Osteological Analysis
Tullyallen
County Louth
Republic of Ireland

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NGR E30485 N27760

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Summary

An osteological assessment of one assemblage of cremated bone excavated in 2002 by Archaeological Consultancy Services was undertaken by York Osteoarchaeology Ltd on behalf of Palaeoecology Research Services Ltd in March 2005. The remains were excavated in advance of a housing development at Tullyallen, County Louth, in the Republic of Ireland (NGR E30485, N27760).

The cremation burials derive from a prehistoric landscape, spanning from the Neolithic to the Iron Age. Both assemblages were unurned and had been interred in steep-sided pits. Osteological analysis found that both burials contained the remains of adults. Parts of all skeletal elements were selected for burial in both cases. The bone was well-calcined throughout and had been cremated thoroughly. No manifestations of disease were noted in both individuals..

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1.0 INTRODUCTION

In March 2005 York Osteoarchaeology Ltd was commissioned by Palaeoecology Research Services Ltd to carry out an osteological assessment of two assemblages of cremated human bone excavated in 2002 by Archaeological Consultancy Services Ltd. The cremation burials had been excavated in advance of a housing development at Tullyallen, County Louth, in the Republic of Ireland (NGR E30485, N27760).

The cremation burials were interred in simple steep-sided pits (118 and 156). Both burials contained cremated bone and fragments of charcoal. The burials could not be dated, but lie in a landscape of prehistoric features, including boundary and enclosure ditches, a ring ditch, a round house, two track ways, a corn drying kiln, a possible ritual area and two urned cremation burials.

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 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 differed between the bone assemblages (Table 1). The bone from the smaller assemblage (167) was poorly preserved, showing severe bone surface erosion. The larger assemblage (119) was less fragmented and displayed little erosion, both on the bone surface and around the bone edges. The pits containing Burials 119 and 167 were of reasonable depth (0.17m and 0.20m), suggesting that if they had been truncated, it was not severe.

Little warping and bone cracking, which occurs commonly during the cremation process, was evident. It is probable that cracks were originally present and the bone fragmented along these weaker fissures, this is supported by the small size of many of the bone fragments.

Table 1 Summary of the assemblage preservation

Burial No	Feature Type	Inclusions	Bone State	Preservation	Age	Sex	Weight (g)
119	Pit	Charcoal	white	Moderate	16+	-	130g
167	Pit	Charcoal	white	Poor	16+	-	5.5g

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). 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 both burials, most of the bone was derived from the 5mm sieve (Table 2). 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)
119	27.2	21	58.1	45	43.2	33	1.5	130
167	-	-	3.5	64	2.0	36	-	5.5

The quantity of cremated bone recovered per burial varied from 5.5g to 130.0g (see Table 2), with a mean weight of 67.8g. The amount of bone retrieved from the burials weighed considerably less than 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. The burials from Tullyallen produced less than 8.1% of the quantity of bone expected to remain following burning.

The cremated bone was very well burnt, causing the complete loss of the organic portion of the bone and producing a white colour throughout the 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 the burials (Table 3). Between 29% and 63% of the bone could be identified. In Burial 119 the majority of identifiable bones were long bone shaft fragments. In Burial 167, lower limb bones were identified most frequently. Parts of the ribs and spine were not found in Burial 167 and were least common in Burial 119.

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 (%)
119	8.2	10	0.6	1	10.4	12.5	4.0	5	58.9	71.5	82.1	63	47.9	37
167	0.4	25	-	-	0.4	25	0.5	31	0.3	19	1.6	29	3.9	71

Both burials contained quantities of charcoal, which was probably deliberately added to the burial.

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

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).

Because none of the criteria normally used for age determination were represented in the burials, age determination was based on less reliable criteria. The bone robusticity and dental development suggested that the individuals from both burials were at least sixteen years of age, but may have been considerably older.

2.4 SEX DETERMINATION

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.

Neither 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 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.

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. In this case, manifestations of disease were not observed.

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. Two tooth fragments were recovered from Burial 119, which had shattered into tiny pieces during the cremation process. These consisted of a root and a crown fragment and no dental pathology could be observed.

4.0 DISCUSSION AND SUMMARY

Two cremated bone assemblages were recovered during archaeological work at Tullyallen. The burials (119 and 167) were interred in simple pits. The burials contained charcoal, which may represent deliberate inclusions, or may have been accidentally raked up from the pyre together with the human remains. No artefacts or animal bones were found with the bone.

Notably, the larger burial (119) contained only 130.0g of cremated bone, which is 8.1% of the expected mean quantity of bone from a modern cremation burial. Burial 167 only contained 5.5g of cremated bone. This suggests that the majority of bone from the burials was lost, probably as a result of truncation of the pit. This hypothesis is supported by the small fragmentation of the some of bone recovered, as well as the considerable erosion observed on the bone fragments from Burial 167.

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 was determined to be adult in both assemblages. No evidence for disease was noted in any of the burials. The osteological evidence suggests that the two individuals were cremated thoroughly, followed by the selection of some of the bones from each body element from the pyre for burial.

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