

Reports from the Environmental Archaeology Unit, York 94/46, 9pp.

**Assessment of biological remains from excavations
at two sites in Lincoln
(sitecodes: ZE87-8, ZE90 and ON362)**

by

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Summary

A series of samples from excavation at two sites in Lincoln (St Marks Station East and Gaunt Street) have been assessed for their content of biological remains. Many of the samples from the first stage of excavation at the former site gave evidence from plant and invertebrate remains for dumping of Roman occupation material rich in organic matter into water; most of this organic material was probably stable manure. One sample appeared to contain the remains of ash from burnt grass or straw.

Residues from samples from the later stage of excavation at St Marks Station were small and contained only very limited assemblages of biological remains, amongst them charcoal, wood, mammal and fish bone, mollusc shell and bird eggshell, indicating occupation waste but of little bioarchaeological value.

Of the two samples from Gaunt Street, the organic component of one had so far decayed that further analysis was not attempted; the other sample gave only limited amounts of plant and invertebrate remains of no interpretative value.

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9 September 1994

Assessment of biological remains from excavations at two sites in Lincoln (sitecodes: ZE87-8, ZE90 and ON362)

Introduction

Fifteen samples from two sites in Lincoln were submitted for an assessment of their content of biological remains and their potential for further bioarchaeological analysis. The material came from:

St Marks Station East

ZE87-8: Excavated between November 1987 and March 1988. 10 samples selected.

From the excavator's records, this was an area of marshland beneath the occupation deposits which covered the site in the early Roman period. There was some evidence for land stabilization in form of dumped layers. The samples dealt with here are from these layers and are dated to the mid-late 2nd century AD. Pertinent questions concern whether the deposits formed in a body of water such as a lake or a backfilling river channel or on marshy ground.

ZE90: Excavated February 1990 and processed by James Greig at the University of Birmingham. Three residues selected.

Similar archaeological questions to those for the material from *ZE87-8* are posed and the possibility of rising river levels.

ON362: Gaunt Street

A watching brief carried out in 1980. Two samples from test pits were selected.

Methods

A total of 10 'general biological analysis' samples (GBAs *sensu* Dobney *et al.* 1992) were selected for assessment of their

content of biological remains (nine from *ZE87-8* and one from *ON362*). In addition, three ready-processed residues from *ZE90* (sieved to 1 mm) were examined for larger plant and animal remains.

Seven of the samples (six from *ZE87-8* and one from *ON362*) were examined for eggs of parasitic nematodes using the 'squash' method of Dainton (1992). Other microfossils (e.g. phytoliths, diatoms, pollen and fungal spores) were also noted if present.

The GBAs were described in the laboratory using a standard *pro forma*. The 'test' samples selected were processed following methods outlined by Kenward *et al.* (1980; 1986).

Results

The results of the investigations are grouped by site and presented in context number order, with information from the excavator concerning context types in square brackets.

ZE87-8: St Marks Station East

Context 90

No sample number

GBA 0.25 kg

Wet, black, soft (working thixotropic) humic fine sand.

The tiny flots and small residue were dominated by unusual remains consisting of small (mostly 1-2 mm) flakes of plant epidermis apparently preserved by silicification. They all appeared to be grass stem/leaf epidermis (to judge from the epidermal cell configuration). This is most likely to represent ash from a fire. Otherwise, there was a small amount of sand and gravel to 10 mm and a little charcoal to 5 mm. (A microfossil 'squash' could not be made; the whole sample had been processed.)

Context 829 [Trench 3]*Sample B1*

GBA 0.5 kg

Moist mid-dark grey/brown unconsolidated to crumbly, humic, slightly silty sand with small pellets of silt present. Has the appearance of a river deposit.

The most frequent identifiable plant remains in the flot and residue were nutlets of sheep's sorrel (*Rumex acetosella* agg.), achenes of buttercup (*Ranunculus* Section *Ranunculus*) and leaves of *Sphagnum*. With them was a diverse mixture of remains from wetland, grassland and waste ground taxa with no particular group predominating. Traces of charred wheat (*Triticum*) spikelet fragments (glume bases and rachis segments) and a probable coriander (*Coriandrum sativum*) fruit indicate the presence of occupation waste (there was also a little charcoal to 15 mm, some of it rounded, suggesting a degree of erosion prior to deposition). The concentration of remains was quite high but preservation was moderate to poor.

The flot gave small numbers of rather pale insect remains. These were rather mixed in their ecological origins but gave hints of the presence of stable manure. The 2 kg subsample remaining would perhaps provide an interpretable assemblage.

The material revealed by the microfossil 'squash' was mostly organic detritus including some fragments of plant tissue with some fungal spores and diatoms and a few grains of quartz and some pollen.

Context 829 [Trench 3]*Sample B2*

GBA 0.5 kg

Moist, dark brown to dark grey (with paler patches), slightly layered to brittle, working crumbly, humic silty sand with fine and coarse herbaceous detritus. Wood and stones in the size range 2-60 mm were present

Fragments of wood to 40 mm (including some 'chips' bearing cut edges), gravel to 25 mm, woody and herbaceous detritus and sand made up the bulk of the residue. Identifiable plant remains included large numbers of chickweed (*Stellaria media*) seeds with small numbers of a variety of plants of grassland, wetland and waste ground habitats. There

were several taxa suggestive of cut vegetation like hay, though this was not a strongly expressed component. *Sphagnum* (bog moss) leaves were present; this may have been a further component of 'litter' of some kind, as for example in stable cleanings.

The flot contained a small group of invertebrates. There were abundant *Daphnia* ephippia and a variety of aquatic insects; deposition was doubtless aquatic. Terrestrial insects included a few decomposers, perhaps from synanthropic habitats. The remaining subsample of about 1.7 kg would give an assemblage just sufficient for interpretation (perhaps after being combined with the material processed for assessment).

The material revealed by the microfossil 'squash' was mostly organic detritus with some fungal spores and a few pollen grains and fungal hyphae.

Context 829 [Trench 3]*Sample B5*

GBA 0.5 kg

Moist, varicoloured humic, soft, working plastic silt to silty, crumbly, detritus peat (with wood).

The large flot and moderately large residue were dominated by rather well preserved remains of probable grassland plants, including hogweed (*Heracleum sphondylium*), carrot (*Daucus carota*), cat's-ear (*Leontodon*) and yellow-rattle (*Rhinanthus*). These, together suggest the incorporation into the deposit of cut (hay-like) vegetation, perhaps hay *per se* or stable manure. Also present were some plants of wetland habitats, most of which could have arrived with hay or grazed material from wet meadows and probably also in this category was a fruit of the salt-marsh plant sea arrow-grass (*Triglochin maritima*) which has been found in this kind of association in deposits of Roman and early medieval date from York and which is interpreted as coming in hay cut from salt-marsh meadows or brought 'on the hoof' in the guts of animals grazed in such a location and driven into the town within the necessary transit time between ingestion and defaecation. The presence of single shoots of two mosses—a *Polytrichum* species and *Leucobryum glaucum*—may point to the incorporation of material from peatland (cf. the *Sphagnum* leaves from other samples in this series).

There were many arthropod remains, often rather fragmentary. *Daphnia ephippia* were numerous and the insects included a few aquatics and some decomposers and other terrestrial forms. Some of the decomposers and a record of *Apion* sp. offer a weak hint of the presence of stable manure. The 2 kg subsample remaining would probably provide an interpretable assemblage, perhaps after being combined with the assessed material. Two snail shells were identified as *Bathyomphalus contortus*, a freshwater species.

The material revealed by the microfossil 'squash' was mostly organic detritus including plant tissue with large numbers of diatoms, fungal spores and hyphae and some pollen grains.

Context 847

Sample 0

GBA 0.5 kg

Moist, mid-dark brown to mid-dark grey, layered and compressed, working crumbly, fine silty sand with layers of coarse herbaceous detritus. The two components form layers.

The residue was rich in herbaceous detritus, some of it still in undisaggregated lumps. The identifiable remains were mostly well preserved and moderately abundant as an assemblage, though no one taxon was especially frequent; there were, however, several glume-bases of wheat (*Triticum*) preserved (rather unusually) by anoxic waterlogging and some grass/cereal culm (stem) fragments. These, together with several grassland taxa suggest the presence of hay and straw, the whole organic component perhaps consisting largely of stable manure or similar, though with some aquatics probably growing locally in the environment of deposition.

The flot contained a variety of insects, including immature stages, but numbers were small and the significance of the remains unclear. Deposition may have been aquatic. Remains of an unusual shieldbug require identification; in view of its presence, the remaining 0.7 kg should be processed, though interpretation of the resultant insect assemblage would remain subjective. No microfossil 'squash' was made for this sample.

Context 847 [Trench 3]

Sample A1

GBA 0.5 kg

Moist, buff to light grey to light brown, soft, slightly silty sand with occasional patches of black, reduced organic matter.

The moderately large residue consisted entirely of sand (there was one clast of gravel to 15 mm), with a trace of charcoal (about 1-2 cm) to 10 mm³. There were a few very decayed and fragmentary insect remains of no interpretative value.

The material revealed by the microfossil 'squash' was mostly inorganic. One fungal spore was seen.

Context 847 [Trench 3]

Sample A2

GBA 0.5 kg

Moist, dark grey/brown, brittle to slightly layered, crumbly, humic sandy silt with pale buff inclusions of highly calcareous clay silt. Stones in the range 2-60 mm present.

Nutlets of sheep's sorrel (*Rumex acetosella* agg.) were frequent in the flot and those of celery-leaved crowfoot (*Ranunculus sceleratus*) frequent in the residue. These plants seem unlikely to have grown together, so it is suggested that the sorrel was washed in from sandy well-drained soil into a wet place in which the crowfoot was growing. Most of the remaining rather poorly preserved plant remains offer little of interpretative value. Some occupation debris was certainly incorporated into this deposit, however, since there were traces of oyster shell to 15 mm and bird eggshell to 5 mm. Some very small and abraded snail shell fragments were present in the residue.

Other invertebrates included some aquatic and waterside species (in addition to beetles, there were abundant *Daphnia ephippia*), and a variety of terrestrial taxa, all decomposers. Several individuals of three *Aphodius* dung beetles were noted as being distorted, conceivably originating in bird pellets. These and some of the other beetles suggest very foul matter, possibly moist dung. The remaining subsample of 1.4 kg should just give an interpretable assemblage when combined with the material already processed.

The material revealed by the microfossil 'squash' was mostly inorganic with some diatoms, fungal spores and organic detritus.

Context 847 [Trench 3]

Sample A3

GBA 0.5 kg

Moist, light yellow grey/brown, brittle working soft and thixotropic, slightly silty sand.

The washover consisted mostly of fine root/rootlet fragments with moderate numbers of *Cenococcum* sclerotia and a trace of coal to 5 mm. The residue consisted entirely of sand. The rootlets and sclerotia probably point to the inwash of soil. No invertebrate remains were seen in the flot. No microfossil 'squash' was made for this sample.

Context 847/849 [Trench 3]

Sample 4

GBA 0.5 kg

Moist, mid-dark reddish grey/brown, soft, working plastic, humic silt with as little fine herbaceous detritus and pale brown sand. Some bluish/black to reddish brown patches of reduction.

The rather small residue consisted mainly of poorly preserved plant detritus, both woody and herbaceous, with some undisaggregated silt matrix (there was perhaps some concretion) and a little sand. There were rather low concentrations of identifiable plant remains in the flot and residue, the most frequent being achenes of celery-leaved crowfoot (*Ranunculus sceleratus*) and goosefoot (*Chenopodium* Section *Pseudoblitum*). These are likely to indicate drying mud with a high nutrient status, such as the environment at the water's edge where stock drink, or a ditch receiving organic waste. The few other taxa present with ecological implications were either aquatics or waterside plants, weeds or grassland plants. There was a trace of poorly preserved hazel (*Corylus avellana*) nutshell and a possible black mulberry (*Morus nigra*) seed, probably from occupation deposits (perhaps the waste which was increasing the nutrient status of the water).

A small group of insect and other invertebrate remains was recovered from the flot. Deposition was clearly in water (there were large numbers of cladocerans of four taxa, some water beetles and a few snails identified as *Planorbis planorbis*); in

addition to aquatics there were some waterside and terrestrial beetles. The remaining subsample of about 2 kg would probably provide an interpretatively useful assemblage.

The material revealed by the microfossil 'squash' was mostly organic detritus with some plant tissue and large numbers of diatoms and fungal spores.

ZE90: St Mark's Station East

The residues and flots were brought to the EAU ready-processed.

Context 1038 [Column 1]

Sample 5

Sample weight: 6.1 kg

Residue weight: 0.75 kg

The residue included small amounts of mollusc shell, fish and mammal bone, and avian eggshell.

Context 1050 [Column 1. Natural sand above natural gravels]

Sample 8

Sample weight: 7.7 kg

Residue weight: 0.35 kg

There were traces of wood and fish bone in the residue.

Context 1101 [Column 3. Slightly organic sand with molluscs]

Sample 26

Sample weight: 3.85 kg

Residue weight: 0.1 kg

The residue included a little charcoal.

Context 1118 [Column 3. Disturbed natural]

Sample 37

GBA 1 kg

C¹⁴ dating only

A sample of alder (*Alnus*) wood extracted from 4 kg of sediment from this layer was dated by radiocarbon assay by Beta Analytic Inc., Miami, Florida. The date obtained on this material was 2710±60 BP (calibrated: BC980-790, 2 sigma, 95% probability).

ON362: Gaunt Street

Context 104 [Test pit 1—orange sand, mid orange/brown silt/peat; organic mix and considerable horn (deposition/environment?, evidence of tanning?)]

No sample number

GBA 1 kg

Dark brown very humic sand with patches of pale pink-yellowish sand and flecks throughout the matrix of humic sand. Some modern, contaminant, algae present.

The small residue consisted largely of sand with a little angular gravel to 15 mm. Also present were traces (<1 cm³) of charcoal to 5 mm; small amounts of very fragmentary concreted sediment (?linings from root channels or worm burrows) were present, and there was a little mineralised wood in slivers to 30 mm. A few whole and fragmentary elderberry (*Sambucus nigra*) seeds were the only identifiable plant remains, and these, together with single specimens of poorly preserved sedge (*Carex* sp.), rush (*Juncus* sp.) and poppy (*Papaver* sp.) were the only plant remains present in the tiny flot. They are of no interpretative value, although this suite is characteristic of occupation deposits where preservation of plant macrofossils by anoxic waterlogging is minimal. Arthropod remains were absent.

The material revealed by the microfossil 'squash' was mostly organic detritus with some grains of quartz.

Context 106 [Test pit 2—Orange/grey sandy silt/clay with brown/black organic material and some shell (deposition/environment?).]

Sample 4

Light-mid grey/brown sandy silt with layers or lenses of dark brown (now very decayed) compressed humic material (probably herbaceous detritus, but now mostly amorphous organic detritus) with 2-6 mm stones and brick/tile present (in the silt only). Some modern, contaminant, algae present

No further action—the organic fraction had almost completely decayed to fine loose particles and the mineral sediment was probably not informative.

Discussion and statement of potential

Several of the samples contained well preserved (anoxic waterlogged) plant and invertebrate remains with clear potential for determining the nature of the material forming the deposits and the conditions of deposition. Assessment recording strongly suggests that much of the material was deposited in water and that it included some occupation waste, perhaps principally stable cleanings. (There was nothing to suggest the presence of human faeces; no intestinal parasite eggs were observed and food plants were rare and likely to have entered from sources other than faeces.) Open water may have been intermittent, although the pattern of invertebrates recorded may equally have resulted from the effects of pollution by the dumped material. These deductions are subjective at this stage and require confirmation through further analysis.

The subsamples processed for assessment were small (mostly 0.5 kg) in view of the very small overall size of the samples. The remaining material would need to be processed in most cases if interpretable assemblages of insects were to be recovered.

Recommendations

It is recommended that the plant remains from at least a selection of the samples (the four samples designated P1/P2+ for plant remains in Table 1) are recorded in detail. The material from the remaining sediment should be examined along with that already processed.

No further analysis for eggs of parasitic nematodes appears warranted. Given the mode of formation of the deposits and the nature of their other biological inclusions, analysis of pollen and diatoms does not appear to be worthwhile.

Selected material should be examined further for its content of insect remains (P1 and P2+ samples). It will be necessary to process the remaining sample material in

each in order to recover sufficient remains for interpretation.

Snails from material processed for insect remains should be recorded if the numbers are sufficiently great for the assemblages to be of interpretative value (this should be regarded as a contingency only).

Retention and disposal

All the material should be retained for the present.

Archive

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

Acknowledgements

The authors are grateful to Dr Alan Vince (City of Lincoln Archaeology Unit) for providing the samples and archaeological information.

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Appendix:

*Table 1. Times required for further processing and for recording plant and invertebrate remains from samples from ZE87-8, ZE90 and ON362. These times do **not** include data entry, analysis and report writing; they are used as a guide for estimating the total times required for further work. Key: P1—top priority...P3—low priority. P0—no remains.*

| Site | Context | Sample | Technician time for further processing | Priority and recording time: | | | |
|-------|---------|--------|--|------------------------------|-----------|--------------|-------------|
| | | | | plants | parasites | insects | snails |
| ZE88 | 90 | - | - | P1, 2 hrs | P0, 0 hrs | P0, 0 hrs | P0, 0 hrs |
| | 829 | B1 | 2 hrs | P1, 2 hrs | P0, 0 hrs | P1, 2 hrs | P0, 0 hrs |
| | 829 | B2 | 2 hrs | P2, 2 hrs | P0, 0 hrs | P2+, 1.5 hrs | P0, 0 hrs |
| | 829 | B5 | 2 hrs | P1, 2 hrs | P0, 0 hrs | P1, 1.5 hrs | P3, 0.5 hrs |
| | 847 | - | 2 hrs | P1/2, 2 hrs | P0, 0 hrs | P1, 1 hr | P0, 0 hrs |
| | 847 | A1 | - | P0, 0 hrs | P0, 0 hrs | P3, 0.25 hrs | P0, 0 hrs |
| | 847 | A2 | 2 hrs | P2/3, 2 hrs | P0, 0 hrs | P1, 2 hrs | P0, 0 hrs |
| | 847 | A3 | - | P0, 0 hrs | P0, 0 hrs | P0, 0 hrs | P0, 0 hrs |
| | 847/849 | 4 | 3 hrs | P2, 2 hrs | P0, 0 hrs | P2+, 1.5 hrs | P3, 0.5 hrs |
| ON362 | 104 | - | - | P3, 0.5 hrs | P0, 0 hrs | P0, 0 hrs | P0, 0 hrs |

Table 2. Time required for further work. Times include a component for ancillary tasks.

| Material/task | Staff | Time (hours) | Cost |
|--|---------------------------------|---------------|------|
| Process further subsamples | Technician | 15 | * |
| Sample databases, administration, storage, curation, etc. | | 4 | |
| Plant macrofossils: | RF1 | | * |
| Recording Data entry and analysis | | 11 11 | |
| Insect remains: | RF2 | | * |
| Recording Data entry and analysis | | 17 8 | |
| Snails | RF3 | | * |
| Contingency | | 4 | |
| Report writing (Technical report, including text for publication) | RF1 RF2 RF3 (contingency) | 17 17 2 | * |
| Consumables | | | * |