Osteological Assessment

Civic Offices Limerick Road

Nenagh

County Tipperary

Eire

Site Code: 03E1295
NGR 85866, 179172

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Prepared for

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Summary

An osteological assessment of four assemblages of cremated bone excavated in August 2003 by Archaeological Consultancy Services was undertaken by York Osteoarchaeology Ltd on behalf of Palaeoecology Research services Ltd in January 2004. The remains were excavated in advance of the construction of the Tipperary Civic Offices, Limerick Road, Nenagh, County Tipperary in the Republic of Ireland (NGR 85866, 179172).

The cremation burials dated to the late Bronze Age and were thought to be part of a significant ritual prehistoric landscape. Osteological analysis found that three of the burials contained adults, while the small quantity of bone in the fourth burial may represent a pyre deposit or accessory burial. All four burials were unurned, but two burials contained probable grave goods in the form of fossils and a pottery sherd. The group of cremation burials may represent a small family plot.

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1.0 INTRODUCTION

In January 2004 York Osteoarchaeology Ltd was commissioned by Palaeoecology Research Services Ltd to carry out an osteological assessment of four assemblages of cremated human bone excavated in August 2003 by Archaeological Consultancy Services Ltd. The four cremation burials had been excavated in advance of an office development at the Civic Offices, Limerick Road, Nenagh, County Tipperary in the Republic of Ireland (NGR 85866, 179172).

The cremation burials were interred in simple pits and contained quantities of charcoal. A single sherd of pottery was recovered from Burial 4, which dates the burials to the late Bronze Age. Two fossils found among the cremated remains from Burial 1 may represent a further deliberate burial inclusion. It is probable that the burials are part of the important prehistoric ritual landscape identified during previous excavations in the Knockanpierce townland, which also included funerary monuments in the form of ring barrows.

1.1 AIMS AND OBJECTIVES

Initially, the assessment aimed to identify whether all cremated human bone recovered from the site was human. The skeletal assessment then 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.

1.2 METHODOLOGY

The cremated bone was first analysed to determine whether it was human or non-human. The human bone was subsequently 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.

2.0 OSTEOLOGICAL ANSLYSIS

Osteological analysis is concerned with the determination of the demographic profile of the assemblage based on the assessment of sex, age and stature, as well as measurements and non-metric traits. This information is essential in order to determine the prevalence of disease types and age-related changes. It is also 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 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.

Preservation varied considerably throughout the bone assemblages (Table 1). Unusually, the best preserved burial pit (Burial 3) contained the smallest assemblage of cremated bone. It is possible that a ditch, which truncated Burial 1, as well as other post-burial disturbance, had caused considerable truncation of the burials.

The cremation process had produced little warping, but much bone cracking, which may have contributed to the small fragmentation of the bone. All bone assemblages with the exception of that recovered from Burial 4 exhibited a considerable amount of surface erosion, suggesting that the nature of the soil and post-burial disturbance affected the bone adversely. The limited degree of erosion of bone from Burial 4, together with the larger size of the bone assemblage from this burial suggests that this feature may have suffered from less severe post-depositional disturbance than the other burials.

Table 1 Summary of the assemblage preservation

Burial No	Feature Type	Inclusions	Bone State	Preservation	Age	Sex	Weight (g)
1	pit	fossils	white	moderate	16+	-	58.1g
2	scoop	-	white	poor	16+	-	70g
3	pit	-	white	very poor	-	-	0.2g
4	pit	sherd	white	good	20-35	-	273.6g

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. However, bone is also prone to fragmentation if it is moved while still hot (McKinley 1994, 340). However, it is believed that post-depositional, rather than post-burning disturbance of the bone caused the fragmentation and erosion of the human remains from this site.

In 50% of these assemblages, the majority of bone was derived from the 5mm sieve (Table 2), whereas in the remaining assemblages, more than half of the remains constituted bone fragments that were in the 2mm category. Only a small proportion of bone fragments were larger than 10mm, which hindered identification.

Table 2 Summary of cremated bone fragment size

Burial No	10mm (g)	10mm (%)	5mm (g)	5mm (%)	2mm (g)	2mm (%)	Residue	Weight (g)
1	11.8	20	25.3	44	21.0	36	-	58.1
2	7.9	11	21.4	31	38.0	54	2.7	70g
3	-	-	-	-	0.2	100	-	0.2g
4	46.4	17	115.0	42	107.7	39	4.5	273.6g

The quantity of cremated bone recovered per burial varied from 0.2g to 273.6g (see Table 2), with an overall mean weight of 100.5g. The quantity of bone retrieved from the burials weighed considerably less than that that produced by modern crematoria, which tends to range from 1000.5g to 2422.5g with an average 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. All burials with the exception of Burial 4 from the Civic Offices produced less than 10% of the quantity of bone expected to remain following burning. Burial 4 contained 17% of the average amount of bone expected to survive the cremation process.

The cremated bone was very well burnt, causing the complete loss of the organic portion of the bone and producing a white bone colour throughout all four assemblages. 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.

Despite the fragmentation of bone elements, it was possible to identify skeletal elements in all but Burial 3, which contained only 0.2g of cremated bone (Table 3). In the three remaining burials, over 60% of the bone could be identified. In all cases, the majority of identifiable bones were long bone shaft fragments. However, other skeletal elements were also recovered from the burials, particularly skull fragments from Burial 4, and upper limb elements from Burial 1. It was notable that Burial 1 did not contain any skull fragments, which are usually very common in cremation burials.

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	0	0	0.5	1	4.6	12	1.0	3	33.0	84	39.1	67	19	33
2	3.4	8	1.4	3	3.1	7	5.1	12	29.5	70	42.5	61	27.5	39
3	0	0	0	0	0	0	0	0	0	0	0	0	0.2	100
4	54.3	31	5.3	3	7.3	4	13.7	8	94.9	54	175.5	64	98.1	36

Burial 1 included two fossil fragments, which may have been deliberately included in the burial as a pyre or grave good, or may have been accidentally scooped up together with the bone from the pyre site. One sherd of pottery was found with Burial 4 and can be considered as a token inclusion in the burial. Additionally, all four burials contained varying quantities of charcoal, which was probably deliberately added to the burials.

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 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 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. In this instance, no double burials were identified.

2.3 ASSESSMENT OF AGE

The determination of age relies on the development and degeneration of bones and teeth. Different stages of development and degeneration have been mapped using data gathered from individuals of known age (Cox 2000). Methods used to determine age rely on the preservation of the dentition and hips and are most precise when used to assess the developing skeleton, due to the fact that the growth of bones and teeth follows a relatively predictable course up to the age of twenty-five. However, the degeneration of the skeleton, which is assessed according to the severity of wear on the teeth, hips and ribs, depends not only on the age, but also on the sex, occupation, lifestyle and health of the individual analysed. The effect of wear on the teeth and bones tends to vary increasingly with advancing age; as a result, age cannot be reliably determined beyond forty-six years.

Age was divided into a number of categories, including foetus (up to 40 weeks *in utero*), neonate (around the time of birth), infant (following birth to 1 year), juvenile (1-12 years), adolescent (13-17 years), young adult (18-25 years), young middle adult (26-35 years), old middle adult (36-45 years) and mature adult (46+ years). Age was determined using standard ageing techniques, specified by Buikstra and Ubelaker (1994) and Scheuer and Black (2000).

Because none of the criteria normally used for age determination were represented in three of the burials, age determination was based on less reliable criteria. The bone robusticity and bone fusion suggested that individuals from Burial 1 and Burial 2 were at least sixteen years of age, but may have been considerably older. Age determination of the individual from Burial 4 was based on the deterioration of the joint between the hip and sacrum (auricular surface), which suggested that this individual was between 26 and 35 years of age. It was not possible to estimate age in Burial 3.

2.4 SEX DETERMINATION

Sex determination is a vital part of the analysis of human remains, because of the likelihood that different sexes followed different lifestyles as a result of varying occupations, childbearing, or other activities which may have affected their health.

Sex assessment relies on the presence of the skull and pelvis, the morphology of which are sexually dimorphic, as described by Mays (2000). None of the cremated bone assemblages contained skeletal elements which were sexually dimorphic.

2.5 METRIC ANALYSIS

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.

2.6 NON-METRIC TRAITS

Non-metric traits are additional sutures, facets, bony processes, canals and foramina, which occur in a minority of skeletons and are thought to suggest diversity and familial affiliation between skeletons (Saunders 1989). Each cremated bone assemblage was examined for thirty cranial and thirty post-cranial non-metric traits selected from the osteological literature (Buikstra and Ubelaker 1994; Finnegan 1978; Berry and Berry 1967). Non-metric traits were not identified in the cremated individuals.

3.0 PATHOLOGICAL AND DENTAL ANALYSIS

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. Two of the cremated individuals exhibited evidence for disease in the form of infection. Superficial inflammation of the bone (periosteal inflammatory lesions) was noted on the long bone shaft fragments, probably representing the tibiae of Burial 1. The nature of skeletal manifestations on the shin bones was characterised by diffuse striae (lamellar bone) indicative of receding inflammation. Inflammatory lesions can be indicative of infectious diseases, such as leprosy and syphilis, and of non-specific infection, such as varicose veins, leg ulcers and trauma to the shins. However, these lesions only form in the bone if the infection is chronic and long-standing (Roberts and Manchester 1995, 125).

Plate 1 Two skull fragments with inflammation from Burial 4

Burial 4 also showed evidence for inflammation in the form of microporosity on the outer (ectocranial) surface of the skull (Plate 1). The exact cause of cranial microporosity is still debated, but it is probable that scalp inflammation, or superficial skull trauma could be responsible for this condition. Skeletal manifestations of non-specific infection are commonly observed in populations from archaeological contexts.

Analysis of the teeth from archaeological populations can provide vital clues about health, diet and oral hygiene, as well as information about environmental and congenital conditions. No teeth were recovered from the burials, which may be due to the severe shattering of teeth during the cremation process.

4.0 DISCUSSION AND SUMMARY

Four cremation burials were recovered during archaeological work at the Civic Offices. All four burials were interred in simple pits or scoops and contained varying quantities of charcoal, which may represent a deliberate

inclusion within the burials, or may have been accidentally raked up from the pyre together with the human remains. Two fossils in Burial 1 and a single sherd of pottery in Burial 4 probably represent a simple form of grave goods.

Notably, the largest surviving burial pit contained only 0.2g of cremated bone. This suggests that the majority of bone from this feature had been contained in the upper parts of the pit, or that this pit contained pyre debris, or an accessory interment, rather than the main burial. It is probable that a considerable quantity of bone was also lost from the other burials, which all contained a smaller amount of bone than would normally be anticipated. This hypothesis is supported by the small fragmentation of the majority of bone recovered, as well as the considerable erosion observed on many of the bone fragments.

The bone recovered from the burials was well calcined, suggesting that the cremation temperature and length had been adequate to thoroughly cremate the bodies. Age could be determined in three cases, all of whom were adults.

The osteological evidence suggests that the four individuals were cremated thoroughly; followed by the selection of some of the bone from the pyre for burial, together with some charcoal, and in two cases, token grave goods. The small group of burials appears to have been reserved for adults and may represent a family plot. Two of the individuals suffered from receding inflammation prior to death, a manifestation of disease which is commonly observed in individuals from archaeological contexts.

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