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Ancient Monuments Laboratory
Report 190/88

ARCHAEOLOGICAL BONE SAMPLES RECOVERED BY SIEVING: 46-54 FISHERGATE, YORK, AS A CASE STUDY

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Summary

The report describes the sieving procedures employed in order to recover small bone fragments from Anglian and medieval deposits at 46-54 Fishergate, York. A preliminary analysis of data obtained from samples sieved to 12mm shows that this mesh size is only suitable for the recovery of the larger birds and mammals, but that even such coarse sieving is an improvement on collection by hand. Certain aspects of the sampling procedure are explicitly criticised, and improvements to sieving and sorting procedures are proposed.

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Archaeological bone samples recovered by sieving: 46-54 Fishergate, York, as a case study.

T. P. O'Connor

Introduction

Sieving procedures are increasingly being used on archaeological sites in Britain in an effort to improve the recovery of bones, artefacts and other materials. As one of the most abundant of archaeological 'finds', bone fragments have received particular attention in assessments of sieving as a recovery tool, and it has long been apparent that sieving is a *sine qua non* of reliable and consistent bone recovery from archaeological deposits (Payne 1975; Clason and Prummel 1977).

By 1980, the sieving of large (ca. 50kg) sediment samples had been adopted as a routine part of excavation procedure in York, with the original aim of facilitating the recovery of small bones and artefacts. The technique employed was based on a modification of the 'Siraf' tank (Williams 1972; Kenward et al. 1980), and basically involved wet-sieving large samples on a 1mm aperture mesh. This procedure quickly proved to be an effective means of recovering fish and small mammal bones which were otherwise not represented amongst the bones recovered during excavation, and also gave more consistent recovery of the bones of larger taxa than could be achieved by collection during excavation. In 1985, faced with the prospect of major excavation at 46-54 Fishergate, the decision was taken to make extensive use of "bulk-sieving tanks", and to supplement this existing procedure with a rather coarser sieving technique capable of processing larger volumes of sediment.

The Fishergate excavation was at a site close to the confluence of the Rivers Ouse and Foss in Central York, and was prompted by the closure of the Redfearn National Glass works and the announcement of the proposed development of the site for an hotel and luxury housing. The site was known to occupy the recorded location of a priory of the Gilbertine order, and, given the rarity of Gilbertine houses, excavation seemed justified. A trial excavation was undertaken in 1985, under the direction of Richard Kemp, of the York Archaeological Trust, with a view to investigating the extent and state of preservation of the remains of the priory. The principal sources of funding for this investigation and for the subsequent excavation were the Historic Buildings and Monuments Commission for England and York City Council.

When the trial excavation began, it seemed likely that opportunities for bioarchaeological investigation would be relatively few. The site was well-drained, in contrast to the highly organic waterlogged deposits encountered elsewhere in York, and deposits associated with the use of a priory seemed to present little research potential beyond simple questions of diet. However, as the trial excavation proceeded, traces of occupation beneath the priory became apparent, and an underlying phase of Anglian settlement was soon identified over a substantial area of the site. Given the dearth of Anglian deposits from elsewhere in York, the Fishergate site promptly assumed a higher degree of importance.

Following demolition of the glassworks buildings, a major open area excavation was undertaken, which continued through much of 1986. Time was limited, however, and excavation had to proceed as rapidly as possible. In order to optimise artefact recovery from the important Anglian deposits, an extensive sieving programme was undertaken. The equipment and procedures are described in more detail below, and were based on procedures already in use on excavations in York. However, for all substantial Anglian deposits, and some associated with the priory, any sediment not already collected as samples for laboratory analysis for insects or plant macrofossils or for wet-sieving in a Siraf tank was passed through a mesh of approximately 12mm aperture. This procedure greatly facilitated artefact recovery, and led to the collection of very large quantities of bone fragments. Obviously, with any such sampling procedure, it is important that nothing is removed from the sample, such as large bones noticed during excavation, before the sample is processed.

The archive of bone fragments from the Fishergate site may thus be divided into three categories: fragments recovered from the Siraf tanks; fragments recovered by 12mm sieving; and fragments recovered by hand during excavation of contexts which were not sieved *in toto*. Each of these categories will have a different content of potential information, and may require a different analytical approach. This report is being prepared while the recording of these bones is still in progress. This is not the 'bone report' for 46-54 Fishergate. Rather it is an assessment of the sieving techniques used from the point of view of bone recovery, and a case study of the opportunities and headaches which an extensive sieving programme may create for the bone analyst.

Methods

Wet-sieving to 1mm - 'bulk samples'

Bulk samples were placed on a 1mm aperture nylon mesh supported in a tank of water plumbed to provide a gentle flow of water upwards through the sample and over a weir into a 1mm aperture sieve. Disaggregation of the sample was encouraged by manual agitation. When all particles of a size less than 1mm were judged to have passed through the mesh, the mesh bearing its residue of particles greater than 1mm was removed from the tank and air-dried. The dried residue was subsequently dry-sieved on a mesh of 2mm aperture. The 1-2mm fraction was retained but not examined, whilst the 2mm+ residue was sorted for all categories of biological and artefactual 'finds'. Bones from bulk samples thus comprise a greater-than-2mm sample.

Since about 1980 it has been the practice in the Environmental Archaeology Unit to collect bulk samples in domestic dustbins. A bin will typically hold about 50-60kg of damp sediment, and this has become the routine standard weight for bulk samples. However, although bulk samples taken at

Fishergate were weighed before sieving, the sample size was determined by the quantity originally collected rather than by use of a standard sample size or by setting upper and lower limits. It is debatable whether weight or volume is the more useful measure of sample size. Weight is dependent on water content, and can thus only be used for imprecise comparisons of sample size. Volume is more difficult to measure on site, however, and much will depend on whether the sample consists of loosely-trowelled soil or blocks of unconsolidated sediment. Neither measure is particularly accurate, and weighing only has the advantage of comparative ease of measurement.

Dry-sieving to 12mm - 'riddled samples'

Riddled samples were shovelled onto a steel mesh of approximately 12mm aperture (actually a nominal half-inch), which was mounted horizontally on a large rectangular frame. This frame was set on nylon wheels which could run between stops on the angle-irons on which they were located. The mesh assembly could thus be shaken back and forth over a distance of about 30cm, encouraging the passage of small particles through the mesh. When this riddling process was no longer effective in removing small particles, a hood could be lowered over the mesh and a fine spray of water applied in order to wash the residue. However, this spraying procedure proved to be slow and ineffective, and it became necessary to move the sample around on the mesh using trowels or shovels. After drying of sprayed samples, the residue was sorted for artefacts, bones, and any other objects thought to be of significance.

Sample size was determined by availability, the intention being to sieve by riddling all that remained of selected contexts after any other samples had been taken.

Practicalities of on site sieving

The sieving programme at 46-54 Fishergate was under the day-to-day supervision of a person seconded from the excavation team, who in turn received advice and direction from the excavation Director and staff of the Environmental Archaeology Unit, the latter usually being A. K. G. Jones. During the course of the excavation, three different people were at various times in charge of the sampling programme, and none of the three could be said to have been familiar with laboratory procedures and thus with the purpose of the different categories of samples and the need for reliable documentation. One sample form was filled in for each sample of whatever type when that sample was taken. The sample form (Fig. 1) is intended to give information about the archaeological context of the sample, its location on the site, the likelihood of contamination, and any particular reasons why this sample was taken. However, the sample forms were usually filled in by excavation staff rather than by the person in charge of the sieving programme, and the amount of information supplied was often negligible. A second piece of documentation, the laboratory sheet (Fig. 2), is intended as a record of what has been done to a sample, and is filled in when a sample is subject to any form of processing. The laboratory sheets were mostly filled in by the person in charge of the sieving programme, though the amount of information supplied, and the legibility, often left something to be desired. In short, the documentation which was generated by the sampling and sieving programme at this large and essentially well-run excavation was adequate but far from ideal. It should be stressed that Figs. 1 and 2 are included to illustrate the documentation which was used, and not as ideal specimens which should be widely adopted.

The Fishergate site was unusual in that the sieving equipment could be housed in a large building on the site, but this did little to dispel the feeling that sieving was a wet, cold, dirty job. Labour for running the tanks and the riddling device was supplied by volunteers, students, and occasionally by people co-opted from the excavation team. Despite the enthusiasm of some of the volunteer staff, sieving was not a popular job likely to engender motivation.

Sample sizes varied enormously. Bulk samples averaged 66.8kg in weight (s.d. = 44.2; n = 276), but ranged from 1kg to 280kg. Some were thus samples of a very small area of deposit, whilst others must have sampled many square metres of an extensive layer. Similarly, riddled samples averaged 231.5kg (s.d. = 235.6; n = 146), but ranged from 5kg to 1274kg.

Practicalities of bone recovery

The washed residues from bulk samples and riddled samples were taken to the Environmental Archaeology Unit, University of York, for sorting. It quickly became apparent that many of the residues were far from clean, and contained lumps of disaggregated sediment. These residues were wet-sieved for a second time in order to obtain a clean residue which could be sorted.

Sorting residues from bulk or riddled samples is time-consuming and monotonous, and this task was undertaken by volunteers and by staff employed through a Manpower Services Commission Community Programme scheme. Both categories of residue essentially comprised large stones, gravel, and bone fragments, with just the occasional fragment of pottery to lend excitement. Even the most patient and motivated staff found the task of sorting these residues singularly dull. The riddled samples presented a particular problem, as the very large quantities of residue produced by a sample comprising hundreds of kilograms of sediment could require many man-days to sort. This had two unfortunate consequences. Residues became subdivided into many smaller parts, with the result that the bone fragments from one sample could become dispersed amongst several bags and boxes. In addition, a form of fatigue not unlike boredom would set in, with a concomitant loss of efficiency on the part of the sorter. Individual competence in recognising bone fagments obviously varies between individuals, and it has become apparent that competence in this task has little to do with experience or intelligence. The ability to concentrate for long periods and to recognise patterns and textures appears to be more important. As a check on the efficiency of sorting, the material discarded during sorting was examined by Richard Kemp, primarily to ensure that vital fragments of pottery, slag, or imported stone were not overlooked. Following this check, the substantial piles of gravel accumulated from riddled samples were usefully disposed of, whilst residues from bulk samples were put into store.

Volunteers and others sorting bones from sieving residues have been encouraged to collect different categories of bones separately, in particular to separate fish bones from all other bones. There is a logic to this practice: the fish bones are identified and recorded by Andrew Jones, all other bones by the present author. Past experience has shown that this separation 'at source', as it were, is not wholly reliable. Whilst staff with little knowledge of comparative osteology can fairly easily be taught to recognise fish vertebrae, caudal and pectoral elements of fish are often categorised as bird or mammal bones, and an assortment of elements, in particular anuran vertebrae, are regularly misidentified as fish bones. For the Fishergate project, therefore, all bones were passed to the author, who could then check the accuracy with which fish bones had been separated before passing them on for identification. The inaccuracy with which fish bones were recognised by sorters should not be overstated, however. Dr. Madeleine Hummler undertook a survey of 111 samples of fish bones collected from Fishergate bulk samples, and showed that 98% of the bones collected as fish actually were fish bones. The remaining 2% nonetheless constituted 287 specimens, and there was a corresponding proportion of fish bones remaining amongst the 'non-fish'. The separation of fish bones during sorting is thus not sufficiently reliable to dispense with checking by a more skilled person. Even though it may be justifiable to use two or three unskilled man-hours in order to save one hour of specialist time, it is debatable whether this preliminary sorting of fish bones saves any time in the long run.

Preliminary observations on the Fishergate sieved bone assemblages

The first point to make about the sieving programme at Fishergate is that it has yielded a huge quantity of bones and bone fragments. Given the size of the excavation - large in area but lacking deep stratigraphy - hand-collection of bones during excavation might have been expected to produce a total not exceeding 100,000 fragments. To date, nearly 70,000 specimens have been recorded, two-thirds of which are unidentified. This total has been reached from only 83 bulk and riddled samples, out of a total of 641. Admittedly, work has been concentrated on some of the largest riddled samples, so the fact that only 13% of samples has been examined is less alarming than it might appear. However, even if the bones recorded to date are taken to be 25% of the total, this would still imply that sieving has produced an archive of material three times as great as that which might have been expected if bones had been collected by hand from all excavated deposits. There are obvious implications for the costing of post-excavation work, although it is emphatically not proposed that all bones recovered from a site should automatically be recorded for analysis and report. In the case of Fishergate, the nature of the archaeology and the excellent information flow between the excavation Director and those involved in post-excavation work should allow an efficient and informed selection of samples for record out of the huge quantity which is available.

The two different sieving procedures - bulk sieving and riddling - have obviously yielded quite different bone assemblages. Those obtained by bulk sieving probably include most identifiable specimens present in the original sample, and can reasonably be assumed not to have been biased by the elimination of small taxa, although unsorted 1-2mm residues may have contained isolated rodent and shrew teeth. The riddled assemblages only include material retained by a 12mm mesh, and nearly all fish, amphibian and small mammal bones, together with a large proportion of bird bones, will have been lost. It might be thought that riddling is no improvement on hand collection during trowelling, but there is one important difference. The size limit on recovery imposed by a 12mm mesh is constant and reliable. That imposed by hand collection is not controllable, and is determined by factors as diverse as the prevailing weather at the time of excavation, the experience of the excavator, the colour and texture of the deposit, and a host of other unquantifiable factors. Levitan's experiments at Uley (Levitan 1982) showed very clearly that whilst excavators are capable of quite remarkable feats of recovery, they can also overlook specimens as large as a sheep mandible. It is the present author's subjective impression that a bone or potsherd 50mm in length stands about a 50% chance of recovery during trowelling. Anything smaller will usually be missed. This is not to denigrate the competence of excavation staff. Excavations in towns are generally undertaken under severe time constraints, and conditions in the trenches are often wet and filthy. To expect excavation staff to see and to collect small objects whilst digging through wet black mud at the bottom of a deep hole is wholly unrealistic. Riddling is thus a useful means of standardising the recovery of bones of larger taxa, allowing reliable comparisons to be drawn between samples.

To underline the differences in the assemblages recovered by bulk-sieving and by riddling, Table 1 shows the number of specimens recovered from twenty of each type of sample, the specimens being grouped in part by taxonomy and in part by size. The samples in Table 1 are not quite a random selection - some attempt has been made to obtain a similar range of feature types and attributed phases for both categories of sample. The figures are quite unambiguous in their implications. Riddling on a 12mm mesh has given standardised assemblages of the bones of larger mammals and birds, but no conclusions should be drawn from these assemblages about the distribution of any other taxa. One sample of each type from context 4847 (an Anglian pit fill) is represented in Table 1. In the bulk sample, fish bones comprised 70% of identified bones, but only 0.2% in the riddled sample. In the same pair of samples, the ratio cattle:sheep fragments is 1:0.39 in the bulk sample, and 1:0.32 in the riddled sample. There is a small difference, indicative of some loss of identifiable sheep bones through the 12mm mesh, but not a great difference. Although this by no means justifies direct comparison of the abundance of the larger mammals between the two types of sample, it does suggest that the relative proportions of the major domestic mammals as shown by the assemblages from riddled samples are not seriously biased by the recovery technique.

Another subject which needs to be considered in any comparison of these two sieving procedures is the amount of breakage and surface abrasion which is caused to bones during sieving and sorting. As the sorting procedure was the same for either type of sample, any differences in the degree of recent damage to the recovered assemblage can reasonably be attributed to the sieving process.

An example of the listing sheet used in the recording of these bone samples is shown in Fig. 3. The record of each bone assemblage includes a summary note of the condition, colour, size range and degree of gnawing and fresh breakage of the bones, developed from the parameters defined for the recording of bones from the City Garage, Blake Street, York (O'Connor 1987a). Fresh breaks were scored for the assemblage as a whole on a four-point semi-quantitative scale - none, few, some, many. Coding these values as 1, 2, 3, and 4 respectively, a simple comparison of the incidence of fresh breaks on bulk-sieved and riddled assemblages may be obtained by calculating the mean numeric score over a number of each type of sample. For bulk samples recorded to date, the mean value is 1.80 (s.d. = 0.76; n = 40), and for riddled samples 2.30 (s.d. = 0.55; n = 43). To a degree, this comparison is invalid, as the >12mm fraction processed by riddling is being compared not with a >12mm bulk-sieved fraction, but with a >2mm bulk-sieved fraction. If fresh breaks are more likely to occur on larger fragments, then it follows that a greater proportion of the coarser fraction is likely to exhibit fresh breaks. The data might best be taken as showing that bulk-sieved assemblages were mostly subjectively assessed as exhibiting 'no' or 'few' fresh breaks, whilst riddled assemblages were typically assessed as showing 'few' or 'some'. At this rather crude level, the comparison is at least useful. Whether this additional damage is significantly detrimental to information retrieval is questionable, particularly given the advantages of bone recovery by riddling over hand collection. At least if an originally intact bone breaks up during sieving, it is likely that all the fragments will be recovered, allowing reconstruction if necessary.

Conclusions and recommendations for future practice

Although the study of bones from 46-54 Fishergate is only at an early stage, it is felt that sufficient material has been examined to permit useful conclusions to be drawn about the procedures involved. Given the immediate prospect of further substantial excavations in York, and the probability that extensive sieving will be justified, it is important that these preliminary conclusions should be made available for discussion.

First, it is essential that the whole sampling and on-site sieving programme should be the sole responsibility of one person, and that this person should be sufficiently familiar with the post-excavation role of the various categories of soil samples to be able to make informed decisions about sampling policy within broad guidelines drawn up by the excavation Director and staff of the Environmental Archaeology Unit. This should ensure an efficient and intelligent sampling programme, and continuity of sample recording. The completion of sample forms may seem a tedious chore on site, but an inadequately completed form may waste the time spent on the collection and processing of the sample. Inadequate documentation should automatically lead to the rejection of a sample for processing.

Second, it is strongly recommended that tighter guidelines on sample size should be laid down. The recent introduction of 10 litre plastic tubs for the collection of the relatively small 'general biological analysis' samples, primarily for arthropods and plant macrofossils, has done much to standardise the range of sample size for these samples. The huge range of bulk and riddled sample sizes at Fishergate was absurd. To reiterate, riddled samples varied from 5kg to 1271kg, and thus varied from samples of a small area of deposit to samples which merged material from many square metres of a large dump or ground surface. Large samples produce large residues, and these produce considerable logistical and 'sorter fatigue' problems. A maximum size should thus be established for bulk and riddled samples. Obviously, the optimum sample size at one site will be inappropriate for a sample of the very different sediments at another site. However, in an analysis of sample size and vertebrate taxon representation at various York sites (O'Connor 1987b), it was argued that a policy of taking more, smaller bulk samples would yield a better information return in terms of the distribution of small taxa, and a standard sample size for bulk samples of about 35kg was recommended. Reducing bulk samples to a maximum of 35kg would have one major advantage on site, if plastic dustbins are to continue to be used for the collection of bulk samples. The existing average of 50-60kg can be quite difficult to handle on site, particularly on a wet, muddy, uneven surface, whilst 35kg is well within the lifting ability of even a modestly fit adult.

Setting a maximum for riddled samples is more difficult because there is less accumulated experience. However, bearing in mind the logistical advantages of keeping the sample fairly small, it is suggested that in future any samples to be processed on a mesh of 10mm aperture or above should not exceed 150kg in weight. For very large deposits, this may require the taking of five or ten samples. These could be used as spatially-defined replicates, comparisons of which might yield useful information about heterogeneity within the deposit. A sample of 150kg of damp sediment should, in terms of on-site practicability, constitute about two wheelbarrow-loads, and in practice it would probably be sensible to adopt this convenient volumetric approximation as a maximum, rather than insisting on a precisely weighed standard. Similarly, three 10 litre tubs-full of sediment should provide a standard bulk sample of around 35kg, on the basis that most archaeological sediments have, when damp, a specific gravity in the range 1.0 to 1.5.

If a maximum sample size is to be set, then a minimum size is also advisable, although some circumstances might justify the processing of much smaller samples, such as a very high concentration of fish bones in a volumetrically small deposit. If the sieving programme is under informed day-to-day supervision, any such exceptions can be accommodated, and establishing a minimum sample size would certainly help to standardise procedures. A minimum of 20kg for bulk samples (i.e. two tubs-full) or 80kg for riddled samples (i.e. one wheelbarrow-load) would, at the present state of knowledge, seem to be a useful and practicable recommendation.

The third recommendation concerns the sorting procedure, and falls into two parts. The residue from one sample should not be subdivided for sorting, as this leads to bones (and other materials) from the sample becoming dispersed amongst the stored materials awaiting identification. Imposing a maximum sample size should, in any case, reduce the need to split up large residues for ease of handling. Recording and identification are greatly facilitated if all the bones from one sample are kept together, and the possibility of an odd bag of fragments being overlooked is reduced. Similarly, the practice of asking sorters to differentiate between fish bones and other bones cannot be recommended. The degree of error is sufficient to require the material to be checked through before the fish bones are handed on for identification in any case, so virtually no time is saved by this initial, inaccurate, segregation. Instead, sorters could be asked to make a simple size division between large and small pieces of bones. If this was defined in simple practical terms, such as defining a large bone as a piece which can easily be picked up with the fingers whilst a small bone requires manual dexterity or forceps, then a useful preliminary sorting of the material would have been obtained without requiring any taxonomic expertise on the part of those undertaking the sorting. The vulnerable small bones should be stored in rigid boxes or tubes, not in polythene bags.

Bone recovery by sieving has obvious advantages over collection by hand, and on sites such as 46-54 Fishergate, where an extensive sieving programme has been undertaken, the hand-collected bone assemblages must assume a very low priority indeed. However, it is important that the on-site sieving programme should not become a sort of 'sin-bin' for disaffected excavators, a wet, miserable duty to be shirked at all costs. Putting the management of the programme into the hands of one experienced person, who should, nonetheless, be answerable to the excavation Director, ought to remove many of the practical pitfalls. There remains the problem of getting the residues sorted, though narrowing the range of sample sizes ought to remove the syndrome of 'large residue lethargy'. Above all, there needs to be an acceptance by all parties, on and off the site, that there is a point to sieving, that it is an important part of the archaeological process, and that it must therefore be done properly if it is to be done at all.

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Context	Sample	F	AR	RIB	OMB	INDET
Bulk samples						
1075	225	87	40	9	121	880
1189	229	185	8	1	41	640
1270	384	174	8	2	79	1560
1273	389	47	-	-	18	240
1287	405	72	4	1	109	590
1292	383	81	4	1	46	1200
1926	1285	45	54	6	114	1720
1944	1310	60	12	2	128	1520
2501	1280	48	16	7	36	900
3378	773	35	45	1	54	230
4299	420	253	14	4	199	1760
4661	598	37	11	-	86	300
4847	993	724	32	12	271	710
4818	988	250	9	4	175	520
4869	999	59	17	2	115	430
4897	1043	700	-	-	149	420
4911	1044	170	11	3	171	1520
4913	1053	45	11	-	243	770
5715	1228	22	4	1	152	500
6019	238	121	3	1	23	480
	TOTAL	3215	303	57	2330	16890
Riddled samples						
2453	1207	-	-	-	214	300
2458	1221	1	-	-	108	130
3137	683	2	-	-	498	1000
3239	601	1	-	-	135	210
3337	733	-	-	-	86	255
3348	743	-	-	-	123	360
3351	747	-	-	-	239	725
4775	961	-	-	-	89	220
4847	998	1	-	-	520	660
4849	996	-	-	-	179	510
4851	995	2	-	-	602	1050
4876	1003	-	-	-	173	630
5319	1137	-	-	-	318	490
5446	1136	-	-	-	229	290
5447	1138	-	-	-	281	450
7097	782	-	-	-	184	600
8003	357	29	-	-	609	420
10004	538	1	-	-	27	85
10039	535	12	-	-	24	52
10214	906	-	-	-	185	440
	TOTAL	49	-	-	4823	9077
Totals as % of identified fragments						
Bulk samples		54.4	5.1	1.0	39.5	
Riddled samples		1.0	-	-	99.0	

Table 1. Comparison of the proportions of bone fragments in different size categories recovered from twenty bulk and twenty riddled samples from 46-54 Fishergate, York.
Key to columns: F = fish; AR = Amphibian + reptile; RIB = rodent + insectivore + bird (starling sized or smaller); OMB = other mammal and bird; INDET = unidentified.

SAMPLE FORM FOR USE BY YORK ARCHAEOLOGICAL TRUST

ENVIRONMENTAL ARCHAEOLOGY UNIT, UNIVERSITY OF YORK, YORK YO1 5DD. Tel: YORK 59861 ext. 5531

SITE NAME:	SITE CODE:	AREA:	CONTEXT NUMBER:	SAMPLE NUMBER:
50, BOOTHAM	1989.17	II	2468	37

SIZE OF SAMPLE: *Large polythene bag; Minigrip bag; Dustbin;*	WATER STATE: *Dry; Moist; Wet; Waterlogged*	ORGANIC CONTENT: *High; Medium; Low; Zero*
LENGTH OF TIME SAMPLED AREA EXPOSED: 1/2 hour	EVIDENCE OF MODERN BIOLOGICAL ACTIVITY: *Earthworm; Insects; Roots; Other*	DEGREE OF CONTAMINATION FROM OTHER CONTEXTS: *Heavy; Little; None*

MATERIALS DELIBERATELY EXCLUDED FROM SAMPLE: *Large stones; Brick/tile; Animal bone; Other*

REASON FOR SAMPLING:

☐ 1. GENERAL BIOLOGICAL ANALYSIS (Large bag 5-10kg)

☑ 2. BULK/WET SIEVING (At least 2 buckets full)
(Do not remove anything from samples taken for soil analysis or bulk sieving)

☐ 3. SOIL ANALYSIS (Small 20 x 20cm bag full 1kg)
Particle size analysis; Detailed description; Chemical analysis
(Endeavour to take a lump of soil rather than a bag of trowelled soil)

☐ 4. SPOT FIND FOR IDENTIFICATION
Insect fragment; Mollusc shell; Egg shell; Bone/s; Stone; Unknown material

☐ 5. SPECIAL TREATMENT
Radiocarbon dating; Pollen analysis; Parasite analysis
(Please take special care with samples for radiocarbon dating, avoid contamination from cigarette ash, petrol, fungicide, etc.)

RELATED SAMPLES FROM ADJACENT CONTEXTS: 36 from immediately overlying layer 2467

PARTICULAR INFORMATION REQUIRED FROM THE SAMPLE:
Function of feature - cess pit or rubbish or mixed?

SAMPLED BY: AKA Bloggs	DATE: 31st Aug '89.

NOTES: USE WHITE PLASTIC LABELS and WATERPROOF SPIRIT-BASED FELT-TIP BLACK MARKERS

If you have never used this form before consult EAU sheet "Notes on the Collection of Samples".

Soil description, including Munsell colour, should be noted on the context card

Use scrupulously clean equipment

USE THE REVERSE OF THIS FORM TO SKETCH THE LOCATION AND DIMENSIONS OF THE SAMPLE, USING SURROUNDING CONTEXTS AND FEATURES AS LANDMARKS

A.K.G.J. 6.79.

Fig. 1. "Dummy" sample form completed for a bulk sample from a mythical site, showing the degree of detail required, though not always obtained. Original size A4.

ENVIRONMENTAL ARCHAEOLOGY UNIT	LABORATORY RECORD SHEET	UNIVERSITY OF YORK

SITE NAME 50, BOOTHAM	SITE CODE 1989.17	AREA II	CONTEXT NO. 2468	SAMPLE NO. 37	SUBSAMPLE NO.
WASHED BY T. B. Jugg	DATE 1-12-89	TYPE OF FEATURE Latrine/refuse pit		SIZE OF WHOLE SAMPLE: *Very large* *Large* *Medium* *Small* *Very small*	
WEIGHT OF SUBSAMPLE 45 kg.		APPROX. VOLUME BEFORE WASHING 40 litre		APPROX. VOLUME AFTER WASHING 5 litre	

PREWASH NOTES Dark grey-brown organic silt, much bone and nut-shell visible

Do internal and external colours vary - How?

Dry Moist Wet Waterlogged

TREATMENT 5 kg. voucher kept. Rest bulk-sieved to 1 mm.

PARAFFINED BY

WASHOVER	P_1 f_1 f_2 f_3	P_2 f_1 f_2 f_3	P_3 f_1 f_2 f_3	P_4 f_1 f_2 f_3

WASHING NOTES Some clay lumps slow to disaggregate.

FLOAT SORTED BY	NUMBER OF DISHES

FLOAT SORT NOTES

RESIDUE SORTED BY	RESIDUE SORT NOTES
Ivor Forsipp	Lot of seeds in 1 to 2 mm. fraction. Masses of small bones.

Sorted wet Sorted dry

EVIDENCE OF CONTAMINATION Cig. end, splinter of plank.

SMALL FINDS, ETC. Short-cross penny

SENT TO YAT Cons. Lab. 7-12-89

Fig. 2. Laboratory Record sheet for the sample recorded in Fig.1. This sample has been bulk-sieved, then sorted. Note that the record sheet allows detailed recording of paraffin flotation for arthropod remains. Original size A4.

BONE SAMPLE SCAN SHEET.

SITE: 50 BOOTHAM   CONTEXT: 2468 s.37 - bulk.   PHASE/GROUP: post- Church pits + dumping see also 2467

	1	2	3	4	5	6
MODAL FRAGMENT SIZE (mm)	0-10	10-30	30-50	50-70	70-100	100+
SUBJECTIVE PRESERVATION	horrid	poor	mediocre	fair	good	excellent
ANGULARITY	battered	rounded	spiky	variable		
GNAWING	none	1-2 frags	a few	the majority		
AVERAGE COLOUR	white	fawn	ginger	mid-brown	dark-brown	black
FRESH BREAKS	none	few	some	many		

	cattle	sheep	pig	fowl	goose	OTHER BIRD	Mus	Rana					fish	INDET.
FRAGS.	57	110	12	10	3	2 *	2	10					75	≈500

ELEMENT	hc	sk	mx	mn	at	ax	cv	sc	hp	hd	rp	rd	ul	mcp	mcd	pe	fp	fd	tp	td	fi	mtp	mtd	as	cl	ph1	ph2	ph3	rib
cattle	1			2			5	2		2	1		1	2	4	1		1	1	4		3	1	4	1	3	2		9
sheep			2	1	1	2	7	1	1	3	1	1	2	1	1	4	5	3	2	7		1	1		1		1		10
pig			1				1			2				2	1									1					
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JAWS		
species	C	S
side	L	R
DP4		12
P4	12	
M1	14	10
M2	12	6
M3	11	2
sex		
LPC	+	+
LMC	+	+

EPIPHS	verts F	verts U	hp F	hp U	hd F	hd U	rp F	rp U	rd F	rd U	olec F	olec U	mcd F	mcd U	fp F	fp U	fd F	fd U	tp F	tp U	td F	td U	tubcal F	tubcal U	mtd F	mtd U	ph1 F	ph1 U
cattle	2	2			2	-	1	-					1	3			-	1			2	1	1	-			3	-
sheep	2	4			3	-	1	-	-	1	1	1	1	-	2	3	2	1	1	-	2	5						
pig					1	1							-	1														

NOTES.

* OTHER BIRD   prox. L tarsomet. Hirundo rustica
L. femur   small Scolopacidae indet.

MUS atlas, L. mandible adult.

RANA 5 vert., L+R femora not a pair, sphenethmoid, 2L tibiofibula - min 3 frogs.

Y/N Anything measured? Y
Y/N Anything retained? Y Mus + Rana bones. Fish → AJ.
weight identified 1032 gm
weight unidentified 877 gm

TPO'C 28.3.87

Fig. 3. Bone listing sheet for fragments recovered from the sample detailed in Figs. 1 and 2. Biometrical data are not listed on this form. Original size A4.