

Reports from the Environmental Archaeology Unit, York

**An evaluation of biological remains from excavations
at 44-45 Parliament Street, York (site code: 1994.3210)**

by

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Cluny Johnstone, Harry Kenward and Annie Milles
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Summary

Biological remains from a group of sediment samples, and hand-collected bone, all from deposits of 11th-13th century date, have been examined for their bioarchaeological potential.

Plant and invertebrate remains from a series of cut fills indicated that most of the deposits contained at least a small component of human faecal material, whilst some appeared to consist very largely of faecal concretions. One layer was probably a backfill of surface material.

Substantial numbers of very well preserved bones were recovered, representing a group with considerable interpretative value.

Both the deposits and the more delicate remains within them showed evidence of what has been interpreted as recently-initiated oxidation.

It is recommended that the biological remains are subjected to detailed study and that the deposits themselves are monitored both in situ and by means of further analysis to determine the cause and course of their decay.

Keywords: York, medieval, Parliament Street, plant remains, parasite eggs, insect remains, bones

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Introduction

Excavations at 44/45 Parliament Street, York in 1994 by York Archaeological Trust revealed a series of deposits of 11th to mid 13th century date. Clearance of the concrete floor-slab of the building within which the trench was cut revealed a substantial void and then a second slab overlying archaeological deposits. It appeared that the void had formed by settlement of the deposits beneath, and it was suggested that this settlement had resulted from decay of richly organic sediments.

Samples of sediment and some hand-collected bone from these deposits have been examined to evaluate their bioarchaeological potential.

Methods

Sediment samples

Twelve samples of sediment (seven GBAs and five BSs *sensu* Dobney *et al.* 1992) were submitted. All of the samples were inspected in the laboratory and a description of the lithology of each GBA sample was recorded using a standard *pro forma*. Subsamples of 1 kg were taken from the GBA samples for extraction of macrofossil remains, following procedures of Kenward *et al.* (1980; 1986). No further examination of the BS samples was undertaken for the present exercise.

Plant macrofossils were examined from both the residues and the 'flots' resulting from processing, while the flots alone were examined for invertebrate remains. Five of the 'GBA' samples were also examined for the eggs of parasitic nematodes using the 'squash' technique of Dainton (1992).

Bone

The bone recovered from these excavations consisted of a moderate-sized assemblage of hand-collected material, the contents of eight boxes (each box 31 x 31 x 22 cm). Most of the material came from deposits dated to the mid 11th to mid 13th centuries, with smaller quantities of bone from more tightly dated contexts of 11th to 12th century date. Bone from four contexts (1005, 1025, 1026 and 1032) was recorded in detail, whilst that from the remaining 15 contexts was scanned. These selected groups contained large quantities of bone and encompassed the main time periods represented at the site.

Spot samples

Four 'spot' samples (*sensu* Dobney *et al.* 1992) of wood fragments from Context 1010 (Samples 4, 5, 6 and 7) were also submitted and were examined cursorily. No further study of this material has been made.

Results

The sediment samples

The results of the investigations are presented in context number order, with information provided by the excavator in brackets. Those plant and invertebrate remains preserved by anoxic waterlogging generally appeared to be undergoing active decay; the evidence for, and significance of, this is discussed below.

Context 1006 [mid 11th century to mid 13th century - fill]

Sample 1

Moist, mid grey-brown, crumbly (working plastic), silty clay to clay silt. Mortar/plaster, brick/tile, charcoal and very rotted wood were present.

Most of the small residue consisted of sand with moderate amounts of brick/tile (to 20 mm) and charcoal (to 15 mm); there were traces of mortar, stones and bone (including fish bone), and decayed wood was present in all fractions in small amounts. Identifiable plant remains were sparse and poorly to moderately well preserved; most were seeds or fruits from weed taxa but there were some very slight hints that food remains, perhaps from faecal material, might formerly have been present. A few food taxa (fig, *Ficus carica* L., and perhaps also opium poppy, *Papaver somniferum* L.) were also recorded in the small flot. The presence of leaves of the peat-bog moss *Sphagnum imbricatum* Hornsch. ex Russ. is noteworthy.

About 30 beetle taxa were noted in the flot, together with a few other invertebrates. Some quite delicate remains had been preserved, but the fossils had a characteristic yellow or yellow-brown coloration, and appeared to be in the early stages of aerobic decay (resembling remains in some modern death assemblages seen by HK). There were numerous individuals of the grain pests *Oryzaephilus surinamensis* (L.) and *Sitophilus granarius* (L.). The abundance of the latter, which is normally the least numerous of the grain pests in archaeological assemblages, perhaps indicates that the remains originated in faeces, having been eaten with spoiled grain (*S. granarius* develops inside whole grains and is thus particularly likely to be ingested). A few water beetles were noted; these may have invaded an open pit but the rarity of other 'outdoor' forms may suggest that they were brought in water.

The material seen in the 'squash' was mostly inorganic with a large amount of organic detritus, some fungal hyphae (perhaps modern), a few diatoms and five *Trichuris* sp. (whipworm) eggs (one with both polar plugs).

This deposit appears to have contained some very poorly preserved human faecal material.

Context 1007 [mid 11th century to mid 13th century - fill]

Sample 2

Moist, mid grey-brown, crumbly (working slightly plastic), slightly sandy clay silt. Very small stones (2 to 6 mm), brick/tile, charcoal, wood and fragments of bone were present in the sample.

Cinder (to 30 mm) and charcoal (to 20 mm) made up a large proportion of the small residue, with sand the largest component of the finer fractions. Traces of bone and some small stones were present, with very decayed wood in all fractions. The concentration of identifiable plant remains was low and preservation was poor. The taxa present were mostly weeds, but toad-rush (*Juncus bufonius* L.), recorded in moderate numbers, suggests low-growing vegetation in damp or wet places, perhaps trampled paths with impeded drainage, whilst *Sphagnum imbricatum* leaves were again recorded, this time more frequently.

Arthropod remains were present in rather small numbers, with fly puparia the most abundant. The limited group of beetles consisted of species typical of urban deposits, but (subjectively) may have included a significant component of invaders of foul matter—with weak indications of material with the consistency of stable manure. The preservational condition of the insect remains was unusual.

The 'squash' yielded no parasite eggs; there was about 50% each of organic detritus and mineral sediment, with a few diatoms.

The balance of evidence suggests the presence of some rather foul organic matter in or near to the pit. The plant remains (including urban weeds) and low concentration of invertebrates may indicate that this deposit consisted of material taken from a ground surface and used to backfill the feature.

Context 1008 [mid 11th century to mid 13th century - fill]

Sample 3

The sample consisted mostly of concretions ranging in colour from yellow to orange-brown to dark brown to black with a matrix of moist, mid grey-brown, crumbly amorphous organic matter and silt. Pot, wood and fruitstones (embedded in the concretions) were also present.

The small residue included moderate amounts of faecal concretions (to 65 mm) and charcoal (to 15 mm); sand made up most of the finer fractions. There were also traces of pottery and mammal and fish bone and a little brick/tile (to 5 mm). Plant remains were sparse and preservation was moderately good to poor. Consistent with the presence of faecal concretions, the only moderately abundant identifiable plant remains were seed fragments of corncockle (*Agrostemma githago* L.), likely to have been an unavoidable contaminant of flour-based foods. The other taxa were mainly weeds of cultivated land or waste places and are of no interpretative significance.

Arthropod remains were rare and mostly rather decayed, being red-brown in colour.

The 'squash' showed mostly mineral grains with a large amount of organic detritus, a few fungal spores, diatoms and modern soil nematodes and three *Trichuris* sp. eggs.

There is no doubt that this deposit consisted largely of (human) faecal material preserved in a mineral matrix which formed around the remains *in situ*.

Context 1014 [11th to 12th century - fill]

Sample 8

Moist, mid grey-brown, plastic to sticky, silty clay with patches of very rotted organic matter. Brick/tile, rotted ?mortar/plaster, charcoal and wood were present.

The small residue contained moderate amounts of brick/tile (to 30 mm) and sand, with traces of charcoal, decayed wood, rotted mortar and bark. There were moderate numbers of identifiable plant remains whose state of preservation ranged from good to poor. Most notable were abundant fig seeds (whose generally good state of preservation reflects their resistance to decay); there were no other convincing 'foodplants' apart from some wheat/rye 'bran'

fragments and an opium poppy seed, the other taxa mostly being weeds, particularly seed fragments of corncockle. *Sphagnum imbricatum* leaves were again present.

The flot contained a rather small group of rather poorly preserved insects, mostly synanthropic species typical of post-Conquest material seen by HK. This being so, and in view of the evidence from plant remains for faeces, the specimens of *Sitophilus granarius* may well have originated in ingested food, in the way discussed for sample 1.

The 'squash' was mostly inorganic with some organic detritus, many fungal spores and three *Trichuris* sp. eggs.

It is likely that some faecal material was present in this deposit.

Context 1027 [fill]

Sample 14

Moist, mid to dark orange-brown, crumbly, amorphous organic sediment or very humic silt with abundant faecal concretions and some bird bone present.

The moderately large residue was dominated by fragments of faecal concretion (to 80 mm) with some fish bones; the finer fractions were mostly sand with a little wheat/rye 'bran'. Other plant remains were sparse and preservation ranged from poor to good. Only corncockle seed fragments were present in more than very small amounts. The taxa represented were mostly weeds with a few probable foodplants (including apple 'core' and seeds, a linseed (*Linum usitatissimum* L.) fragment, blackberry (*Rubus fruticosus* agg.) and hazel nutshell (*Corylus avellana* L.)).

The flot contained quite large numbers of insects, showing unusual preservation (indicated by the yellowish to dirty orange colour). Fly puparia were predominant, and it was estimated that in excess of 100 ?Sphaeroceridae were present. The beetles were a heterogeneous group including species associated with foul matter, human habitation and (in very small numbers) open-air habitats. Most of the beetles probably entered the pit accidentally or in search of breeding places, although unlike the flies none appear to have established breeding populations.

The 'squash' gave 14 *Trichuris* eggs, two of which retained one polar plug, the remainder none; preservation was poor. Otherwise, there was organic detritus with many mineral grains, and a few fungal hyphae (perhaps modern) were noted.

This was another deposit rich in human faecal material, though with generally poor preservation of plant and invertebrate macrofossils.

Context 1028 [11th to 12th century - fill]

Sample 15

Gingery-brown to dark brown (to black internally), brittle concretions.

There was a large residue from this subsample, most of it consisting of faecal concretions larger than 4 mm, and reaching a maximum of 40 mm. The finer fractions (especially the <0.3 mm), not surprisingly, were rich in wheat/rye 'bran' and there was some leek/onion (*Allium* sp.) leaf epidermis. Other components were restricted to a little fish bone and charcoal. Corncockle seed fragments were abundant (and there was some bird eggshell membrane representing another food component), but the few other plant remains were mainly from weed taxa.

Only a fraction of the large flots was examined for insect remains. Fly puparia were abundant but few beetles were seen. It seems likely that this deposit was either too foul for colonisation by beetles (some fly species being able in the immature stages to tolerate extremely vile conditions), or that burial was rapid.

The 'squash' was mostly organic detritus with many mineral grains, some plant tissue and fungal hyphae (perhaps modern) and twenty-three *Trichuris* sp. eggs.

There is no doubt that the bulk of this sample was faecal material.

Context 1030 [11th to 12th century - fill]

Sample 16

Moist, mid orange-grey-brown, crumbly, slightly silty amorphous organic sediment. Very small and small stones (2 to 20 mm), brick/tile, twigs, eggshell and fly puparia were present and faecal concretions were common in the sample.

The small to moderately large residue consisted predominantly of what appeared to be very rotted mortar or granular lime. The largest fragments were 20 mm but it was frequent or abundant in all fractions. There were moderate amounts of charcoal, too, the largest being 15 mm, with traces of pottery, bone and wood, and a single small (20 mm) fragment of faecal concretion. The small to moderate concentration of identifiable plant remains (which were in a poor to moderately good state of preservation) included some weed seeds and corncockle seed fragments and a few taxa which might represent wetland habitats. The single poorly preserved seed of opium poppy might have originated from a plant which was a weed or a foodplant. Two snails were also recorded (one *Vallonia pulchella* (Müller), one *Vallonia* sp.), of no interpretative significance.

Insects were numerous in the flots. The most abundant were fly puparia, but there was a group of beetles characteristic of rather foul decaying matter, together with some indicators of herbaceous vegetation. Two specimens of the bark beetle *Leperisinus varius* (Fabricius) were noted; this common species is generally found in ash (*Fraxinus*) and frequently imported in firewood. The most abundant beetle, however, was *Sitophilus granarius*, and this seems likely to have originated in faeces.

The 'squash' was mostly organic detritus with many mineral grains, a few fungal spores and hyphae (perhaps modern), thirteen *Trichuris* sp. eggs and one *Ascaris* sp. egg.

This appears to have been another faecal deposit. There were weak hints of an insect assemblage associated with stable manure (decomposers and plant-feeders which might have been brought with hay) but on balance the insects seem most likely to have been a mixture of invaders of human faeces with species originating on urban weeds.

Bone

Overall, preservation was recorded as excellent and numerous complete and measurable fragments were present. The bones were mostly dark brown in colour. The proportion of butchered fragments in the groups selected for detailed recording was relatively high (20-50%) and some of the cattle longbones had been split longitudinally. There was also evidence from the caprine remains of horncore removal, achieved by chopping through the base of the horncore. Few of the bones showed evidence of fresh breakage and dog gnawing, although gnawing attributable to cats was present on a small number of the domestic fowl fragments.

A total of 417 (weighing 13,887 g) identified and 608 (10,245 g) unidentified fragments were recorded. The bulk of these were identified as cattle-sized fragments (including 32 horncores and many shaft, rib and vertebra fragments), followed by sheep/goat, pig and domestic fowl (Table 1). A single horncore (Context 1025) and two juvenile metatarsals were identified as goat, an additional goat horncore being noted from the scanned material (1008).

In the quantified groups, a total of 130 measurable fragments were present, of which 46 were from cattle, 23 from caprines and 29 from domestic fowl. Twenty-one mandibles with teeth were also recorded.

The remains of Cervidae included red deer (*Cervus elaphus* L.) and fallow deer (*Dama dama* (L.)), both represented by single fragments (a distal metacarpal and a scapula fragment respectively) from Contexts 1005 and 1025. Other mammal species present included domestic cat and dog, as well as hare (*Lepus* sp.).

The remains of geese and ducks were also present in small numbers. Most of the geese fragments were from the larger species of grey geese (*Anser* spp.), although it was not possible to conclude whether they represented domestic or wild individuals. A single goose coracoid was consistent in size with the black geese (*Branta* spp.).

A goose humerus showed evidence (mid-shaft) of an unhealed fracture. Constant movement of the wing had prevented the fracture from re-fusing, producing a false joint.

Four of the duck fragments were identified as medium-sized individuals (*Anas* spp.) and could therefore be of wild or domestic stock. The remaining fragments were tentatively identified as tufted duck (*Aythya fuligula* (L.)) and teal (*Anas crecca* L.).

Also present were two fragments identified as raven (*Corvus corax* L., one from the scanned material), probably representing an urban scavenger.

Those fish remains recovered consisted of seven large gadid fragments identified as cod (*Gadus morhua* L.), plus single fragments of hake (*Merluccius merluccius* (L.)) and pike (*Esox lucius* L.). Conger eel (*Conger conger* (L.)) and flatfish (Pleuronectidae) fragments were present in the scanned material. The cod and flatfish fragments represent very large specimens. The marine species must have been transported to York from coastal fisheries, whilst the pike, a freshwater fish, may have been caught locally.

In addition to those species recorded from the four main contexts, a distal femur identified as crane (*Grus* sp.) was noted from the scanned material. Cranes were apparently more common in medieval England (Allison 1985) and have been found from a number of other medieval contexts in York and Lincoln. Cranes were mentioned in many medieval documents and were frequently served at feasts and banquets.

Discussion

Site interpretation

Most of the deposits from cuts which were examined were undoubtedly the remains of fills rich in human faeces, with a variable component of food remains, including wheat/rye 'bran', fruits (including sloes and figs), poppy seed, and leek/onion, as well as some fish bone. One layer appeared to have originated as backfill, perhaps from a surface deposit.

The larger bone groups came from deposits described as 'layers' and were very largely remains of animals that are likely to have been eaten. Evidence of butchery was abundant.

Grain beetles were present in several of the deposits, and quite abundant in two. It is notable that the grain weevil *Sitophilus granarius* was more common than usual in relation to the other regularly occurring storage pests (*Oryzaephilus surinamensis*) and *Cryptolestes ferrugineus* (Stephens)). *S. granarius* develops inside grains and is particularly likely to be eaten in grain-based food. It is suggested that these remains of grain pests entered with faeces. The remaining insects were a mixture of typical urban species associated with decaying matter ranging from dry to very foul, with some aquatics and open-air species which may have lived on weeds on the site. Beetles typically found inside buildings were present but (other than the grain pests) only in small numbers.

Preservational status of remains

As has been noted above, the more delicate organic remains in the samples analysed for plant and invertebrate remains showed strong evidence of oxidative decay. It is contended that such delicate remains would have disappeared completely had such decay continued over a long period. It is thus suggested that these remains had been preserved by anoxic waterlogging until recently and that some change in ground conditions within the last few decades (at most) has allowed the onset of decay. The most likely cause is a fall in groundwater levels, although another possibility is leaching of alkali from the concrete slab overlying these deposits.

These conclusions drawn from an examination of the fossils are strongly supported by direct observation of the samples of deposits. All of the deposits examined contained organic matter, in several cases in the form of

concretions familiar to us from previous excavations as being faecal in origin. Some of these concretions showed signs of oxidation, with voids and the softer-textured areas rather orange in colour. The matrix in which these were contained was soft and spongy in texture, reddish in colour, and will undoubtedly decay to dust very quickly with exposure. Several samples contained wood, and there were four 'spot' finds also of wood; this material was generally very soft on the outside with a brittle core which may have been the result of mineralisation. It is our contention that organic material in this condition could not possibly have survived for nearly a millennium. We have seen deposits in a somewhat similar condition on a few occasions, when we have suspected that there had been recent changes in ground conditions allowing the onset of decay. The present site offers very much the best case for such recently initiated decay, however. There are also strong similarities to some of the samples from 16-22 Coppergate, which were in good condition when excavated but had become distinctly soft and friable in storage, although in this case there was more limited colour change and oxidation of fossils.

Our preliminary examination of the samples thus appears to support the hypothesis of recent decay of richly organic deposits *in situ* generated on the basis of field observations. This can only be regarded as extremely alarming. Were the pattern to be repeated throughout the built-up parts of York, we might see the effective loss of the hugely valuable waterlogged deposit archive within a couple of decades. This would be an archaeological disaster of international proportions.

Statement of potential

Potential for site interpretation

Although the plant and invertebrate macrofossils appear to be undergoing decay, they still have considerable potential for reconstructing diet and living conditions at the site. The insect assemblages have some unusual characteristics which reinforce the desirability of carrying out detailed studies.

All but one of the *Trichuris* eggs seen were very poorly preserved. Consequently, there may be insufficient measurable eggs for the statistical analysis required for identification to species as a means of confirming the nature of the faecal material as human. Poorly preserved *Ascaris* sp. (maw-worm, the other common human gut parasite identifiable from archaeological deposits) eggs are difficult to identify and may be under represented in the records discussed above.

The high concentration of bone recovered from within such a small excavation area indicates the presence in the ground of a potentially large assemblage. Numbers of horncores, longbones ribs and vertebrae suggest a mixture of hornworkers' waste and domestic refuse.

The excellent preservation, tight dating framework, and large number of measurable fragments, make the animal bone assemblage of considerable interpretative and academic value.

Importance in relation to other sites in York

Few deposits of early post-Conquest date in York have been subjected to bioarchaeological analysis. A large corpus of material from 16-22 Coppergate (some 100 m to the south) awaits analysis, however. A small proportion of this post-Conquest material from Coppergate has been assessed, and preservation like that observed at 44-45 Parliament Street has not been encountered. Similarly, the upper layers of the site at Lloyds Bank, 6-8 Pavement (50 m to the south-east; Hall *et al.* 1983; Addyman and Hall 1991), in which preservation was not particularly good, showed no signs of a recent onset of oxidation; the fossils appeared to have decayed in antiquity and not by a route which left them with the characteristic colours seen in the material from the present site.

Potential for elucidation of wider issues

These deposits have a clear potential as subjects for a study of decay in urban archaeological deposits rich in organic matter, caused by human interference through building or other operations.

The plant and insect macrofossil assemblages have value as part of a wider synthesis of biological remains from the early post-Conquest period and for their implications for archaeological interpretation.

Few animal bone assemblages of post-Conquest and high medieval date have been studied from York. Small assemblages which have been reported include those from Skeldergate (O'Connor 1984) and General Accident (O'Connor 1988), whilst assessments exist for the material from Lawrence Street (Carrot *et al.* 1994) and North Street (Dobney and Jaques 1993). A large collection, dated to the post-Conquest period, was recovered from excavations at 16-22 Coppergate but has not been published; it would provide excellent comparanda from adjacent areas within the city.

Recommendations

It is possible that the deposits at this site are exceptional in some way, so that our interpretation of them as undergoing recently-initiated decay is incorrect. However, there seem to be no alternative hypotheses and it is necessary to proceed on the assumption that widely-held fears about the instability of organic deposits in the built-up environment are being realised. Naturally, it is extremely important to investigate these deposits further to establish in more detail the organic status and preservational quality of the material, and to determine (a) the stability of the deposits so far revealed, (b) the depth to which oxidation is occurring, and (c) whether there is progressive downward movement of the zone of oxidation.

It is recommended that a detailed study is made of the full range of biological remains in the samples already recovered and of the hand-collected bone groups.

It is very important that any of the deposits threatened by development are fully excavated and recorded to the highest standard, with provision for an appropriate strategy for sampling and analysis. The sampling regime would need to be more intensive for at least some of the deposits than that outlined by Dobney *et al.* (1992).

Long-term monitoring should be instigated, and this should include assessment of the preservational status of fossils as well as recording of ground conditions *in situ*.

Retention and disposal

All the unprocessed sediment should be retained and stored under the best possible conditions (subsamples, at least, being held in a cool-room). The bone should also be retained.

Archive

All extracted fossils from the test subsamples, and the residues and flots, are currently stored, together with raw sediment and bones in the Environmental Archaeology Unit, University of York, along with paper and electronic records pertaining to the work described here.

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Table 1. Hand-collected bone from recorded contexts (numbers in parentheses represent fragments from the scanned material).

Taxon		Total fragments	Total weight (g)	No. measurable	No. mandibles
<i>Bos</i> f. domestic	cattle	157	10,418	46	3
Caprine	sheep/goat	106	2054	23	12
<i>Sus</i> f. domestic	pig	49	974	6	6
<i>Cervus elaphus</i> L.	red deer	1	64	-	-
<i>Dama dama</i> (L.)	fallow deer	1	26	-	-
<i>Canis</i> f. domestic	dog	7	76	5	-
Canidae	dog family	3	14	-	-
<i>Felis</i> f. domestic	cat	5	27	1	-
<i>Lepus</i> sp.	hare	1	3	-	-
<i>Anser</i> spp.	grey goose	16	77	12	-
<i>Branta</i> spp.	black goose	1	12	-	-
<i>Anas</i> spp.	duck	4	6	4	-
<i>Anas crecca</i> L.	teal	1	1	1	-
cf. <i>Aythya fuligula</i> (L.)	?tufted duck	2	3	2	-
<i>Gallus</i> f. domestic	chicken	42	87	29	-
<i>Grus</i> sp.	crane	(1)	6	-	-
<i>Corvus corax</i> L.	raven	1(1)	3	1	-
Fish		14	36	-	-
Sub-total		411	13,887	130	21
Indeterminate bird		6	6	-	-
Unidentified		608	10,245	-	-
Sub-total		614	10,251	-	-
Total		1025	24,138	130	21