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**Technical report: biological remains from excavations at Civic Offices,
Limerick Road, Nenagh, County Tipperary, Republic of Ireland
(site code: 03E1295)**

by

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Summary

Small quantities of biological remains recovered from the processing of bulk sediment samples from deposits encountered during works in advance of the construction of the Tipperary Civic Offices, Limerick Road, Nenagh, County Tipperary in the Republic of Ireland, were submitted for analysis.

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 contained probable grave goods in the form of fossils and a pottery sherd. Palaeopathology was noted on bone fragments from two of the burials. The plant material consisted mainly of wood charcoal presumably from the cremation pyres.

This small group of burials appears to have been reserved for adults and may represent a family plot.

KEYWORDS: CIVIC OFFICES, LIMERICK ROAD; NENAGH; COUNTY TIPPERARY; REPUBLIC OF IRELAND; TECHNICAL REPORT; BRONZE AGE; CHARRED PLANT REMAINS; WOOD CHARCOAL; CHARRED GRAIN; HUMAN REMAINS; PALAEOPATHOLOGY; CREMATIONS

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Technical report: biological remains from excavations at Civic Offices, Limerick Road, Nenagh, County Tipperary, Republic of Ireland (site code: 03E1295)

Introduction

An archaeological excavation in advance of the construction of the Tipperary Civic Offices, Limerick Road, Nenagh, County Tipperary in the Republic of Ireland (NGR 85866, 179172), was undertaken by Archaeological Consultancy Services Ltd (ACS).

The excavation encountered cremation burials dated to the late Bronze Age and which were thought to be part of a significant prehistoric ritual landscape (identified during previous excavations in the Knockanpierce townland and including funerary monuments in the form of ring barrows). All four burials were unurned, but two contained probable grave goods in the form of fossils and a pottery sherd.

Small quantities of charred plant remains and cremated bone, recovered from the processing of bulk sediment samples by the excavator, were submitted to PRS for analysis.

Methods

The soil samples were placed onto 1 mm nylon mesh in a sieving tank. The light organic fraction was washed over through a 2 mm sieve into a 500 micron sieve to collect the 'flot'. The sample was put through this system twice to ensure that as much material as possible was recovered.

Plant remains

The plant remains recovered from the samples were examined and identified as closely as possible.

Human bone

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 10 mm, 5 mm and 2 mm 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, bagged separately and described in detail. Bone colour, fragmentation, preservation and the rate of cracking and warping resulting from burning were recorded with the aim of obtaining information on cremation processes and subsequent funerary rituals.

The preservation of the skeletal remains was assessed subjectively, depending on bone surface erosion and fragmentation, using a grading system divided into five categories: very poor, poor, moderate, good and excellent.

Age was determined using standard ageing techniques as specified by Buikstra and Ubelaker (1994) and Scheuer and Black (2000). Determination of sex, which is dependant on the presence of skulls and pelvises, followed morphological characteristics described by Mays and Cox (2000).

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).

Results

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Archaeological information, provided by the excavator, is given in square brackets.

Plant remains

All weights given were supplied by the excavator.

Context 2 [clay in Burial 1] Sample 1

The material comprised about 5 g of angular charcoal (to 10 mm in maximum dimension) and modern roots, with some uncharred (and clearly modern) seeds. There was also a little charred bark (to 20 mm). All the material was strongly coated with fine mineral sediment. Two fragments of charred material (to 5 mm) are thought to be tubers or rhizomes, perhaps from false oat-grass or onion couch (*Arrhenatherum elatius* ssp. *bulbosum* (Willd.) Schübler & Martens.), which may have arrived with grass used for tinder or in turves. Inspection of the charcoal suggested that it consisted of both willow/poplar/aspens (*Salix/Populus*) and alder (*Alnus*), no ring-porous material being present.

Context 3 [clay in Burial 2] Sample 2

There was about 23 g angular charcoal (to 15 mm), not too heavily 'silted', and quite fresh-looking but quite crumbly when handled; all of it appeared to be from diffuse-porous wood, and closer inspection revealed it to be mainly willow/poplar/aspens, with a little alder, and giving an impression of being from larger branches and trunk wood rather than twigs. There were also some modern roots.

Context 3 [clay in Burial 3] Sample 3

The sample comprised about 1 g of small (to 10 mm, but mostly less than 5 mm) angular, slightly 'silted' charcoal plus some modern roots. There were also at least two ?*Arrhenatherum* 'tubers'. Further analysis is probably not worthwhile.

Sample 5

These remains, sorted by ACS comprised: one charred ?tuber, one charred black bindweed (*Bilderdykia convolvulus* (L.) Dumort.) fruit (perhaps ancient) and some uncharred, and therefore probably modern, weed seeds.

Context 5 [clay in Burial 4] Sample 4

There was about 30 g of angular, slightly silted charcoal (to 10 mm) and some modern roots. Some of the charcoal was rather 'glassy' and brittle; it proved to be ring-porous, perhaps oak (*Quercus*). Some diffuse-porous material was also present which was mainly willow/poplar/aspens but with some specimens thought to be of Pomoideae (apple/pear/hawthorn/rowan, etc.). There was one ?*Arrhenatherum* tuber and three poorly preserved charred structures which were probably cereal grains.

Human bone

No animal bone was identified within the assemblages and all unidentified fragments have therefore been included with the human bone.

Preservation

Preservation varied considerably throughout the bone assemblages (Table 1). 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 fragment size of the bone. The 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 less severe post-depositional disturbance than the others.

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). At this site, it is believed that post-depositional, rather than post-burning, disturbance of the bone caused the fragmentation and erosion of the human remains.

In two of the assemblages, the majority of bone was derived from the 5 mm fraction (Table 2), whereas in the two remaining assemblages, more than half of the remains were bone fragments in the 2 mm category.

Only a small proportion of the bone fragments was larger than 10 mm, which hindered identification.

The quantity of cremated bone recovered per burial varied from 0.2 g to 273.6 g (see Table 2), with an overall mean weight of 100.5g. These quantities of bone are considerably less than those produced by modern crematoria, which usually range from 1000.5 g to 2422.5 g with an average of 1625.9 g (McKinley 1993). Wahl (1982, 25) found that archaeologically recovered remains of cremated adults tend to weigh less (between 250 g and 2500 g), as a result of the common practice of selecting only some of the cremated bone from the pyre for inclusion in the burial, thereby representing a symbolic, or token, interment. With the exception of Burial 4, the burials 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 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 this 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 0.2 g 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.

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.

Minimum number of individuals

It is not possible to calculate the MNI for cremation burials, as often only a token selection of bone from the pyre is 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.

Determination of age and sex

None of the criteria normally used for age determination were present in the cremated remains. 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.

None of the cremated assemblages contained skeletal elements which were sexually dimorphic.

Metrical analysis

It was not possible to metrically analyse the cremated remains, as cremated bone shrinks at an inconsistent rate (up to 15%) during the cremation process.

Analysis of non-metric traits

Non-metric traits were not identified in the present cremated bone assemblages.

Palaeopathological 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).

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, was responsible for this condition. Skeletal manifestations of non-specific infection are commonly observed in populations from archaeological contexts.

No teeth were recovered from the burials, which may be due to the severe shattering of teeth during the cremation process.

Discussion

Plant remains

The material consisted mainly of wood charcoal of which the greatest part was willow/poplar/aspens, with a little alder and rare specimens of ?Pomoideae (apple/pear/hawthorn/rowan, etc.) and ?oak. This suggests the use of a limited range of wood for the cremation pyres. Interestingly some tuber or rhizome structures, mostly tentatively identified as false oat grass (or onion couch) were noted from most of the samples. These remains probably originated in dry grassy material pulled for tinder for the pyres or perhaps came from turves which became baked during firing. They are not uncommon on prehistoric and early historic sites amongst assemblages of charred remains. Perhaps not surprisingly, given the context, charred remains of cereals (or indeed of other plant remains) were effectively absent; the three possible grains from one sample were very eroded and may even be reworked.

If needed, Samples 1, 2 and 5 would provide enough material for dating by AMS and Samples 2 and 4 would provide enough for a conventional radiometric date (though neither quite reaches the optimal amount required). Use of material that is not clearly from twigs may lead to dating which is not very precise, of course, although the rather fresh angular appearance of most of the material at least suggests none was reworked.

Human remains

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 0.2 g 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 fragment size of the majority of the bone recovered, as well as the considerable erosion observed.

The bone recovered from the burials was well calcined, suggesting that the cremation temperature and duration had been sufficient 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. Two of the individuals suffered from receding inflammation prior to death, a manifestation of disease which is commonly observed in individuals from archaeological contexts.

This small group of burials appears to have been reserved for adults and may represent a family plot.

Retention and disposal

All of the material should be retained as part of the physical archive for the site.

Archive

All material is currently stored by Palaeoecology Research Services (Unit 8, Dabble Duck Industrial Estate, Shildon, County Durham), along with paper and electronic records pertaining to the work described here.

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Table 1. Civic Offices, Limerick Road, Nenagh: summary of the bone 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

Table 2. Civic Offices, Limerick Road, Nenagh: summary of cremated bone fragment size.

Burial No	10 mm (g)	10 mm (%)	5 mm (g)	5 mm (%)	2 mm (g)	2 mm (%)	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

Table 3. Civic Offices, Limerick Road, Nenagh: summary of identifiable elements in the cremation burials. Key: UL = upper limb; LL= lower limb; UI LB = unidentified limb bone; ID = identified; UID = unidentified.

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

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Plate 1. Civic Offices, Limerick Road, Nenagh: two skull fragments showing damage from inflammation from Burial 4.



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