

Ancient Monuments Laboratory
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CREMATED ANGLO-SAXON HUMAN BONE
FROM SNAPE, SUFFOLK (EXCAVATED
1862-3, 1972, 1985-92)

J Steele & S A Mays

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Summary

Twenty-three cremations were studied. Sixteen were adults (four male, four female, eight unsexed), four were children, and in three cases age could not be determined. Bone colour was consistent with firing to temperatures in excess of about 940° C. Sixteen of the cremations were plough-damaged. Bone weights, fragment counts and mean fragment sizes were recorded and are analyzed as indicators of the extent of the bone loss. Of the intact adult cremations, the average collected bone weight was about only 25% of the weight expected from cremation of a corpse. Since cremated bone survives well in the soil this deficiency is probably a reflection of incomplete retrieval of the remains from the pyre in antiquity. A small quantity of animal bone was recovered, occurring in about 35% of the cremations examined.

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1862-3, 1972, 1985-92).

1. Introduction to the site.

An Anglo-Saxon cemetery surrounding the Snape ship burial was partially excavated in 1862/3, and further material recovered from a sewer trench in 1972 (West and Owles 1973). Recent excavations (1985-1992) have suggested that the excavated areas represent but part of a larger cemetery, of both cremations and inhumations, dating from the 5th to the 7th centuries AD.

Bone survival of inhumations at this site was poor, probably owing to the free-draining, acid soil conditions (the ploughsoil covers a truncated Anglo-Saxon topsoil, over natural sand). Inhumations were recognized by the grave cut and by the presence of soil silhouettes.

2. The Cremated Human Bone.

Bone from a previously unexamined intact, urned cremation discovered in 1862 was received for analysis, with another intact urned cremation discovered in 1970, and the bone from 21 cremations and some bone scatters discovered in 1985-1992.

Of these 23 cremations, 16 were plough-damaged and 7 were intact. All 7 of the intact cremations were urned. Of the plough-damaged cremations, 8 were recorded as urned, 3 as unurned, and the remaining 5 as unknown.

Additionally, bone from eight cremations recovered from the 1972 sewer trench, and previously examined by Calvin Wells (Wells 1973), was received for re-examination and for scanning for animal bone. It was evident that some of this material had become mixed since Wells' examination (Cremations Nos. 6 and 7), and that some of the material may have been lost. These eight cremations were therefore excluded from the calculation of summary statistics (below).

Our aim is to report on the 23 cremations from 1862/3, 1970, and 1985-92, and also to record our re-examination of the 1972 material.

2.1. The Cremated Bone: Recovery Methods.

All bone was hand recovered on site. To facilitate specialist examination, the cremated bone was subsequently sieved through 4mm and 2 mm mesh sieves, and any non-bone material removed.

2.2. Demographic aspects.

Estimation of sex was made from sexually dimorphic aspects of the skull (Workshop of European Anthropologists 1980), or failing this, from overall skeletal size and robusticity. It is not feasible to determine the sex of juveniles.

Age at death was approximated for juveniles using dental development, epiphysial fusion, or failing this, overall skeletal size and robusticity. For adults, cranial suture closure (Perizonius 1984) was used as a very approximate guide to age range.

In only one cremation was there evidence of the bones of more than one individual. 0896, a juvenile c. 2-7 years old, contained two long bone fragments which were markedly more robust than the rest of the assemblage. They would however be consistent with the age of the older juvenile in the immediately adjacent cremation 0897. Given the lack of other elements from the second individual in the 0896 assemblage, it seems most probable that these two fragments are intrusive, perhaps from the skeleton represented more fully in 0897. Whether this intrusion occurred before, during, or after deposition of the 0896 urn, or indeed is an artefact of recovery strategy, is unclear.

The cremations thus yielded data on 23 individuals. Demographic data for each individual are given in the Appendix. Three individuals could not be assigned an age or sex; of the remaining 20, one was identifiable only as infant/juvenile, three were juveniles in the 2-7 years age range, and sixteen were adult. Of the adults, four were in the young/middle age range, four were in the middle/old age range, and in the remainder age could not be determined beyond the observation that they were adult rather than juvenile. Four of the adults were sexed as probable or possible males, and four were sexed as possible females; the remaining eight could not be sexed.

2.3. Quantification of the Cremated Bone.

The figures for weight of bone, estimates of the numbers of fragments and mean fragment size are give in Table 1.

Table 1. Summary statistics for bone from the cremations.

Weights of bone (grams)							
All cremations				Adult cremations only			
N	Mean	S.D.	Range	N	Mean	S.D.	Range
23	224.1	268.2	1.4-1146.8	16	281.9	303.5	11.7-1146.8
Estimated number of fragments							
All cremations				Adult cremations only			
N	Mean	S.D.	Range	N	Mean	S.D.	Range
23	1321.3	1724.6	6-6628	16	1572.1	1948.0	61-6628
Estimated mean fragment length (mm.)							
All cremations				Adult cremations only			
N	Mean	S.D.	Range	N	Mean	S.D.	Range
23	9.3	2.8	5-14	16	8.8	3.0	5-14

Modern studies suggest that the burning of an adult corpse will yield about 2-2.5 kg of burned bone (Trotter and Hixon 1974, Wahl 1982). It is clear from Table 1 that the Snape cremations, as recovered, have yielded only about 10-15% of that figure. It is known that most of these cremations were truncated by ploughing (16 out of 23) and/or were recorded as unurned (3 out of 23), so loss of cremated skeletal material may be attributable to post-depositional disturbance. It is evident from the data in Table 2 that the intact adult cremations contain (on average) over four times as much material as the truncated assemblages.

Table 2. Summary statistics of bone quantity from the intact and the truncated cremations.

Weights of bone (grams)								
	All cremations				Adult cremations only			
	N	Mean	S.D.	Range	N	Mean	S.D.	Range
Intact	7	476.0	331.9	172.2-1146.8	5	597.6	317.2	369.8-1146.8
Truncated	16	113.9	137.3	1.4-572.3	11	138.4	159.6	11.7-572.3
Estimated number of fragments								
	All cremations				Adult cremations only			
	N	Mean	S.D.	Range	N	Mean	S.D.	Range
Intact	7	3303.0	1973.6	1120-6628	5	3859.0	2043.5	1558-6628
Truncated	16	454.3	412.0	6-1306	11	532.5	467.2	61-1306
Estimated mean fragment size (mm.)								
	All cremations				Adult cremations only			
	N	Mean	S.D.	Range	N	Mean	S.D.	Range
Intact	7	7.6	1.8	5-10	5	6.8	1.5	5-9
Truncated	16	10.1	2.8	6-14	11	9.7	3.2	6-14

It may be estimated that these intact adult cremations

contained an average of about 25% of the expected skeletal residue of a single adult cremation, by weight. Cremated bone survives well, even in adverse soil conditions where inhumed bone is destroyed (Wahl 1982), so it is unlikely that much has been lost from these intact adult cremations since their burial. Weights of bone from the five intact adult cremations from Snape (mean 597.6 g, range 369.8-1146.8) therefore suggest incomplete collection of the remains from the pyre for burial at Snape.

The five intact adult cremations also contained (on average) over seven times as many fragments as the truncated adult cremations, with much greater representation of the lighter, smaller-sized fragments. Truncation *per se* appears to correlate with a loss of smaller fragments of cremated bone. Whether this reflects fragment distribution within the urns, post-depositional disturbance and attrition, or biased collection during excavation cannot be resolved on the basis of the bones. There is also some suggestion in the plough-damaged cremations of a continuum from urned to uncertain to unurned contexts, corresponding to a progressive loss of bone weight. This would be consistent with one possible interpretation of these contexts, as representing increasingly severe truncation caused by plough damage of originally urned cremation deposits.

Cremation assemblages can also be assessed to estimate any bias in recovery of skeletal parts from the pyre prior to interment. According to Trotter and Hixon (1974), skull bone makes up 33-50% of the total skeletal weight of juveniles (decreasing from birth - c. 13 years old), while it makes up 17-25% of the total skeletal weight of adults. Percentage weight loss due to firing is approximately equal for skull and for postcranial bones. Weight was recorded separately for skull fragments and for postcranial/unidentified fragments from the 4 mm sievings. From the intact cremations, the two juvenile assemblages averaged 40.7% identifiable skull bone (by weight), while for the 5 adults the figure was 11%. This is much as expected, and suggests that there was no noticeable bias in favour of either skull or postcranial fragments when bones were collected from a pyre for burial.

2.4. Bone colour and pyre temperature.

Experiments by Shipman et al. (1984) have shown that the approximate temperature reached by burnt bone can be estimated from bone colour. Most of the bone in the Snape cremations is of a white or greyish-white appearance, indicating a sustained pyre temperature probably in excess of approx. 940^o C. This is similar to the evidence from other cremations of this period (e.g. Illington: Wells 1960; Mucking: Mays 1992), and is similar to temperatures achieved in modern crematoria (Wahl 1982).

In the Snape assemblages, fragments of cortical bone sometimes occur which appear dark grey or blackened on broken surfaces (as seen in section), suggesting that the broken surfaces were less burnt. This indicates that the bone has shattered during incineration, and fragments have fallen to cooler parts of the

pyre. Additionally, fragments of yellowish white trabecular bone were occasionally noted in some assemblages. It is probable that these fragments were not fully burned due to their shifting to cooler parts of the pyre as the bones disintegrated during the cremation process.

In conclusion, the high temperatures required to produce bone with the characteristics of these cremations suggests that an efficient pyre technology was used, with the body positioned to promote both intensive firing of the whole skeleton, and a sufficient supply of oxygen to all elements to sustain their cremation for the duration of the fire. The high temperatures required are also indicated by the presence of fragments of 'cremation slag' in one of the cremations from the 1972 sewer trench. Cremation 3, an infant, was found to contain two small fragments (0.1g) of this slag. It seems that cremation slag is principally silica fused at high temperature in the cremation pyre; Henderson et al. (1987) found that it occurred most often in cremations in areas with sandy soils, as at Snape.

2.5. The 'Pyre Scatter' Area.

A part of the 1985-1988 excavation area was identified by the excavators as a possible 'pyre area'. A spread or spreads of cremated bone from this area and from adjacent scatters was recorded as a number of separate contexts (summary in Table 3).

Table 3. Summary of the human bone from contexts in or adjacent to the 'pyre area'.

Context	Weight (grams)	Mean frag. size (mm)	Sex	Age	Notes
0143	11.1	9.1	U	Adult	
0216	72.7	11.2	U	Adult	
0245	8.5	7.7	U	Adult	
0273	22.1	9.9	U	U	Includes animal bone.
0327	6.0	33.3	U	U	
0421	60.5	11.1	U	U	Includes animal bone.
0547					
(excl. 0701, 1164)	22.8	10.0	U	Adult	
0547 (0701, 1164)	<u>28.0</u>	n/a	M?	Middle/Old Adult	Unburnt.

TOTAL BONE WEIGHT = 231.7 g

There is no duplication of burnt skeletal elements across these various contexts. Thus the minimum number of individuals is one, although given the number of unidentified bone fragments more than one individual *could* have contributed to the assemblage. In fragment size and colour, the bone is similar to that from the cremation burials at the site. The existence or otherwise of a pyre area may therefore only be inferred from independent archaeological evidence that some or all of these scatters derive from a single, discrete depositional event. In terms of the cremated bone, there is nothing to indicate that these are not scatters deriving from disturbed cremations.

3. Anomalies and Pathologies.

3.1. Porotic Hyperostosis.

Cremation 3 from the 1972 excavations was an infant aged 6-9 months. Two cranial vault fragments from this infant were found to have porotic lesions - pitting on the surface of the bone - which are often classified as porotic hyperostosis. This condition is most frequent in infants in the 6 months - 2 years age range (Stuart-Macadam 1989), and seems to be the result of iron-deficiency anaemia. Iron-deficiency anaemia can be caused by poor diet, but it is perhaps most commonly caused by intestinal parasites (Stuart-Macadam 1991). It particularly affects individuals during phases of rapid growth and immunological vulnerability (e.g. weanlings). This was a common disease in antiquity. However, it is fairly unusual to be able to diagnose pathologies in cremated remains due to the fragmentation and distortion which they undergo.

3.2. Sutural ossicles ('Wormian bones').

Sutural ossicles ('Wormian bones') were found in three cremation contexts (0216, 0520, 0896). These are supernumerary bones growing in the sutures of the cranial vault bones. Although it may be that such ossicles are to some extent hereditary (Sjøvold 1984), they have been found to be so common in British Anglo-Saxon skeletons (occurring in c. 55% of individuals - Brothwell 1981: Table 4) that we cannot use their occurrence in these three individuals to infer a familial relationship.

4. The animal bone.

Burnt animal bone was recorded in 8 out of the 23 previously unexamined cremations (35%), and also in three of the 8 cremations recorded by Wells from the 1972 excavations. This is similar to the frequencies recorded in other Anglo-Saxon cremation assemblages (ranging from about 15% at Loveden to 48% at Spong Hill - Richards 1987: 125; McKinley 1989). The data are summarized in Table 4.

Table 4. Summary of the animal bone from the Snape cremations.

Context:	Identification:	Note:
Cremations:		
0041	Unknown	3 frags (1.0g). Similar material in appearance to frag from Cremation 6(1972)
0083	Unknown	1 frag (0.6 g)
0084	Unknown	1 frag (2.2 g)
0085	Unknown	2 frags (3.1 g)
0421	?Cow/Horse	2 frags (2.1g), 1 ?zygomatic and 1 ??calcaneum, both of large animal. Identified by S. Payne.
0822	?Horse/Cow	8 frags (28.1 g) incl. mandible (large animal), ?horse tibia shaft frags, and rib (smaller animal). Identifications by M. Maltby and by S. Payne.
1970-90	Unknown	1 frag (0.1 g) ossified cartilage. Identified by S. Payne.
1972-90	Horse/Donkey	44 frags (98.9 g) incl. equid second carpal (identified by S. Payne) and ??horse mandible and occipital frags (identified by M. Maltby).
1972-120		
CR.#1	Unknown	4 frags (5.4 g)
CR.#5	?Pig/Cow/Horse	2 frags (10.9 g). 1 frag. petrous identified by S. Davis.
CR.#6	Unknown	1 frag (0.9 g). See Note on Analysis (below).
Scatters:		
0143[0141]	Unknown	1 frag (1.3 g)
0273[0416]	Unknown	2 frags (5.4 g) petrous.
[0531]	Unknown	1 frag (5.2 g)

The degree of fragmentation of this bone prevents more precise identification (by contrast, at Spong Hill most of the burnt bone was retrieved from the 10 mm sieve range - McKinley 1989).

The bone was burned: it is not clear whether, had it been present, unburned animal bone would have survived any better than the inhumed human bone (although in one case a horse mandible was recovered intact from a Snape inhumation). Biased representation of animal skeletal elements has been reported elsewhere (e.g. McKinley 1989: 244), but there is not enough material here to make either parallel or contrasting inferences about Snape.

In most cases, when animal bone was present in a cremation deposit there was very little of it. The principal exception is context 1972-90, the '1862 urn', with nearly 10% of the total bone by weight identified as animal bone. When animal bone is found in cremation burials the question arises as to whether it represents deliberate burning of parts of animals with the corpse as funerary offerings, or whether they are simply bone fragments which were present on the surface in the area of the pyre which were inadvertently burnt and collected and buried with the human remains. The quantity of animal bone in context 1972-90 is such that it could represent the remains of deliberate funerary

offerings. The small amount of animal remains in the other contexts might suggest that they were accidental inclusions, although the degree of firing is in each case similar to the human remains.

5. Summary

Bone from 23 cremations was studied by the writers, with a small quantity of additional material from various surface scatters. An additional eight cremations, previously reported by Calvin Wells, were scanned for animal bone; this material had suffered some mixing and possible loss during curation, and was therefore excluded from the summary statistics.

Most of the assemblages were truncated by plough-damage. For the five intact adult cremations, it was found that on average only about 25% of the individual's expected ash weight was collected from the pyre for burial in antiquity. Inhumed bone was almost entirely destroyed by soil conditions, and most of the plough-damaged cremations had suffered extensive bone loss.

Of the 23 cremations reported, sixteen adults and four children were identified. Four of the adults were sexed as male, and four as female. Firing temperatures were indicated in excess of about 940° C., similar to other Anglo-Saxon cremation sites. A small number of fragments of burnt animal bone were recovered, occurring in cremations with a similar frequency to that seen in other Anglo-Saxon East Anglian cemeteries.

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APPENDIX 1: DATA FROM THE 23 CREMATIONS NOT PREVIOUSLY ANALYZED.

Context:	Urned?:	Intact?:	Sex:	Age:	Main colour:	Subsidiary colour:	Bone weight (g):	Est. N frags:	Mean frag. size (mm.):
0017	Y	N	U	Middle/old adult	White		181.2	753	11
0025	Y	Y	M??	Adult	White	Some blackening internally	369.8	1558	9
0041	Y	N	F??	Young adult	White		156.0	469	12
0045	Y	N	U	Adult	White		126.7	487	8
0046	N	N	U	Adult	White	Some yellowish trabecular	11.7	113	7
0083	Y	N	M?	Adult	White	Some blackening internally Some yellowish trabecular	29.6	61	13
0084	Y	Y	F??	Middle/old adult	White	Some blackening internally Some yellowish trabecular	487.3	4530	5
0085	N	N	U	U	White		53.7	290	12
0171	Y	Y	M?	Middle/old adult	White	Some blackening internally	576.8	6628	6
0216	?	N	U	Adult	White	Occ. blackening internally	72.7	206	9
0421	?	N	U	U	White		60.5	220	11
0520	Y	N	M??	Young adult	White	Occ. blackening internally	572.3	1306	14
0628	Y?	N	J	Infant/ juvenile	White		1.4	6	12
0822	M?	N	U	U	White	Some yellowish trabecular	119.3	367	12
0895	?	N	U	Adult	White		19.0	80	14
0896	Y	Y	J	Child 2-7 years	White		172.2	1120	10
0897	Y	Y	J	Child c.7 years	White		172.2	2706	9
1425	Y	N	U	Young/middle adult	White		136.2	1140	6
1473	Y	N	U	Adult	White		197.8	1088	7
1474	Y	N	J	Child c.2 years	White		64.7	528	8
1496	N	N	U	Adult	White		19.7	155	6
1970-90	Y	Y	F??	Middle/old adult	White		407.1	2140	7
1972-90	Y	Y	F??	Middle adult	White		1146.8	4439	7

KEY: Age ranges are as follows: Infant, 0-2 years; Child, 2-12 years; Adolescent, 12-18 years; Young adult, 18-35 years; Middle adult, 35-50 years; old adult, 50+ years.

Sexing: ? indicates 'probably', ?? indicates 'possibly'.

U=unknown, J=juvenile.

NOTES

Context: Note:

- 0041 3 frags. unident. burnt animal bone.
- 0083 1 frag. burnt animal bone.
- 0084 1 frag. ?bone comb, 1 frag burnt ?animal bone.
- 0085 Includes burnt animal bone.
- 0171 Scheerl's node on vertebral body (Scheerl and Junghanns 1971:158-168).
- 0216 Sutural ossicle. 'Fyre spread' component.
- 0421 Includes burnt animal bone.

Context: Note:

0520 Sutural ossicle.

0822 Includes burnt animal bone.

0896 Sutural ossicle. There is a deposit of woven bone upon the surface of a bone fragment from this burial, probably indicative of infection. 2 frags intrusive bone (from 0897?).

1970-90 Includes 1 frag. ?animal bone (ossified cartilage).

1972-90 Includes animal bone.