; with the majority of bone from Burials [6729], [6723], [6782], [6783], [6785] and Deposits (6798) and (6191) deriving from the 5mm sieve. Only the bone from one of the bustum burials [6790], contained bone fragments of which almost half (43.8%) were 10mm in size or larger, including a proximal radius shaft, which measured 99.43mm, from Context (25004)AG and a proximal femur shaft, which measured 96.1mm, from Context (25005)AB. This would suggest that the remains from Burials [6729], [6723], [6782], [6783], [6785] and Deposits (6798) and (6191) may have been subject to disturbance while still hot or due to intentional fragmentation.

The average weight of the six cremation burials was 1,555.6g and ranged from 150.0g to 6,511.2g. If the bone from Contexts (6798) and (6191) are included, the average weight is reduced to 1,170.3g and 7.55g to 6,511.2g. Where it was possible to calculate the expected quantity of bone for the burials as a percentage two [6729] and [6783] contained considerably less cremated remains than the quantity of bone expected from a modern cremation, while Cremation Burial [6723] contained only slightly less (see Table 1) than the average amount of bone from modern cremations, as given by (McKinley 1993). In comparison, the quantity of bone from Contexts (6798) and (6191) was miniscule, with 0.5% and 1.3% of the bone expected from a modern cremation. The average bone weight produced by modern crematoria 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. It was not possible to calculate the expected quantity of bone for Burials [6782], [6785], or [6790] since two of these were multiple burials and two contained multiple individuals, and one contained a juvenile.

The degree of calcination of the bone in the cremated bone assemblages was very varied. 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. None of the cremation burials were entirely calcined. Bone fragments from the possible bustum burial [6790] contained by far the widest array of colour variations, with some fragments of femur from (6791) only partly charred (black) at one end, and entirely unburnt at the other. Likewise, Context (25005)AF from the same burial contained fragments of lumbar vertebrae (lower spine) that were entirely unburnt. Many fragments from Context (25004)AG and AB were incompletely burnt and black, whereas bone from Context (25004)AD appeared to have been more successfully burnt, with the majority of the bone from this context appearing white, with occasional black patches. The varied colouration of the bone from this bustum suggests that incomplete calcination of the remains may have been the result of localised pyre collapse, preventing the necessary air flow

for adequate combustion and may suggest that the pyre was not constantly attended while alight. Similarly, Cremation burials [6729], [6723], [6782], [6783], [6785] and Deposits (6798) and (6191) were also incompletely burned, suggesting that the bone had not reached sufficient temperatures, or had not been allowed to burn for sufficiently long on a well constructed pyre.

It was possible to identify between 60.4% and 78.5% of the cremated bone from the six burials and two deposits (6798) and (6191) that contained cremated bone. With regards to the possible bustum [6790], the quantity of identifiable fragments varied between contexts and spits. The context within [6790] that contained the least amount of identifiable bone (37.4%) was (25004)AD, while the context that contained the most identifiable bone (86.1%) was (25009).

The majority of identifiable fragments in Burials [6729], [6723], [6785], [6790] and Deposits (6798) and (6191) were long bone shafts, which could not be identified to a specific region, followed by skull fragments in Burials [6729], [6723], [6790] and Deposit (6798) and lower limb bones in Burial [6785] and Deposit (6191). Whereas the most abundant elements in Burials [6782] and [6783] were skull fragments followed by unidentified long bone fragments in Burial [6782] and axial fragments in Burial [6783]. It is unsurprising that skull fragments were one of the most abundant skeletal elements, 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). When the contexts that were divided into zoned spits from the possible bustum burial [6790] were analysed, Context (25004) appeared to represent the remains of an individual burnt *in situ*, with a similar distribution of skeletal elements. For example, Spits (25004)AA and AH, were taken from one end of the feature and contained mostly skull fragments, while horizontally the next two spits (25004)AB and AG consisted of skull fragments, axial and upper limb bones. The following two spits (25004)AC and AF consisted primarily of lower limb bones. The distribution of skeletal elements in Context 25005, however, was far more mixed.

It is not possible to calculate the MNI for the 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. Cremation Burial [6790] appeared to contain the remains of at least five individuals, three of whom were adults, represented by odontoid processes, which were recovered from Contexts (6792), (25005)AA and (25005)AB. Furthermore, two juveniles were also identified, one of whom was between aged between five and six years (young juvenile), based on the developing crown of a mandibular second premolar from (25005)AB. The other was a ten to eleven year old (older juvenile), based on the developing crown of a third molar from (25005)AA. Context [6785] also contained multiple individuals, including a developing deciduous canine crown belonged to an infant aged between one to six months, a developing permanent maxillary incisor crown belonging to a young juvenile aged between three to four years and a completed permanent mandibular incisor root that belonged to an individual that was at least ten years old or older.

The MNI for the inhumed disarticulated bone was two. This was based on the presence of a deciduous maxillary molar from the upper fill of Ditch [25173], which belonged to a juvenile, and an adult skull recovered from intercutting Features [25124] and [25148].

Age is usually determined using standard ageing techniques, as specified in Scheuer and Black (2000a; 2000b) and Cox (2000). Age estimation in adults 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 age of the remains from some of the burials could be assessed. As discussed above, Cremation Burial [6785] contained a developing deciduous canine crown belonged to an infant aged between one to six months, a developing permanent maxillary incisor crown belonged to a young juvenile aged between three to four years and a completed permanent mandibular incisor root that belonged to an individual that was at least ten years or older. The developing permanent dentition from Burial [6782] suggested that the burial contained the remains of a young juvenile between the ages of four to six years.

Cremation Burials [6792] and [6723] and the cremated bone from Deposits (6798) and (6191) each contained the remains of an adult. However, because none of the criteria normally used for age determination were present, age determination was based on less reliable criteria, such as bone robusticity, which suggested that the individuals were at least sixteen years old but may have been considerably older. Cremation Burial [6783] contained a fragment of auricular surface, which had lost the billowed appearance to its surface and appeared relatively inactive (although taphonomically abraded), suggesting that the individual was at least 35 years old or older when they died.

Cremation Burial [6790] contained two largely complete pubic symphyses, which appeared to belong to individuals of different ages; one of these still retained a billowed surface, suggesting that it belonged to a young adult or adolescent (<19years old), the second appeared far more degraded with the loss of the billowed surface and completion of the symphysial rim, which suggested that it belonged to a mature adult (aged 46+ years). Additionally, this bustum burial also contained two juveniles, one of whom was aged between five to six years (young juvenile) based on the developing crown of a mandibular second premolar from Context (25005)AB, and the other a ten to eleven year old (older juvenile) based on the developing crown of a third molar from Context (25005)AA.

Despite being damaged, it was possible to determine that the deciduous maxillary molar from the upper fill of Ditch [25173], belonged to a juvenile (aged1-12 years). Based upon dental wear of the adult skull recovered from intercutting features [25124] and [25148], this individual was potentially a young adult (18-25 years).

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.

It was not possible to determine the sex of any of the inhumed bone.

Due to the shrinkage and warping of skeletal elements during the cremation process, assessing the sex of any remains must be considered as tentative at best, however, an orbital rim from Context (25004)AG and a sciatic notch from (25004)AG recovered from Bustum Burial [6790] were thought to possess female characteristics. However, the remains may instead have belonged to an adolescent and thus have appeared more female.

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. All teeth and jaws were examined macroscopically for evidence of pathological changes.

Cremated tooth roots and unerupted tooth crowns were recovered from all six cremation burials; none, however, exhibited any dental pathology.

A single deciduous left lateral maxillary incisor was recovered from the upper fill of Ditch [25173], which, although moderately worn, did not exhibit any dental pathology. It is likely that this tooth was shed naturally during childhood. Ten permanent teeth belonging to the skull from Contexts (25123) and (25149) and are discussed below.

Calculus (mineralised dental plaque) is commonly observed in archaeological populations whose dental hygiene was not as rigorous as it is today. If plaque is not removed from the teeth effectively (or on a regular basis) then these plaque deposits mineralise and form concretions of calculus on the tooth crowns or roots, along the line of the gums (Hillson 1996). Nine of the ten teeth from Contexts (25123) and (25149) exhibited slight deposits of calculus.

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. Four of the teeth from Contexts (25123) and (25149) exhibited grooves on the crown, suggesting that they may have experienced episodes of stress during their childhood.

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Appendix

Table 1 Summary of cremated bone assemblages

Cremation Burial No	Feature Type	Urned?	Period	Artefacts and Inclusions	Bone Colour	Preservation	Weight (g)	Percentage of Expected Quantity of Bone
6729 (Burial 1)	Cremation pit	N	Roman?	Charcoal; hobnail (6518)	White/blue grey/black	Good	314.5	19.3%
6723 (Burial 2)	Cremation pit	N	Roman?	Charcoal, coin, grinding stone, burnt clay (6725), Pottery, quern stone, grinding stone (6724)	White, some grey internal surfaces	Excellent	1390.7	85.5%
6782 (Burial 3)	Possible bustum burial	N	Roman?	Coin	White/blue grey/dark grey	Good	150.0	*
6783 (Burial 4)	Cremation pit	Y	Roman?	Charcoal; Fe nail; cremation vessel (6787)	White/blue grey/dark grey	Good	435.1	26.8%
6785 (Burial 5)	Cremation pit	Y	Roman?	Fe nails (6786)	White to grey/black	Very good	532.0	*
6790 (Burial 6)	Bustum	N	Roman?	Fe nails, Cu object (6791) Fe nail (6792), Fe nails, Cu coin, Cu bangle fragments (25005)	White to black, context (6791) some fragments black to unburnt, (25004)AB and (25004)AF generally black	(25004) and (25005) Excellent, (25003), (6792), (6791), (25007), and (25009) Good	6511.2	*
6191	-	N	?	-	White, some black internal surfaces	Good	21.05	1.3%
6798	layer	N	?	_	White, some black internal surfaces	Good	7.55	0.5%

- cannot calculate due to the presence of multiple individuals or non-adult remains

Table 2 Summary of cremated bone fragment size

Burial No	10mm (g)	10mm (%)	5mm (g)	5mm (%)	2mm (g)	2mm (%)	Residue	Weight (g)
1	42.4	13.5	179.0	56.9	88.0	28.0	5.1	314,5
2	488.9	35.2	608.9	43.8	285.7	20.5	7.2	1390.7
3	26.0	17.3	72.9	48.6	47.8	31.9	3.3	150.0
4	164.9	37.9	199.1	45.8	67.5	15.5	3.6	435.1
5	122.6	23.0	215.6	40.5	189.5	35.6	4.3	532.0
6	2854.2	43.8	2231.9	34.3	1205.3	18.5	219.8	6511.2
6191	3.9	18.5	9.8	46.6	7.3	34.7	0.05	21.05
6798	0	-	3.75	49.7	3.7	49.0	0.1	7.55

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 (%)
1	54.5	17.3	19.2	6.1	31.8	10.1	46.8	14.9	73.2	23.3	225.5	71.7	89.0	28.3
2	208.8	15.0	90.6	6.5	171.8	12.4	103.6	7.4	394.7	28.4	969.5	69.7	421.2	30.3
3	79.0	52.7	6.2	4.1	6.7	4.5	5.5	3.7	20.4	13.6	117.8	78.5	32.2	21.5
4	106.7	24.5	84.6	19.4	33.8	7.8	34.6	8.0	43.9	10.1	303.6	69.8	131.5	30.2
5	19.4	3.6	28.0	5.3	12.9	2.4	33.6	6.3	227.2	42.7	321.1	60.4	210.9	39.6
6	862	13.2	765.9	11.8	589.1	9.0	702.2	10.8	1210.9	18.6	4130.1	63.4	2381.1	36.6
6191	1.5	7.1	0.2	1.0	6.5	30.8	2.2	10.5	5.2	24.7	15.6	74.1	5.45	25.9
6798	1.6	21.2	0.3	4.0	0.9	11.9	1.0	13.3	1.8	23.8	5.6	74.2	1.95	25.8

Table 4 Summary of disarticulated bone

Context	Bone Element	Detailed Description	Side	%	SP	No. Frags	Age	Sex	Other
25123	Skull	L petrous, frontal and parietal fragments, L orbital rim.	L	35	2	38	Adult	-	Part of same skull also in (25149)
25149	Skull	L mastoid, L zygoma, L& R maxilla, occipital, parietal & temporal fragments	L&R	30	2	60+	Adult	-	Part of same skull also in (25123) 10 teeth, 9 with slight calculus. 4 with DEH, wear grade 1
6744	-	19 fragments of unidentifiable burnt bone	0.3g	-	-	-	-	-	-
6766	-	19 fragments of unidentifiable burnt bone	0.4g	-	-	-	-	-	-
6117	-	Not human, potentially fossils	-	-	-	-	-	-	-
67011	-	1 fragment of unidentifiable burnt bone	0.05g	-	-	-	-	-	-
6115	-	fragments of unidentifiable burnt bone	0.1g	-	-	-	-	-	-
6772	-	fragments of unidentifiable burnt bone and 3 fragments of unidentifiable unburnt bone	0.05g	-	-	-	-	-	-
25174	Tooth	Deciduous lateral maxillary incisor, root broken off	L	502	1	1	Juv	-	-
6727	-	2 fragments of unburnt and 1burnt fragment of	-	-	-	-	-	-	-

		unidentifiable bone							
6755	-	4 fragments of unburnt and 2 burnt fragments of unidentifiable bone	-	-	-	-	-	-	-
6750	Animal bone	-	-	-	-	-	-	-	-