Assessment of the microfauna from Longstone Edge

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Introduction

An assessment is made here to determine the potential of the hand-collected and sieved/floated microvertebrate assemblages from the early Neolithic and Bronze Age deposits at Longstone Edge. Some levels have great abundance of microvertebrates, and if their mode of accumulation can be identified they could provide information as to the nature of the deposits and the environment existing during the Neolithic. The microfauna may further provide important clues about the taphonomic history of the barrows, including access to and exposure of the structures in different periods.

Summary of results

Preliminary assessment is that there are significant differences in preservation of the small mammal bone between the two barrows. The bones from barrow 2 have higher degrees of digestion than the bones of barrow 1 and must have been accumulated by a different predator. This may indicate differences in human occupation of the two sites, for example, if the different predators have different tolerances of human disturbance. There are also differences within barrow 1 between the grave fill deposits and the mound deposits, and again this indicated different processed of accumulation. For example, the lack of alteration of the grave fill bones could indicate occupation of the grave fill by microfauna (easy to burrow into the disturbed fill deposits) or perhaps human agency in the accumulation. There is also a difference between the two grave fill deposits, the empty grave apparently with higher degrees of alteration of the bones of the microfauna and similar to the bones from the fissure deposits.

At this stage I cannot say how significant these differences are, nor the processes leading to them, but it is possible to make several suggestions. No evidence of accumulation by mammalian carnviore was seen; the most likely accumulators of microfauna indicated by the damage to the bones are barn owl and/or short eared owl; and the bones accumulated over time, for there is some variation in degrees of weathering.

Material

There are two sources of material. The first consists of the sorted bones, which include mandibles and isolated teeth of the Northern water vole, *Arvicola terrestris* and rodent postcranial bones of comparable size. Bones of large amphibians (probably toad) are common, and there are small numbers also of a smaller species of amphibian. There are also the remains of smaller rodents, including species of murine and microtine, in the richer samples. The second source of material is the screening residues themselves, and an assessment is made of the number of samples that should be further sorted and analysed.

The material is described in tables 1 and 2. Table 1 lists the samples with microvertebrates, with a simple taxonomic breakdown. Presence/absence of digestion is indicated for most of the samples (column 6) as this relates to the mode of accumulation of the remains. On the right of the table are three columns which show,

from left to right, the sample size on a scale of 1 to 4, the number of days needed to analyse an adequate subsample for taphonomic purposes, and on the far right the average screening score, also on a scale of 1 to 4, with 1 indicating rich screening residues and 4 indicating absence of bone in the residues.

The screening scores are shown in detail in table 2, with the scores shown opposite each sample as divided between the boxes of residues. Thus for sample 5118 shown at the top of the table, there are screening residues from the 2-4mm sieves in Box 76 and from the 1-2mm sieves in Box 66. Both sets of residues score 4 in the screening assessment, in other words having no bone. The averages of these scores are shown in the far right column of table 1.

Methods

The methodology should follow that of Andrews (*Owls, Caves and Fossils*, Natural History Museum 1990). Element counts of major cranial (skulls, mandibles, teeth) and postcranial (femur, tibia, humerus, ulna) elements should be made in the first instance. Breakage of postcrania and tooth loss from the jaws should be assessed. The degree and extent of digestion of the teeth and at least one major postcranial element should be made, including at least the molars, incisors and the femur. Finally, an assessment should be made of the post-depositional damage to the bones, including particularly surface and/or subsurface weathering, staining, and root marks. Most of the work can be done with binocular light microscope, but some microphotography is anticipated using low vacuum scanning electron microscope in order to define precisely the different levels of modification to the bones. Comparative data for all features can be found in Andrews (1990).

Analysis of sorted bones

Three small samples are available from the possible excarnation deposit in barrow 1, contexts 1053, 1056, 1057 & 1106. It is estimated these should take 3 days to analyse. The cist fill deposits have much richer samples, particularly sample 5094 in context 1060, and they are estimated to take 3 days for analysis. The burial contexts in barrow 1 are also rich, but preliminary analysis suggests that the bones are little modified. In many ways this makes the analysis more difficult and time consuming, and 7 days are estimated for the identification and analysis of the burial contexts (subsamples of 1059 and 75502-3). Some of the mound deposits are also rich, particularly contexts 1055 and 1081 estimated to take 4.5 days (based on subsampling). Finally there are several minor contexts of interest, the cremation fill (context 3030: 0.5 day), the subsoil below the mound (context 5170: 0.5 day) and the stone mound (context 1095: 0.5 day. This makes a total of 19 days for barrow 1. Mixed or contaminated contexts such as the material in the fissure (context 1050, 1080) will not be analysed.

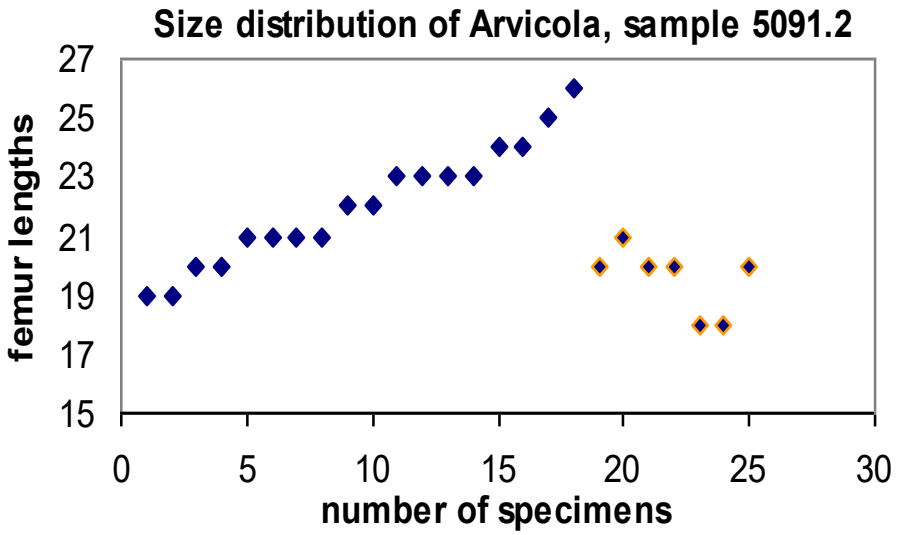
There is little worth sorting from barrow 2. Context 2058 has several samples and subsamples from the subsoil with bone (although nothing in the screening residues), and the bone is more heavily digested than that from barrow 1, suggesting a different process of accumulation. One day is allocated for that.

At this stage of preliminary analysis, there appears to be little difference in the taxonomic composition of the different samples. It is not likely that taxonomic analysis will provide much evidence of site differentiation. All species show evidence of digestion, and it is likely that further analysis will identify the predator, which in

turn will provide evidence of site activity. For example, the ecological preferences of the predator can be used to indicate the amount of human activity at the site, for some predators are more tolerant of disturbance by people than others. In addition, possible indications of nesting as opposed to roosting behaviour and/or seasonal occupation of the site (for both, different degrees of digestion may occur for most predators) may indicate other aspects of the local environment. There is some indication that the predator is selectively targeting immature individuals of *Arvicola* and adults of *Microtus*, for the majority of *Arvicola* bones are relatively small and many with unfused epiphyses, whereas the *Microtus* are all similar in size with fused epiphyses. In figure 1, for example, 17 of the sample of 25 *Arvicola* femora from the grave fill in barrow 1 (context 1059) are 22mm or less, including the 7 specimens with unfused femoral heads.

Preliminary analyses of the numbers, breakage and digestion of crania and postcrania are shown in table 3, and numbers of elements in table 4. Timing of these analyses has formed the basis for the time estimates given above and in table 1, and altogether it is estimated that 20 days are needed for analysis of the sorted material.

Figure 1 The size distribution of Arvicola based on maximum femur lengths (N = 25. The coloured dots on the right of the figure are specimens with the epiphyses of the head unfused.



Screening residues

The great majority of the residues from all samples are not rich enough to justify further sorting. It is important to check a reasonable sample, however, for the samples already sorted include only the larger bones, and smaller species are almost certainly under-represented. These should be present in the finer screen residues. Samples with screening scores of 1 do not require sorting, for they are essentially all bone. They are listed as follows:

Sample 5111, context 1055
Samples 5090, 5095, 5096, context 1058
Sample 5093, context 1059
Samples 5106, 5107, 5108, 5110, 5183, context 75502-3
Key contexts are indicated in red.

The samples requiring sorting are those with scores of 2 (or 3)

Samples 5075, 5092, context 1055
Sample 5116, context 1081
Samples 5091, context 1059
Sample 5094, context 1060
Sample 5080, context 1056
Samples 5103, 5117, 5135, context 1057

Samples with scores of 3 would only be worth investigating if the context is really important. Examples are contexts 1008 and 1019/1095, which all have samples with a score of 3. It is estimated that the additional analysis of these will entail another 7 days work.

None of the samples from barrow 2 are rich enough to justify sorting unless the context is really important. The samples with a score of 3 are the only ones worth looking at. The mound contexts have no bone at all, and the key contexts at the base of the mound also have no bone except for context 2008 which has a little.

It is difficult to give a time estimate for sorting the sieved residues, for much depends on how much needs to be done for the different contexts. On the basis of the list above, assuming that everything that I have recommended is done, a minimum of three months for a skilled operator is needed. This could be up to six months for someone with no experience of extracting microfauna from matrix.

Summary of time estimates

Preliminary tasks		
-sorting residues	30 days	£ 0000
Analysis		
-recording and analysis of existing material	20 days	£ 3000
-recording and analysis of sorted material	7 days	£ 1050
-report writing and edit	10 days	£ 1500
Total	37 days	£ 5550
Other expenses		
-SEM (use of microscope, 4 x 1 day sessions)	20 hours	£0000 (in-house)
-SEM time (CfA technician)	4 days	£ 000
-travel London-Portsmouth, 5 trips		£ 230

Table 2: Longstone Edge - Contexts with richness of small mammal remains (ordered by area and phase)
The richness R of different samples and contexts are shown on a scale of 1 to 4, with 1 = extremely rich (nearly all bone and little matrix), 2 signifies more than half bone and well worth sorting, 3 signifies some bone, and worth sampling if the context warrants it, and 4 means no bone. Intermediate richness is denoted by double numbers, with the first number being the more significant: thus 3-4 indicates some bone present in some subsamples but no bone in other subsamples.

Barrow 1

Cxt	*Sample*	*Ct >4mm*	*<4mm res uns*	*R*	*2-4 res uns*	*R*	*1-2 mm res uns*	*R*	*Flot*	*Flot ass*	*Description*
1087	5118	97			B76	4	B66	4			barrow mound (lower)
1087	5175	1									barrow mound (lower)
1098	5137	69			B77	3	B67	3	B43	++	fill of grave/pit cutting 1095
1098	5176	6									fill of grave/pit cutting 1095
3040	5161	85			B77	3-4	B68	3-4	B44	+/++	?grave below barrow
1095	5138	87			B77	4	B67	4	B43	++	stone mound
1095	5141	188	B86	3					B44	+++?	stone mound
1095	5143	10			B77	?	B68	3	B44	++	stone mound
1103	5155	3									subsoil below barrow
1004	5026	51	B87	4							barrow mound (upper)
1004	5027	40									barrow mound (upper)
1005	5030	50									barrow mound (lower)
1005	5031	1									barrow mound (lower)
1011	5044				B69	4					barrow mound (upper) = 1004
1012	5046	1	B87	4							barrow mound (lower) = 1005
1013	5045										barrow mound (lower) = 1005
1019	5065	35	B87	3							stone mound
1019	5068	58	B87	4							stone mound
1008	5043	6	B87	3							core of enclosure wall

1020	5063	40	B87	3							tumble from enclosure wall
1050	5072	c.500	B87	2							material in fissure
1080	5102	735	B82	1-2					B98 B39	+ 3	material in fissure = 1050
1080	5104	c. 3700	B83, B82	2 1	B74	2-3	B64, B56	3 4	B99 B39	+++2	material in fissure = 1050
1052	5070	c. 1081	B87	2	B70 B69	4 3	B57, B58	3 4			barrow mound
1052	5074	15			B70	3	B58	3			barrow mound
1052	5086	121	B79	4							barrow mound
1052	5087	277	B79	4-3			B60	2-3			barrow mound
1052	5089	76	B80	4							barrow mound
1052	5144	105			B77	4-3	B68	4	B44	+	barrow mound
1052	5171	105									barrow mound
1055	5075	c. 3400	B78	3	B70	2	B59, B71, B56	2 2-4 3			barrow mound
1055	5092	893	B81	3-2							barrow mound
1055	5111	1750	B84	1	B75	2-3	B65, B56	2 -	B99 B40	++ 2-3	barrow mound
1055	5172	38									barrow mound
1058	5090	10000			B72	1-2	B61, B56	1-2	B98 B97	3	barrow mound = 1055
1058	5095	1920	B81	1					B98	2	barrow mound = 1055
1058	5096	500	B81	1					B98		barrow mound = 1055
3030	5136	230			B76	3	B67	3	B43	++	grave fill
3030	5140	38			B77	3	B68	3	B43	++	grave fill
1081	5114	460			B75	2-3	B66 B56	? ?	B40	++ 2	barrow mound
1081	5116	c. 2700	B84	2	B76	2-3	B66	3	B99 B40	+++ 2	barrow mound

1059	5091	5000			B73	1	B62, B56	1 2	B98	2	grave fill (cist) with skeletons 75502, 75503
1059	5093	990	B81	1			B63	1	B98	3	grave fill (cist) with skeletons 75502, 75503
1060	5094	3600			B74	2	B63, B56	1 2	B98	1	grave fill (cist)
1056	5080	398	B78	2							excarnation deposit
1082	5115										excarnation deposit = 1056
1053	5105	637	B83	3					B40	++	subsoil
1053	5145	19			B77	3	B68	3	B44	++	subsoil
1057	5081	176	B78	3							subsoil = 1053
1057	5083	998	B79	1					B97		subsoil = 1053
1057	5103	444	B82	2					B98, B39	+++	subsoil = 1053
1057	5117	40	B84	2-3					B41	++	subsoil = 1053
1057	5135	c.1000	B85	4-3-2					B42	+++?	subsoil = 1053
3045	5162	24			B77	4	B68	4	B45	++	grave fill
3046	5163	0			B77	4	B68	4	B45	+	grave fill
1106	5159	22									subsoil below barrow
1106	5170	130			B77	2-3	B68 B56	3 4	B45	++	subsoil below barrow

Barrow 2

Cxt	*sample*	*Ct >4*	*<4 mm res uns*	*R*	*2-4 mm res uns*	*R*	*1-2 mm res uns*	*R*	*Flot*	*Flot ass*	*Description*
1109	5151	17									subsoil below barrow
2080	5132	5	B84	4							subsoil
2073	5113	2	B84	4	B75	4	B65	4			barrow mound
2074	5128	0			B76	4	B66	4	B42	0	barrow mound
2001	5069	156			B69	3	B57 B56	3-4 4	B24	++	topsoil & cleaning
2002	5033	360	B87	4					B18	+	barrow mound (upper)
2003	5042	129	B87	4-3					B23	++	barrow mound
2003	5177	55									barrow mound
2008	5062	67			B69	4	B57	3	B23	++	barrow mound (basal)
2008	5066	21	B87	4-3					B24	++	barrow mound (basal)
2063	5079	158	B78	3-4					B33	+++?	basal grave fill
2065	5084	144	B79	3-2					B33	++	basal grave fill
2066	5085	156			B71	3	B60 B56	3 4	B34	++	basal grave fill
2067	5088	126	B80	4-3					B34	+	basal grave fill
2060	5071	c.1000			B94, B93	3 3	B92	3	B97, B29	++	C19 backfill
2060	5073	94	B78	3					B30	+++	C19 backfill
2060	5076	230			B71	3	B60	3	B33	+++	C19 backfill
2060	5082	172			B71	3	B60, B56	3 4	B33	++	C19 backfill
2057	5064	760									barrow mound
2058	5100	127			B74	4	B63	3-4	B38	+	subsoil

2058	5101	15	B82	4-3					B39	+	subsoil
2058	5112								B40	0	subsoil

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Additional contexts with hand-collected bones and/or residues (SFN - small find number)

Barrow 1

Context	*Sample*	*Ct >4*	*<4 mm res uns*	*R*	*2-4 mm res*	*R*	*1-2 mm res*	*R*	*Flot*	*Flot ass*	*Description*
1090	5126		B76	4			B66	4	B41	0	fill of ?Roman pit/grave
1095	5141		B86	3			B68	4			stone mound
1097	5133		B84						B42	0	tumble from wall 1096 (=1007)
1097											tumble from wall 1096 (=1007)
1104											buried soil from gap in encl. wall
1004	5025 B		B87	4					B16	0	barrow mound (upper)
1008											core of enclosure wall 1007
1014	5166										?marker stone
1002	5016				B69	4	B57	4	B16	0	subsoil
75501											human skeleton in cist 1061 (disturbed by fissure 1050)
75502	5106	340					B56	2			grave fill (cist) with skeletons 75502, 75503
75502	5107	1700			B74	1-3	B64, B56	4 4	B99 B40	+++	grave fill (cist) with skeletons 75502, 75503
75502	5108	57	B79	1	B74	1	B64, B56 B68	1-4 4 1			grave fill (cist) with skeletons 75502, 75503
75502	5110	677			B74	2	B56	4	B99,B40	+++	grave fill (cist) with skeletons 75502, 75503
75503	5123	30									grave fill (cist) with skeletons 75502, 75503
75502	5124	6			B76	1	B66, B56	3 4			grave fill (cist) with skeletons 75502, 75503

75502	5127	26			B76	1	B66, B56	3 4			grave fill (cist) with skeletons 75502, 75503
75502	5183	750			B77	2	B56	4			grave fill (cist) with skeletons 75502, 75503
3041											barrow material assoc. human bone
3042											human bone in 3041

Additional contexts with hand-collected bones and/or residues (SFN - small find number)

Barrow 2

Context	*Sample*	*Ct >4*	*<4 mm res uns*	*R*	*2-4 mm res*	*R*	*1-2 mm res*	*R*	*Flot*	*Flot ass*	*Description*
2076	5131				B76	4	B67	?	B42	0	layer of stones at base of mound
2077											ring of barrow markers
2078	5134				B76	4	B67	4	B42	0	subsoil
2079	5139				B77	4	B67	4	B43	+	natural
2067											basal fill of grave
2004											barrow mound
2007	5061				B69	4	B57	4	B23	0	barrow mound
2009	5067		B87	4					B24	0	subsoil
2051											topsoil/cleaning
2053	5059				B69	4	B57	4	B23	0	fill of ?post-medieval quarry pit
2054	5060				B69		B57	4	B23	0	fill of ?post-medieval quarry pit
2059											natural