UNDERSTANDING THE EAST LONDON GRAVELS
Archaeological excavations on the Thames Gravels of Newham, Barking and Dagenham 1963–99

Analysis of the human bone

Site code: UP-GS83, UP-MF83, UP-HH89

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1 Methods

The burnt bone from probable cremation burials was examined in accordance with current guidelines (McKinley and Roberts 1993, McKinley 2004). The total weight of each context was measured in grams; fragmentation determined by noting the largest fragment size and the average (mean) size of fragments within each context. Sieving separated the >10mm, >4mm and >2mm fractions, each of which was weighed. Identifiable fragments were separated by body area (skull, axial skeleton, upper and lower limbs) and weighed. The percentage of the sample within each fraction and body was calculated. Where significant quantities of bone were identifiable, this was recorded onto a diagram of the skeleton, which is available in the site archive.

The deposits containing burnt bone had been fully sorted some years prior to examination and the resulting residues were not available for examination in all but two contexts. All artefacts had also been removed. This has limited the data available for discussion of the nature or purpose of the deposits and of pyre technology.

The colour of the cremated bone fragments was described and an approximate percentage assigned for each colour present. Age was estimated from observation of epiphyseal and dental development (Scheuer and Black 2000, Gustafson and Koch 1974). Animal bone and other intrusive material were noted and, where appropriate the approximate percentage composition of the residue recorded.

Non-burial deposits were weighed and the size of fragments assessed using the same fractions as the other samples. Where a single fragment of bone was present, this was measured using sliding callipers. Identifiable fragments were noted together with observation of colour and feature type.

Three samples of burnt bone from Hunt's Hill and an inhumation from R-MHF77/79 had no associated stratigraphic information. Details of this material can be found in the project archive.

2 Results

2.1 Burnt bone

Two samples of cremated bone from early Iron Age features were excavated at Great Sunning's Farm (UP-GS83), three Roman contexts from Hunt's Hill (UP-HH89) and four from Manor Farm (UP-MF83). Some of the cremated bone from Manor Farm was heavily concreted preventing surface observation and identification. However, F[3] and F[13] contained large and identifiable fragments of bone. Three of the four contexts from Manor Farm were contained within burial urns (F[3], F[4], F[118]).

Two contexts E[9] and A[49] contained small quantities of bone (cranial fragments only) and are unlikely to represent cremation burials.

In addition to the cremated bone samples from burial features, there were fourteen small samples of burnt bone from Hunt's Hill that originated from non-burial features. This included contexts A[2] and A[10] which had been recorded as cremation burials by the original excavators but which contained extremely small quantities of burnt bone. In the absence of archaeological or artefactual evidence to the contrary, it appears that this bone was simply intrusive within small pits or post-holes, from disturbance of one of the contemporary burials or possible from pyre site clearance. Much of the bone consisted of cortical pieces only and was unidentifiable to species due to fragmentation and abrasion, the latter indicating redeposition. All bone was calcined indicating complete oxidation and burning at high temperature. A single fragment of probable human bone from a feature of Roman date A[38] showed charring of the trabeculae (spongy internal bone), whilst the cortex was calcined.

Table 1Burnt bone from non-burial features at Hunt's Hill (UP-HH89)

Demographic data

Observation of fused epiphyses indicated that early Iron Age deposit E[8] from Great Sunning's Farm, Roman features A[37] and A[39] from Hunt's Hill, F[3], F[13] and F[118] from Manor Farm contained the remains of adults. In the material from Manor Farm this was confirmed by observation of teeth or tooth sockets, which indicated formation of the permanent dentition was complete.

No repeated skeletal elements were found and there was no evidence to suggest that any deposits contained multiple individuals.

Pathology

The sockets for two posterior left mandibular molars were present in UP-MF83 F[3], a small fragment of molar root remaining in the anterior socket. A partial tooth socket remained in front of these two and was aligned with the mental foramen. This indicates that the observable positions were for the first and second molars, the third molar congenitally absent. No indications of joint contour change were seen in the temporal tubercle (which forms the anterior border of the articulation for the jaw) or the fragment of acetabular surface. Context F[13] demonstrated no joint changes in the observable left acetabulum, right distal femur, femoral heads or odontoid peg

Pyre technology and ritual

Oxidation

Observation of the physical characteristics of burnt bone may enable an understanding of the cremation process; the appearance will represent the extremes of any cremation event. Time allowed, temperature and availability of oxygen all affect the efficiency of the cremation process (McKinley 2000).

All of the burnt bone was off-white or a pale bluish grey in colour indicating sustained heating at high temperatures: in excess of 600°C (Holden *et al* 1995 (a) and (b)).

Table 2 Colour of burnt bone, all sites

Total weight of bone

A number of larger, recognisable fragments from UP-MF83 [3], Manor Farm had been reconstructed during previous examination in 1985. The use of adhesive to reconstruct elements may have increased the total weight. This is likely to have a disproportionate affect dependant on the size of the fraction and as such is most likely to have slightly increased the weight of the >4mm fraction.

Over a kilogram (and up to more than three kilos) of burnt bone will result from the cremation of an adult individual (McKinley 1989). The amount of bone for burial will depend on efficiency of collection, with on average, 40-60% recovery of the burnt bone from the pyre over the course of several hours (McKinley 2000). This suggests that 600g - 2000g of bone would be available for burial, providing deliberate selection or omission of skeletal elements was not practised.

Two contexts E[9] and A[49] contained small quantities of bone (cranial fragments only) and are unlikely to represent cremation burials. Of the remaining samples, two from Manor Farm (F[13] and F[118]) and one from Hunt's Hill A[39] contained more than 600g of burnt bone(Fig 1). These are likely to represent complete and largely undisturbed

burials of single individuals, one of which F[118] was contained within a ceramic vessel. The remaining deposits would appear to signify truncated or partial burials.

Fig 1 Total weight of bone by context, all sites

Fragmentation and dehydration

Warping and both longitudinal and transverse fissures were present in all samples, indicating the bone was 'wet' when burnt and most likely fleshed (Buikstra and Ubelaker 1994, McKinley 2000).

Reconstruction of UP-MF83 [3] resulted in alteration to excavated fragment size. However, it appeared that the individual pieces within each reconstructed part were all over 10mm in diameter and thus proportions of fractions were not affected. A fragment that had not been reconstructed was chosen to determine maximum fragment size and the pre-reconstruction to determine mean fragment size (Table 3).

Table 3 Weight and percentage of burnt bone in each fraction, all sites

Maximum fragment size was under 50m in all but two cases, five of the nine contexts were composed of more than 50% fragments over 10mm in size. As an undisturbed modern cremation will produce fragments of *c*.250mm (McKinley 1994 (a) and (b)), this appears to demonstrate breakage of hot bone due to pyre collapse or collection of still brittle pieces together with post-burial fragmentation (Gejval 1969, McKinley 1989). Those burials interred within vessels would be expected to be less subject to taphonomic change but only F[3] contained a large percentage of fragments >10mm and a large maximum fragment size.

Identifiable bone fragments

Most deposits contained identifiable fragments from all areas of the body. Comparison with known weight for the areas of the skeleton indicated that two contexts from Manor Farm contained close to the expected proportions (McKinley 1994 (a)). The smallest samples contained only fragments of cranial vault, and the skull was also over represented in E[9] (Fig 2). Selection bias towards easily identifiable vault pieces may have occurred after cremation, though it is likely that post-deposition fragmentation had merely rendered all but the cranium unidentifiable.

Fig 2 Percentage of identifiable fragments in each body area, all sites

Identifiable fragments of lumbar vertebrae were noted in F[3] and were most likely to originate from the fourth and fifth vertebrae. The right side of the body of F[3] was represented more frequently than the left and may indicate bias in collection from the pyre. Context F[13] contained four anterior mandibular tooth sockets (single roots, side unknown) (Table 4).

Table 4 Weight of identifiable bone, all sites

Pyre goods and debris

Calcined large animal limb bone(s) fragments (19g) were present in UP-HH89 A[39] and a partial pig mandible and possible horse pelvis fragment within UP-MF83 F[118] (K. Reilly *pers comm*).

Residue from this deposit (F[118]) contained a small proportion of burnt soil and fuel slag. An iron object had been removed prior to examination. Twenty-two grams of burnt stone were present in UP-MF 83, F[13]. Small fragments of a copper alloy object were present in Roman burial A[37].

2.2 Unburnt human bone

Fragments of probable human bone were recovered from a late bronze age well from UP-HH89 A[2850]. A note contained with the remains stated that they consisted of the head of a femur and parts of the pelvis. A soil cast formed of sand, degraded organic material, presumably from the well itself and concreted stones. No bone was visible, but the morphology of the element suggested that it was iliac blade (possibly left).

3 Discussion

The total weight pf bone recovered from each deposit indicates that seven contexts are likely to be primary burials of cremated bone. Although so called ‘token’ burials have been identified from Iron Age contexts, here fragmentation data suggests that small deposits of bone are intrusive fragments within non-burial features (McKinley 1989). The apparent presence of only a single individual in each case is consistent with findings for Britain as a whole: only 5% of cremation burials have been found to contain multiple individuals (McKinley 2000). The larger fragment size of the Roman burials from Manor Farm is consistent with findings from contemporary sites (Powers 2006).

Calcined large animal bone in UP-HH89 A[39] and UP-MF83 F[118] indicate the inclusion of animals, perhaps foodstuffs, on the funeral pyre. Burnt animal bone is a relatively common finding in British cremation burials. Small fragments of a copper alloy object were present in Roman burial A[37] and did not appear to have been distorted by heat, suggesting the article may have been a grave inclusion, rather than placed on the pyre.

The probable human bone from well deposit UP-HH89 A[2850] is intriguing. If, as the excavation note suggests an articulated leg and pelvis were identified, then fleshed or partially decomposed remains must have been deposited within the well and would have tainted the water supply. Apparently deliberate deposition of isolated human bones within pits is known from numerous Iron Age and earlier sites and has been suggested to indicate excarnation or deliberate disarticulation of the body after death (Taylor 2001: 65). In this case preservation was so poor that it is possible that the remaining parts of the individual did simply not survive and it is not possible to draw any definite conclusions about the remains.

4 Conclusions

Seven of the nine context of burnt bone represent cremation burials of Iron Age and Roman date. Contexts E[9] and A[49] are most probably redeposited fragments, or possibly the result of pyre clearance. All burials contained the remains of a minimum of one individual and there were no indications of non-adult remains. Cremation had been carried out efficiently and there was no demonstrable bias in the selection of remains for burial. Portions of animal carcasses had been placed on at least two of the pyres: and early Iron Age burial from Hunt's Hill and a Roman cremation from Manor Farm. A copper alloy object from a Roman burial from Hunt's Hill suggests inclusion within the grave of objects that were not burnt on the pyre.

5 Bibliography

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Context	Period	Date		Weight	Size (mm)	ID	Feature type
A6570	4	1500-700BC	Mid-late Bronze Age	<1g	>4	-	Pit fill
A5130	5	1000-300BC	Late Bronze Age-Early Iron Age	7g	>2	-	Post hole fill
A5208	5	1000-300BC	Late Bronze Age-Early Iron Age	<1g	21	Animal?	Ditch fill
A5880	6	1000-100BC	Late Bronze Age-Middle Iron Age	1g	>2	-	Ditch fill
A6588	7	600-300BC	Early Iron Age	<1g	>4	-	Post hole fill
A6588	7	600-300BC	Early Iron Age	3g	>10	Animal	Post hole fill
A246	9	100BC-400AD	Late Iron Age- Roman transition	<1g	>2	-	Pit fill
A5990	9	100BC-400AD	Late Iron Age- Roman transition	<1g	37	Human	Pit fill
A2	10	40-400AD	Roman	<1g	>4	-	Cremation
A38	10	40-400AD	Roman	<1g	24	Human?	Cremation
A5978	10	40-400AD	Roman	<1g	28	-	Pit fill
A4565	11	AD400-1066	Anglo-Saxon	2g	25	Human?	Well
A4565	11	AD400-1066	Anglo-Saxon	<1g	23	Human? (mastoid)	Well
A4567	11	AD400-1066	Anglo-Saxon	7g	48	Animal	Well

Table 1 Burnt bone from non-burial features at Hunt's Hill (UP-HH89)

Site Code	Context	% Colour			
		White	Light blue grey	Dark blue grey	Charred
UP-GS83	E8	70	30	0	0
UP-GS83	E9	90	10	0	0
UP-HH89	A37	90	5	5	0
UP-HH89	A39	95	5	0	0
UP-HH89	A49	95	5	0	0
UP-MF83	F3	90	10	0	0
UP-MF83	F4	95	5	0	0
UP-MF83	F13	90	10	0	0
UP-MF83	F118	95	5	0	0

Table 2 Colour of burnt bone, all sites

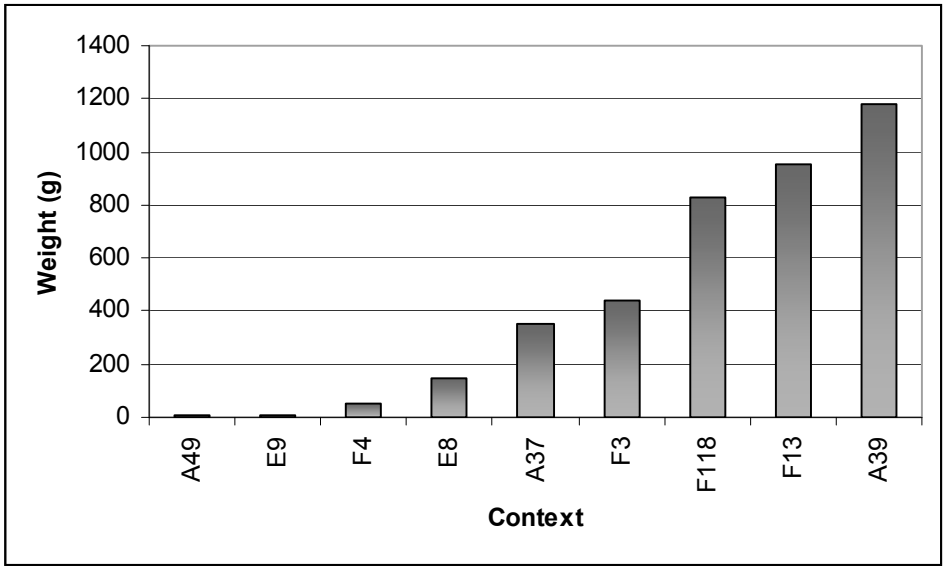

Fig 1 Total weight of bone by context, all sites

Site code	Context	Total weight (g)	Residue (g)	Largest Fragment (mm)	Mean Fragment (mm)	>10mm (g)	%	>4mm (g)	%	>2mm (g)	%	% Residue burnt bone
UP-GS83	E8	144.0	-	27	10	53	36.8	84	58.3	7	4.9	-
UP-GS83	E9	10.0	-	19	10	2	20.0	7	70.0	1	10.0	-
UP-HH89	A37	353.0	86	45	20	209	59.2	144	40.8	0	0.0	80
UP-HH89	A39	1177.0	-	48	20	535	45.5	551	46.8	91	7.7	-
UP-HH89	A49	7.0	-	30	10	5	71.4	2	28.6	0	0.0	-
UP-MF83	F3	437.0	-	60	25	355	81.2	76	17.4	6	1.4	-
UP-MF83	F4	52.0	-	26	10	4	7.7	36	69.2	12	23.1	-
UP-MF83	F13	954.0	-	84	230	642	67.3	258	27.0	54	5.7	-
UP-MF83	F118	828.0	193	45	20	445	53.7	383	46.3	0	0.0	60

Table 3 Weight and percentage of burnt bone in each fraction, all sites

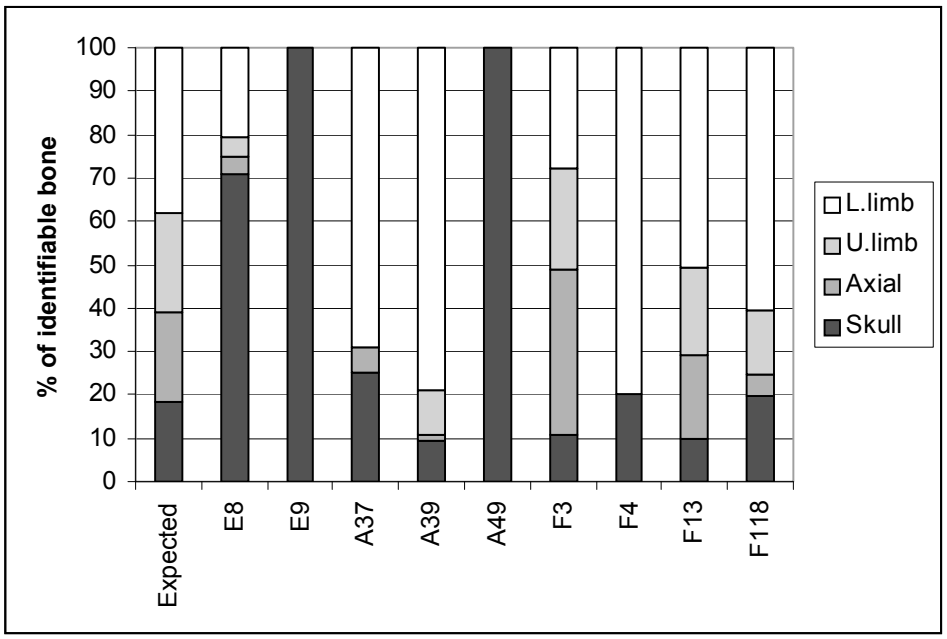

Fig 2 Percentage of identifiable fragments in each body area, all sites

Site code	Context	Total weight (g)	ID fragments (g)	% total	skull (g)	Full ID (fragments)	Axial (g)	Full ID (fragments)	U.limb (g)	Full ID (fragments)	l.limb (g)	Full ID (fragments)
UP-GS83	E8	144	24	16.7	17	Left mandibular condyle 2g	1	Rib 1g	1	Mid hand phalanx, distal R. MC1, trochlear	5	Femoral shaft
UP-GS83	E9	10	5	50.0	5	Cranial vault	0		0		0	
UP-HH89	A37	353	143	40.5	36	Mastoid 4g, Cranial vault 32g	8	Vertebrae	0		99	Fibula shaft 4g, femoral shaft 71g, distal fibula 6g, tibial plateau 3g
UP-HH89	A39	1177	167	14.2	16	Cranial vault, tooth root apex	2	Vertebrae	17	Humerus 8g	132	Tibial shaft 35g, femoral shaft 96g
UP-HH89	A49	7	1	14.3	1	Cranial vault	0		0		0	
UP-MF83	F3	437	332	76.0	35	R. mandible 18g, L. mandible 1g, R. external auditory meatus 2g, R. temporal tubercle 2g R. vault 12g	127	Vertebrae 66g, R. rib 1g, ilium 60g	77	L. distal humerus 53g, humeral shaft 28g, R. distal ulna 5g, radial head surface <1g, mid hand phalanx <1g	93	Femoral shaft 37g, (right?) distal femur 38g, tibial shaft and plateau 16g, MT (2-4) head 1g, MT1 base 1g
UP-MF83	F4	52	5	9.6	1	Cranial vault	0		0		4	Femoral shaft
UP-MF83	F13	954	477	50.0	48	Occipital 8g, L. petrous temporal 3g, anterior mandible 2g, vault 35g	92	Vertebrae (inc. odontoid peg 53g, rib 9g, (mostly left) ilium 30g	95	Humeral shaft 24g, R. distal humerus 13g, radial shaft 15g, humeral head 6g, proximal phalanx <1g	242	Femoral shaft 89g, femoral heads 36g, patellae 17g, distal femora 55g, tibial plateau (inc. r medial condyle) 14g, tibial shaft 17g, distal tibia 6g, (?left) cuboid 4g

UP-MF83	F118	828	173	20.9	34	Mastoid 11g, cranial vault 23g, tooth roots <1g	9	Vertebrae	25	R. hamate 1g, proximal hand phalanx 1g, MC shaft 1g, radial head 1g, humeral condyle 1g	105	Proximal first foot phalanx 1g, femoral shaft 87g, tibial shaft 9g, distal femoral epiphyses 8g

Table 4 Weight of identifiable bone, all sites