

**Technical Report: Plant and invertebrate remains
from excavations associated with renovations
at All Saints Church, Pavement, York (site code 95.47)**

by Allan Hall, Harry Kenward and John Carrott

Summary

Samples collected during excavation and piling consequent upon renovation of All Saints Church, Pavement, York, were submitted for assessment of their bioarchaeological value. Three samples of deposits thought to date to the time before the construction of the earliest known church and probably to the Anglo-Scandinavian period yielded plant and invertebrate assemblages of considerable interpretative value and were examined subsequently in more detail. They provide bioarchaeological evidence closely similar to that from deposits of Anglo-Scandinavian date from the south side of Coppergate, having good preservation of a rich variety of plant remains, with abundant wood and sometimes also bark, and the presence of remains of at least four plants interpreted as having been used in dyeing and mordanting of textiles. The insect assemblages were of limited size and variable preservation but probably accumulated through deposition of various materials in the open air.

The remaining samples, from grave/coffin fills from within the church, were almost barren except for the presence of some human bone in some instances.

Keywords: ALL SAINTS CHURCH; YORK; ENGLAND (NE); ANGLO-SCANDINAVIAN; MEDIEVAL; ?POST-MEDIEVAL; GRAVE FILLS; OCCUPATION DEPOSITS; MICROFOSSILS; PLANT REMAINS; INSECT REMAINS

Prepared by:

Environmental Archaeology Unit
University of York
Heslington
York YO10 5DD

For:

MAP Archaeological Consultancy Ltd.
39 Greengate
MALTON
N. Yorks YO17 0EL

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Introduction and methods

Excavations were undertaken by MAP Archaeological Consultancy Ltd. during 1995 within and to the south of All Saints Church, Pavement, York, during renovation and underpinning operations carried out with financial support from English Heritage. A series of small samples from test boreholes was submitted to the Environmental Archaeology Unit, University of York, in 1995 for assessment of their bioarchaeological value and an informal report compiled (included as an appendix to the assessment report, see below). A number of deposits from grave or coffin fills (from trenches) or from deposits apparently pre-dating the earliest church on the site (from pile-borings) were sampled by means of 'GBAs' (*sensu* Dobney *et al.* 1992) and these were assessed for their bioarchaeological potential in 1996 (Carrott *et al.* 1996). Latterly, further material from three of these samples (selected on the basis of the results of the assessment exercise) has been examined in more detail and it is the combined results of all these investigations that are presented in this report.

The GBAs have been examined by means of 'test' subsamples (Kenward *et al.* 1986), using either a 'flot' from paraffin flotation or a 'washover' to provide fractions for assessment of insect remains; in addition, one tubful of one of the samples (21) was 'bulk-sieved' to 0.5 mm. Two samples were described but not subjected to further analysis since they appeared very unlikely to contain interpretatively useful biological remains and it was necessary to constrain costs at the assessment stage.

Plant remains and other components were examined in the residues, flots and washovers; flots and washovers were checked for insect remains (which were also, to a limited extent, recovered from residues). 'Squashes' (*sensu*

Dainton 1992) were made on selected samples to check for the presence of microfossils, especially parasite eggs.

Results

The results of the various analyses of GBA samples are presented in context number order, with comments from the excavator in square brackets. The work undertaken is indicated by the paragraph headings 'Assessment' and 'Assessment and analysis'. Data are presented in Tables 1-6.

Context 2054 [fill of grave cut around articulated skeleton 2055; ?post-medieval; routine sampling of burial]

Sample 23: Mid grey-brown, unconsolidated sand with stones 2-60 mm present, together with some brick/tile fragments. A 1 kg 'test' subsample was processed and the excess material bulk-sieved to 1 mm.

Assessment: There was a large residue of sand, with some brick/tile and mortar and a trace of charcoal to 10 mm, and a little (?human) bone. The tiny washover (a few cubic centimetres at most) included traces of charcoal (<5 mm), bone and an elderberry (*Sambucus nigra*) seed, together with a few traces of invertebrate cuticle. The squash consisted of inorganic particles with a trace of organic detritus. No microfossils were observed.

Context 4133 [grave fill of complete articulated ?medieval skeleton 4138; routine sampling of fill]

Sample 20: Mid golden-grey-brown, unconsolidated, stony sand with stones 2-60+ mm and mortar/plaster present. A 1 kg 'test' subsample was processed.

Assessment: There was a large residue of sand and mortar with traces of gravel, brick/tile and charcoal (<10 mm); the very small flot contained

a few fragments of very decayed wood (<5 mm) and charcoal (<10 mm) and a single sedge (*Carex*) nutlet. There were no more than traces of invertebrate remains. The squash consisted mostly of inorganic particles, with a little organic detritus. Some silica bodies resembling phytoliths were noted, but the identification was not certain.

Context 4139 [clean sand bedding at base of grave on which nearly complete skeleton 4137 rested; only burial of this kind; routine sampling of grave fill]

Sample 22: Mid golden-brown, unconsolidated coarse sand with stones 6-60+ mm present, together with some large chunks of mortar/plaster. Not investigated further.

Context 4143 [fill of coffin around complete articulated ?medieval skeleton 4146; routine sampling of burial]

Sample 21: Mid grey, crumbly, unconsolidated sand with mortar/plaster and human bone present (a second tub: mid golden-brown, uncon-solidated sand with stones 20-60 mm, mortar/plaster, brick/tile, coal and large mammal bone present). A 1 kg 'test' subsample was processed.

Assessment: The large residue was of sand and mortar with some ?human bone, a trace of charcoal (<10 mm) and brick/tile; the tiny washover (a few cubic centimetres only) contained some charcoal and very decayed wood (<5 mm). There were a few fragments of a ?modern millipede but no other invertebrate remains were observed. The squash consisted primarily of inorganic particles, although there was some organic material. A few phytoliths were noted.

Context 4164 [material cut by earliest structure encountered; quite unlike other deposits recorded from within church, ?pre-church and Anglo-Scandinavian in date]

Sample 24: Dark grey-brown, crumbly, humic slightly sandy silt with patches of matted herbaceous detritus locally, iron-rich concretions (perhaps an iron object), charcoal, large mammal

bone and oyster shell fragments. A 1 kg 'test' subsample was processed.

Assessment: The small residue (of about 0.2 litres) consisted of about half its volume of organic material, mainly charcoal to 15 mm, with some very decayed wood to 15 mm; there was some bone and a few rather poorly preserved weed seeds. There was also a single charred fragment of a woody stem which may have been dyer's greenweed (*Genista tinctoria*), a plant recorded from some of the other pre-church deposits (see below). The tiny flot yielded a few seeds and invertebrate remains of no interpretative value. The lack of 'waterlogged' plant and insect remains is rather surprising given the presence of 'matted herbaceous detritus' observed in the raw sediment.

Context 4171 [thin lens beneath Context 4164 (see above); material cut by earliest structure encountered; ?pre-church and Anglo-Scandinavian in date; ?ash]

Sample 25: Light grey ash with darker patches of charcoal. Not investigated further.

Context 4172 [slightly laminated organic deposit sealed by Context 4171 (see above); material cut by earliest structure encountered; quite unlike other deposits recorded from within church, ?pre-church and Anglo-Scandinavian in date]

Sample 26: Dark grey (speckled light grey at mm scale), crumbly, soft, working just plastic, humic sandy silt with inclusions of herbaceous detritus, a slab of flaggy sandstone (with pale grey ash or mortar associated with it), charcoal, well decayed wood, large mammal bone and oyster shell fragments. Subsamples of 1 and 5.8 kg were processed.

Assessment and analysis: The residues of the combined subsamples consisted of about 2.5 litres of material of which about 40% by volume was organic—mainly decayed wood (to 30 mm) with some charcoal to 20 mm—and another 40% oyster shell with some bone. There was also some bark,

and amongst the wood fragments were chips from working of wood.

There was good evidence for a suite of plants associated with textile dyeing and which were common in Anglo-Scandinavian deposits at 16-22 Copper-gate, a little more than 20 metres to the south of the present site: moderate numbers of twig fragments of dyer's greenweed, plus traces of stem fragments of the clubmoss *Diphasium complanatum* and root fragments of madder (*Rubia tinctorum*). The tiny flot yielded several *Diphasium* fragments and some well preserved achenes of hop (*Humulus lupulus*). Other plants, mostly present in very low concentrations, were a mixture of weeds, wetland and food plants.

Insect remains were rather rare in the flot from the 1 kg assessment subsample, but it was considered that an interpretable fauna would be recovered from a much larger subsample. In the event, 5.8 kg processed for analysis produced only about twice as many insect fragments as were recorded from the initial subsample, probably at least in part as the result of presence of a large volume of oyster shell and wood. Although this group would not be out of place amongst the assemblages from Anglo-Scandinavian Coppergate (Kenward and Hall 1995), it had no clear character. It is notable that, although the material from the first subsample was described as showing 'good to moderate preservation', the remains in the second were 'rather decayed and very fragmented', probably suggesting that the sample was heterogeneous (decay during storage is considered unlikely in this case).

Other material, presumably from occupation, recorded in the residue included charcoal, apple (*Malus*) endocarp (core fragments), mammal bone, mortar, oyster shell fragments, and pottery.

Context 5012 [from pile-hole 5, 12.25 m OD; organic silt from under first church, ?Anglo-Scandinavian]

Sample 28: Dark grey, crumbly (working just plastic), humic, slightly sandy clay silt with

mortar/plaster and large mammal bone present. Two separate subsamples of 1 kg were processed.

Assessment and analysis: There was a moderately large combined residue (of about 0.7 litres) of which about two-thirds by volume was organic: charcoal (to 20 mm), bark (to 50 mm) and decayed wood fragments (to 20 mm); the wood included some ?modern pale conifer wood. Small numbers of generally well preserved seeds were present, mostly probably from weed taxa; however, there were also some achenes of hop, a capsule fragment of flax/linseed (*Linum usitatissimum*), and fragments of dyer's greenweed and clubmoss stem and madder root. There was a single charred ?wheat (*Triticum*) grain and one well-preserved oat (*Avena*) grain. A quite long list of other plant taxa was recorded (Table 2), most of them weeds, though with some heather, food plants (hazelnut, apple endocarp) and a moderately wide range of mosses, most of which were types widely recorded at 16-22 Coppergate. The residue also contained some charcoal fragments, some (unusually) bearing a blue residue (presumably vivianite); the rest of the residue comprised sand with some mortar, brick/tile, mammal bone, gravel and pottery. The tiny flots contained a few rather poorly preserved seeds, including more hop achenes, and further rare fragments of *Diphasium*.

There were moderate quantities of insect remains in the flot from the first subsample, both adults and immatures. Most were of species associated with decomposing matter, and this component was subjectively very similar to many groups recorded from Anglo-Scandinavian deposits at 16-22 Coppergate. There were also two *Helophorus* water beetles, doubtless 'background fauna' elements. Of the more abundant taxa, *Acritus nigricornis* (4 individuals) is associated with somewhat foul, decaying matter, and *Anotylus nitidulus* (3) probably exploited similar conditions. *Xylodromus concinnus* (4) was probably associated with rather drier material. It is regarded as typical of 'house fauna' assemblages and the presence of such a component was supported by single individuals of a few other taxa. The second subsample gave remains showing good preservation. The assemblage was not very similar

to that from the first subsample, the most abundant beetles being *Trox scaber* (3), *Carpelimus fuliginosus* (also 3), and *C. ?bilineatus* (4). There was probably somewhat foul decaying matter at the point of deposition but no clear interpretation can be offered. Again, there were house fauna elements, including a single human flea, *Pulex irritans*.

Context 5015 [from pile-hole 6; 12.25 m OD; dark organic deposit under foundations of first church, ?Anglo-Scandinavian date]

Sample 27: Dark grey, crumbly, humic, slightly sandy silt with patches of fine herbaceous detritus locally, and charcoal, wood and large mammal bone all present. Subsamples of 1 kg and 0.8 kg were processed.

Assessment and analysis: Of the moderately large residue (of about 1 litre), about three-quarters was decayed wood, including well-preserved wood chips (to 35 mm), and two large fragments of vertebrate (a butchered cow bone and a red deer antler fragment) which made up about 10-15% of the volume of the smaller subsample; other debris included *Diphysium complanatum* and *Genista tinctoria* stem fragments and *Rubia* root. There was only a low concentration of rather poorly preserved seeds, though a quite wide range of plant taxa was present, including weeds, grassland forms (perhaps from hay and/or stable manure), food plants and wetland taxa. No one group predominated. Overall the assemblage was reminiscent of some of the floor deposits from 16-22 Coppergate. The remainder of the residue comprised sand and gravel with a little bone, pot and mortar.

The two squashes carried out showed approximately equal quantities of inorganic and organic particles; there were several 'grass-type' phytoliths and diatoms and a few fungal spores.

The tiny flot (a few cubic centimetres at most) from the first subsample was mainly of fine herbaceous detritus. Moderately well preserved invertebrate remains were present in modest numbers and, although the species composition

was different from that seen in Sample 28, they, too, constituted an assemblage typical of Anglo-Scandinavian deposits. Subjectively there was a 'house fauna' component, with which a puparium of the sheep ked *Melophagus ovinus* should be included, doubtless having originated in wool cleaning. Slightly foul conditions were indicated. A single honey bee (*Apis mellifera*) first hind tarsal segment was also noted.

The second subsample produced only rather few insect remains, the fauna having some subjective differences from that of the first in that there were hints of rather fouler material. There were traces of house fauna, including a human flea.

Context 5116 [from pile-hole 36, material of a kind not encountered in other holes or in excavations, ?pre-church, ?domestic]

Sample 29: Mid grey-brown, soft silty clay sand with stones 6-60 mm, ?human bone, and a lump of tufa making up about one-third of the sample. A 1 kg 'test' subsample was processed.

Assessment: The moderately large residue (about 0.5 litres) was essentially of sand with some gravel, mortar, brick/tile, ?human bone, charcoal (<10 mm). Some of the tufa was dissolved in dilute hydrochloric acid to check for the presence of identifiable remains trapped within its matrix but it was not productive. The small washover (a few cubic centimetres only) was of charcoal (to 5 mm) and very decayed wood (also to 5 mm), with a few rather poorly preserved seeds of no interpretative value. There were no more than traces of invertebrates.

Tufa of the kind observed from this pile-hole was recorded as 'spot' finds on several occasions during excavation of Anglo-Scandinavian deposits at 16-22 Coppergate (Kenward and Hall 1995, 719, 750). Its origin is unknown, though formation within the built-up town is suspected, perhaps in association with limestone buildings.

Discussion

Three of the samples examined during assessment (from Contexts 4172, 5012 and 5105) were considered to have potential for worthwhile bioarchaeological analysis and were selected for further investigation via additional subsamples. For the plant remains, the additional material provided confirmation of the nature of the assemblages and, inherently also reinforced the belief that the material was of Anglo-Scandinavian date: the assemblages contained a diversity of taxa including traces of plants likely to have been used in textile dyeing and mordanting (of the kinds discussed by Kenward and Hall 1995). Wood (including chips from woodworking) and bark were also important, as in many of the Coppergate samples.

The results of the insect analyses also served to underline the typical 'Anglo-Scandinavian' character of the biota, but unfortunately in two cases the quantity of material remaining for processing was small and in the third the large additional subsample examined produced a disproportionately small number of remains by comparison with the assessment subsample. The insects thus gave only limited information about local ecology; it may be stated that none of the groups showed a strong character and that they probably represent external accumulations. To an extent, this is supported by the weak subjective similarity of the fauna from Sample 28 to some assemblages recorded at the nearby site at 5-7 Coppergate (Hall *et al.* 1983) and regarded as reasonably certainly having formed on a damp surface in the open air. The presence of human fleas in two of the samples is by no means incompatible with this; fleas seem to have been deposited in small numbers fairly widely on sites of this period and there was a range of 'house fauna' suggesting scattering or dumping of floor material. Similarly, a single honey bee does not provide evidence of bee-keeping, but is consistent with the numerous records of honey bees a few metres away at 16-22 Coppergate.

The grave/coffin fills examined were not productive of plant and invertebrate remains although there was some human bone.

Archive

All paper and electronic archive material pertaining to the work described here is stored, together with the remaining unprocessed sediment and any residues, flots or washovers, at the Environmental Archaeology Unit, University of York.

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Table 1. Complete list of plant taxa recorded from All Saints Church, Pavement, York, in taxonomic order; nomenclature follows Tutin et al. (1964-90) for vascular plants and Smith (1978) for mosses .

<i>Diphasium complanatum</i> (L.) Rothm.	complanate clubmoss	shoot fragment(s)
<i>Betula</i> sp(p).	birch	fruit(s)
<i>Corylus avellana</i> L.	hazel	charred nut(s) and/or nutshell fragment(s)
<i>Corylus avellana</i> L.	hazel	nut(s) and/or nutshell fragment(s)
<i>Humulus lupulus</i> L.	hop	achene(s)
<i>Urtica dioica</i> L.	stinging nettle	achene(s)
<i>U. urens</i> L.	annual nettle	achene(s)
<i>Polygonum aviculare</i> agg.	knotgrass	fruit(s)
<i>P. hydropiper</i> L.	water-pepper	fruit(s)
<i>P. persicaria</i> L.	persicaria/red shank	fruit(s)
<i>P. lapathifolium</i> L.	pale persicaria	fruit(s)
<i>Bilderdykia convolvulus</i> (L.) Dumort.	black bindweed	fruit(s)
<i>Rumex acetosella</i> agg.	sheep's sorrel	fruit(s)
<i>Rumex</i> sp(p).	docks	fruit(s)
<i>Chenopodium album</i> L.	fat-hen	seed(s)
<i>Atriplex</i> sp(p).	oraches	seed(s)
<i>Stellaria media</i> (L.) Vill.	chickweed	seed(s)
<i>Spergula arvensis</i> L.	corn spurrey	seed(s)
<i>Agrostemma githago</i> L.	corncockle	seed(s), seed fragment(s)
<i>Silene</i> cf. <i>alba</i> (Miller) Krause in Sturm	?white campion	seed(s)
<i>Ranunculus</i> Section <i>Ranunculus</i>	meadow/creeping/bulbous buttercup	achene(s)
<i>R. sardous</i> Crantz	hairy buttercup	achene(s)
<i>R. flammula</i> L.	lesser spearwort	achene(s)
<i>Thlaspi arvense</i> L.	field penny-cress	seed(s)
<i>Coronopus squamatus</i> (Forskål) Ascherson	swine-cress	fruit(s)
cf. <i>C. squamatus</i>		seed(s)
<i>Brassica rapa</i> L.	'turnip'	seed(s)
<i>Brassica</i> sp(p).	cabbages, etc.	seed(s)
<i>Raphanus raphanistrum</i> L.	wild radish	pod segments and/or fragment(s)
<i>Reseda luteola</i> L.	weld/dyer's rocket	seed(s)
<i>R. lutea</i> L.	wild mignonette	seed(s)
<i>Rubus fruticosus</i> agg.	blackberry/bramble	seed(s)
<i>Potentilla</i> cf. <i>erecta</i> (L.) Rauschel	?tormentil	achene(s)
<i>Malus sylvestris</i> Miller	crab apple	endocarp
<i>Prunus spinosa</i> L.	sloe	fruitstone(s)
Leguminosae	pea family	pod(s) and/or pod fragment(s)
<i>Genista tinctoria</i> L.	dyer's greenweed	stem fragment(s), twig epidermis fragment(s)
cf. <i>G. tinctoria</i>		charred stem fragment(s), pod fragment(s)
<i>Vicia faba</i> L.	field bean	charred seed(s)
<i>Linum usitatissimum</i> L.	cultivated flax	capsule fragment(s)
<i>Aethusa cynapium</i> L.	fool's parsley	mericarp(s)
<i>Calluna vulgaris</i> (L.) Hull	heather, ling	bud(s)
cf. <i>C. vulgaris</i>		charred root and/or twig fragment(s)
<i>Galium</i> sp(p).	bedstraws, etc.	fruit(s)
<i>Rubia tinctorum</i> L.	dyer's madder	root fragment(s)
<i>Marrubium vulgare</i> L.	white horehound	nutlet(s)
<i>Galeopsis</i> Subgenus <i>Galeopsis</i>	hemp-nettles	nutlet(s)
<i>Prunella vulgaris</i> L.	selfheal	nutlet(s)
<i>Lycopus europaeus</i> L.	gipsywort	nutlet(s)
<i>Sambucus nigra</i> L.	elder	seed fragment(s), seed(s)

<i>Carduus/Cirsium</i> sp(p).	thistles	achene(s)
<i>Centaurea</i> sp(p).	knapweeds, etc.	achene(s)
<i>Sonchus asper</i> (L.) Hill	prickly sow-thistle	achene(s)
<i>Lapsana communis</i> L.	nipplewort	achene(s)
<i>Juncus bufonius</i> L.	toad rush	seed(s)
Gramineae	grasses	charred and waterlogged caryopsis/es
Cerealia indet.	cereals	charred caryopsis/es
<i>Triticum</i> sp(p).	wheats	charred caryopsis/es
<i>Hordeum</i> sp(p).	barley	charred caryopsis/es
<i>Avena</i> sp(p).	oats	charred caryopsis/es
<i>Scirpus lacustris</i> sensu lato	bulrush	nutlet(s)
<i>Eleocharis palustris</i> sensu lato	common spike-rush	nutlet(s)
<i>Carex</i> sp(p).	sedges	nutlet(s)

Mosses (all leaf/leaves and/or shoot fragment(s))

<i>Sphagnum</i> sp(p).
<i>Leucodon sciuroides</i> (Hedw.) Schwaegr.
<i>Neckera crispa</i> Hedw.
<i>N. complanata</i> (Hedw.) Hüb.
<i>Homalia trichomanoides</i> (Hedw.) Br. Eur.
<i>Thuidium</i> cf. <i>tamariscinum</i> (Hedw.) Br. Eur.
<i>Scorpidium scorpioides</i> (Hedw.) Limpr.
<i>Calliergon giganteum</i> (Schimp.) Kindb.
<i>C.</i> cf. <i>giganteum</i> (Schimp.) Kindb.
<i>Homalothecium sericeum</i> (Hedw.) Br. Eur./ <i>H. lutescens</i> (Hedw.) Robins.
<i>Brachythecium</i> sp(p).
<i>Hypnum</i> cf. <i>cupressiforme</i> Hedw.
<i>Rhytidiadelphus</i> sp(p).

Calliargon cf. giganteum	1		Chenopodium album	2
Calluna vulgaris (b)	1		wood chips	2 max. size 35 mm
Carex sp(p).	1		Aethusa cynapium	1
Centaurea sp(p).	1		Agrostemma githago (sf)	1
cf. Calluna vulgaris			antler fgts	1 max. size 70 mm
(ch rt-tw fgts)	1		Atriplex sp(p).	1
cf. Coronopus squamatus	1		bark fgts	1 max. size 20 mm
Chenopodium album	1		beetles	1
Coronopus squamatus (fr)	1		Betula sp(p).	1
Corylus avellana	1		bone fgts	1 max dim. 110 mm
Corylus avellana (ch)	1		Brachythecium sp(p).	1
Diphasium complanatum	1		Brassica sp(p).	1
earthworm egg caps	1		brick/tile	1 max. size 20 mm
Eleocharis palustris sl	1		burnt bone fgts	1 max. size 10 mm
fish bone	1		Calliargon giganteum	1
fly puparia	1		Carduus/Cirsium sp(p).	1
Galeopsis Subgenus Galeopsis	1		Carex sp(p).	1
Genista tinctoria (st fgts)	1		Cerealina indet.	1
gravel	1	max. size 25 mm	charcoal	1 max. size 15 mm
grit	1		Compositae (inv br)	1
Homalothecium sericeum/ lutescens	1		Corylus avellana	1
Humulus lupulus	1		Corylus avellana (ch)	1
Hypnum cf. cupressiforme	1		Diphasium complanatum	1
Lapsana communis	1		earthworm egg caps	1
leather fgts	1	max. size 2 mm	eggshell fgts	1 max. size 2 mm
Leguminosae (pods/fgts)	1		Eleocharis palustris sl	1
Leucodon sciuroides	1		fish bone	1 max. size 3 mm
Linum usitatissimum			fish scale	1
(caps fgts)	1		fly puparia	1
Lycopus europaeus	1		Galeopsis Subgenus Galeopsis	1
Malus sylvestris (endo)	1		Galium sp(p).	1
mortar	1		Genista tinctoria (st fgts)	1
Neckera complanata	1		glassy slag	1 max. size 2 mm
Neckera crispa	1		Gramineae	1
oyster shell fgts	1	max. size 5 mm	gravel	1 max. size 20 mm
Polygonum aviculare agg.	1		grit	1
Polygonum hydropiper	1		herbaceous detritus	1
Polygonum lapathifolium	1		Hordeum sp(p).	1
Polygonum persicaria	1		Humulus lupulus	1
Potentilla cf. erecta	1		Hypnum cf. cupressiforme	1
pottery	1	max. size 15 mm	Lapsana communis	1
Prunella vulgaris	1		leather fgts	1 max. size 10 mm
Ranunculus flammula	1		Leguminosae (pods/fgts)	1
Ranunculus sardous	1		marine mollusc shell fgts	1 max. size 5 mm
Ranunculus Sect. Ranunculus	1		Marrubium vulgare	1
Raphanus raphanistrum			mortar	1 max. size 5 mm
(pod segs/fgts)	1		Neckera complanata	1
Reseda luteola	1		oyster shell fgts	1 max. size 10 mm
Rhytidadelphus sp(p).	1		Polygonum aviculare agg.	1 very small type
Rubia tinctorum	1		Polygonum lapathifolium	1
Rumex acetosella agg.	1		Polygonum persicaria	1
Rumex sp(p).	1		pottery	1
Sambucus nigra	1		Prunella vulgaris	1
Scorpidium scorpioides	1		Ranunculus flammula	1
Sonchus asper	1		Ranunculus Sect. Ranunculus	1
Stellaria media	1		Reseda lutea	1
Thlaspi arvense	1		Rubia tinctorum	1
Triticum sp(p).	1		Rubus fruticosus agg.	1
wood chips	1	max. size 15 mm	Sambucus nigra	1
			sand	1
			Scorpidium scorpioides	1
			Silene cf. alba	1
			Spergula arvensis	1
			Sphagnum sp(p). (lvs)	1
			Stellaria media	1

Context 5015, Sample 27/T (1.8 kg)

wood fgts 3 max. size 35 mm

Thuidium cf. tamariscinum	1
Urtica dioica	1
Urtica urens	1
Vicia faba	1

Context 5116, Sample 29/T

sand	3	
?human bone	1	
brick/tile	1	
Carex sp(p).	1	
charcoal	1	max. size 10 mm
marine mollusc shell fgts	1	
mortar	1	
Sambucus nigra	1	
tufa	1	
Urtica dioica	1	
wood fgts	1	very dec. fragments

*Coleoptera sp. (larva) u

*Insecta sp. (larva) u

ARACHNIDA

*Aranae sp. u

*Acarina sp. u

Table 4. Main statistics for assemblages of adult beetles and bugs (excluding aphids and scale insects) from samples from All Saints Church, York, rounded to nearest whole figure. For explanation of abbreviations, see Table 5. Where alpha = 0 there were too few remains for a meaningful value to be calculated.

Context	4172	4172	5012	5012	5015	5015	Whole site
Sample	26	26	28	28	27	27	
Ext	/T(1)	/T(2)	/T(1)	/T(2)	/T(1)	/T(2)	
S	11	20	42	38	38	21	89
N	12	20	56	49	45	21	203
ALPHA	0	0	76	77	113	0	60
SEALPHA	0	0	22	25	45	0	7
SOB	2	6	9	9	7	3	23
PSOB	18	30	21	24	18	14	26
NOB	2	6	9	11	7	3	38
PNOB	17	30	16	22	16	14	19
ALPHAOB	0	0	0	0	0	0	25
SEALPHAOB	0	0	0	0	0	0	8
SW	0	1	2	0	1	1	3
PSW	0	5	5	0	3	5	3
NW	0	1	2	0	1	1	5
PNW	0	5	4	0	2	5	2
ALPHAW	0	0	0	0	0	0	0
SEALPHAW	0	0	0	0	0	0	0
SD	1	1	4	4	1	1	9
PSD	9	5	10	11	3	5	10
ND	1	1	6	6	2	1	17
PND	8	5	11	12	4	5	8
ALPHAD	0	0	0	0	0	0	0
SEALPHAD	0	0	0	0	0	0	0
SP	0	0	3	3	3	0	8
PSP	0	0	7	8	8	0	9
NP	0	0	3	3	3	0	9
PNP	0	0	5	6	7	0	4
ALPHAP	0	0	0	0	0	0	0
SEALPHAP	0	0	0	0	0	0	0
SM	0	0	0	0	0	0	0
PSM	0	0	0	0	0	0	0
NM	0	0	0	0	0	0	0
PNM	0	0	0	0	0	0	0
ALPHAM	0	0	0	0	0	0	0
SEALPHAM	0	0	0	0	0	0	0
SL	0	1	1	1	2	1	2
PSL	0	5	2	3	5	5	2
NL	0	1	1	1	2	1	6
PNL	0	5	2	2	4	5	3
ALPHAL	0	0	0	0	0	0	0
SEALPHAL	0	0	0	0	0	0	0
SRT	6	11	23	19	25	11	88
PSRT	55	55	55	50	66	52	99

Context	4172	4172	5012	5012	5015	5015	Whole site
Sample	26	26	28	28	27	27	
Ext	/T(1)	/T(2)	/T(1)	/T(2)	/T(1)	/T(2)	
NRT	7	11	34	27	32	11	122
PNRT	58	55	61	55	71	52	60
ALPHART	0	0	32	29	52	0	141
SEALPHART	0	0	11	12	21	0	27
SRD	1	4	7	5	5	0	22
PSRD	9	20	17	13	13	0	25
NRD	2	4	7	6	8	0	27
PNRD	17	20	13	12	18	0	13
ALPHARD	0	0	0	0	0	0	54
SEALPHARD	0	0	0	0	0	0	26
SRF	2	1	2	2	3	3	13
PSRF	18	5	5	5	8	14	15
NRF	2	1	2	3	3	3	14
PNRF	17	5	4	6	7	14	7
ALPHARF	0	0	0	0	0	0	0
SEALPHARF	0	0	0	0	0	0	0
SSA	1	10	17	13	21	12	36
PSSA	9	50	40	34	55	57	40
NSA	1	10	26	21	27	12	97
PNSA	8	50	46	43	60	57	48
ALPHASA	0	0	22	15	45	0	21
SEALPHASA	0	0	9	6	21	0	3
SSF	0	6	10	6	12	6	18
PSSF	0	30	24	16	32	29	20
NSF	0	6	13	12	17	6	54
PNSF	0	30	23	24	38	29	27
ALPHASF	0	0	0	0	0	0	10
SEALPHASF	0	0	0	0	0	0	2
SST	1	2	6	5	7	5	14
PSST	9	10	14	13	18	24	16
NST	1	2	12	7	8	5	35
PNST	8	10	21	14	18	24	17
ALPHAST	0	0	0	0	0	0	9
SEALPHAST	0	0	0	0	0	0	2
SSS	0	2	1	2	2	1	4
PSSS	0	10	2	5	5	5	4
NSS	0	2	1	2	2	1	8
PNSS	0	10	2	4	4	5	4
ALPHASS	0	0	0	0	0	0	0
SEALPHASS	0	0	0	0	0	0	0
SG	0	0	0	0	0	0	0
PSG	0	0	0	0	0	0	0
NG	0	0	0	0	0	0	0
PNG	0	0	0	0	0	0	0
ALPHAG	0	0	0	0	0	0	0
SEALPHAG	0	0	0	0	0	0	0

Table 5. Abbreviations for ecological codes and statistics used for interpretation of insect remains in text and tables. Lower case codes in parentheses are those assigned to taxa and used to calculate the group values (the codes in capitals). See Table 3 for codes assigned to taxa from All Saints Church, York. Indivs - individuals (based on MNI); No - number.

No taxa	S	Percentage of RT taxa	PSRT
Estimated number of indivs (MNI)	N	No RT indivs	NRT
Index of diversity (α)	alpha	Percentage of RT indivs	PNRT
Standard error of alpha	SE alpha	Index of diversity of RT component	alpha RT
No 'certain' outdoor taxa (oa)	SOA	Standard error	SEalphaRT
Percentage of 'certain' outdoor taxa	PSOA	No 'dry' decomposer taxa (rd)	SRD
No 'certain' outdoor indivs	NOA	Percentage of RD taxa	PSRD
Percentage of 'certain' outdoor indivs	PNOA	No RD indivs	NRD
No OA and probable outdoor taxa (oa+ob)	SOB	Percentage of RD indivs	PNRD
Percentage of OB taxa	PSOB	Index of diversity of the RD component	alphaRD
No OB indivs	NOB	Standard error	SEalphaRD
Percentage OB indivs	PNOB	No 'foul' decomposer taxa (rf)	SRF
Index of diversity of the OB component	alphaOB	Percentage of RF taxa	PSRF
Standard error	SEalphaOB	No RF indivs	NRF
No aquatic taxa (w)	SW	Percentage of RF indivs	PNRF
Percentage of aquatic taxa	PSW	Index of diversity of the RF component	alphaRF
No aquatic indivs	NW	Standard error	SEalphaRF
Percentage of W indivs	PNW	No synanthropic taxa (sf+st+ss)	SSA
Index of diversity of the W component	alphaW	Percentage of synanthropic taxa	PSSA
Standard error	SEalphaW	No synanthropic indivs	NSA
No damp ground/waterside taxa (d)	SD	Percentage of SA indivs	PNSA
Percentage D taxa	PSD	Index of diversity of SA component	ALPHASA
No damp D indivs	ND	Standard error	SEALPHASA
Percentage of D indivs	PND	No facultatively synanthropic taxa	SSF
Index of diversity of the D component	alphaD	Percentage of SF taxa	PSSF
Standard error	SEalphaD	No SF indivs	NSF
No strongly plant-associated taxa (p)	SP	Percentage of SF indivs	PNSF
Percentage of P taxa	PSP	Index of diversity of SF component	ALPHASF
No strongly P indivs	NP	Standard error	SEALPHASF
Percentage of P indivs	PNP	No typical synanthropic taxa	SST
Index of diversity of the P component	alphaP	Percentage of ST taxa	PSST
Standard error	SEalphaP	No ST indivs	NST
No heathland/moorland taxa (m)	SM	Percentage of ST indivs	PNST
Percentage of M taxa	PSM	Index of diversity of ST component	ALPHAST
No M indivs	NM	Standard error	SEALPHAST
Percentage of M indivs	PNM	No strongly synanthropic taxa	SSS
Index of diversity of the M component	alphaM	Percentage of SS taxa	PSSS
Standard error	SEalphaM	No SS indivs	NSS
No wood-associated taxa (l)	SL	Percentage of SS indivs	PNSS
Percentage of L taxa	PSL	Index of diversity of SS component	ALPHASS
No L indivs	NL	Standard error	SEALPHASS
Percentage of L indivs	PNL	No uncoded taxa (u)	SU
Index of diversity of the L component	alphaL	Percentage of uncoded indivs	PNU
Standard error	SEalphaL	No indivs of grain pests (g)	NG
No decomposer taxa (rt + rd + rf)	SRT	Percentage of indivs of grain pests	PNG

Table 6. Species lists in rank order for invertebrate macrofossils from samples from All Saints Church, York. For each sample assemblage the adult Hemiptera (bugs) and Coleoptera (beetles) are listed first, followed by the remaining invertebrates (*). Weight is in kilogrammes; n = minimum number of individuals; ec = ecological codes; sq = semi-quantitative (e = estimate; - = fully quantitative, m = 'many', translated as 15 individuals; s = several, translated as 6). For translation of ecological codes, see Table 5.

Context: 4172 Sample: 26/T(1) ReM: S
Weight: 1.00 E: 0.00 F: 0.00

Notes: One dish flot, few insects other than pupae. Recorded in flot and on filter paper. Preservation good to moderately good.

	n	sq	ec
Atomaria sp.	2	-	rd
Cercyon sp.	1	-	u
Catops sp.	1	-	u
Xylodromus ?concinnus	1	-	rt-st
Platystethus arenarius	1	-	rf
Platystethus cornutus group	1	-	oa-d
Stenus sp.	1	-	u
Gyrophypnus sp.	1	-	rt
Staphylininae sp.	1	-	u
Aphodius granarius	1	-	ob-rf
Orthoperus sp.	1	-	rt
*Diptera sp. (pupa)	15	m	u
*Diptera sp. (puparium)	6	s	u
*Acarina sp.	1	-	u

Context: 4172 Sample: 26/T(2) ReM: S
Weight: 5.80 E: 0.00 F: 0.00

Notes: One dish flot, rather few insects. Recorded in flot and on filter paper; remains to tube. Fossils rather decayed and very fragmented. Some modern Nematocera adults

	n	sq	ec
Carabus nemoralis	1	-	oa
Pterostichus ?melanarius	1	-	ob
Ochthebius sp.	1	-	oa-w
Omalium caesum or italicum	1	-	rt-sf
Xylodromus ?concinnus	1	-	rt-st
Carpelimus pusillus group	1	-	u
Platystethus nitens	1	-	oa-d
Anotylus complanatus	1	-	rt-sf
Stenus sp.	1	-	u
Staphylininae sp.	1	-	u
Falagria or Cordalia sp.	1	-	rt-sf
Aphodius sp.	1	-	ob-rf
Lycetus linearis	1	-	l-sf

Cryptophagus sp.	1	-	rd-sf
Atomaria sp.	1	-	rd
Lathridius minutus group	1	-	rd-st
Corticaria sp.	1	-	rt-sf
Typhaea stercorea	1	-	rd-ss
Aglenus brunneus	1	-	rt-ss
Curculionidae sp.	1	-	oa
*Diptera sp. (pupa)	15	m	u
*Acarina sp.	6	s	u
*Diptera sp. (puparium)	6	s	u
*?Melophagus ovinus	1	-	u
*Siphonaptera sp.	1	-	u
*Diptera sp. (larva)	1	-	u
*Lepidoptera sp. (pupa)	1	-	u

Context: 5012 Sample: 28/T(1) ReM: S
Weight: 1.00 E: 0.00 F: 0.00

Notes: One dish flot; recorded in flot and on filter paper, remains to tube.

	n	sq	ec
Acritus nigricornis	4	-	rt-st
Xylodromus concinnus	4	-	rt-st
Anotylus nitidulus	3	-	rt-d
Cercyon ?nalis	2	-	rt-sf
Carpelimus bilineatus	2	-	rt-sf
Carpelimus pusillus group	2	-	u
Anotylus complanatus	2	-	rt-sf
Neobisnius sp.	2	-	u
Philonthus sp. A	2	-	u
Conomelus anceps	1	-	oa-p
Clivina ?fossor	1	-	oa
Helophorus aquaticus or grandis	1	-	oa-w
Helophorus sp.	1	-	oa-w
Histerinae sp.	1	-	rt
Omalium caesum or italicum	1	-	rt-sf
Omalium sp.	1	-	rt
Coprophilus striatulus	1	-	rt-st
Carpelimus fuliginosus	1	-	st
Platystethus arenarius	1	-	rf
Platystethus ?degener	1	-	oa-d
Anotylus rugosus	1	-	rt
Philonthus sp. B	1	-	u

Staphylininae sp.	1	-	u
Aleocharinae sp. A	1	-	u
Aleocharinae sp. B	1	-	u
Aleocharinae sp. C	1	-	u
Pselaphidae sp.	1	-	u
Trox scaber	1	-	rt-sf
Aphodius sp.	1	-	ob-rf
Cyphon sp.	1	-	oa-d
Anobium punctatum	1	-	l-sf
Ptinus sp.	1	-	rd-sf
?Kateretes sp.	1	-	oa-p-d
Cryptophagus scutellatus	1	-	rd-st
Cryptophagus sp. A	1	-	rd-sf
Cryptophagus sp. B	1	-	rd-sf
Atomaria sp. A	1	-	rd
Atomaria sp. B	1	-	rd
Lathridius minutus group	1	-	rd-st
Corticaria sp.	1	-	rt-sf
Aglenus brunneus	1	-	rt-ss
Chaetocnema ?concinna	1	-	oa-p
*Acarina sp.	6	s	u
*Diptera sp. (puparium)	6	s	u
*Coccoidea sp.	2	-	u
*Coleoptera sp. (larva)	2	-	u
*Aculeata sp.	1	-	u
*Chalcidoidea sp.	1	-	u
*Hymenoptera Parasitica sp.	1	-	u
*Proctotrupoidea sp.	1	-	u
*Heteroptera sp. (nymph)	1	-	u
*Diptera sp. (pupa)	1	-	u

Context: 5012 Sample: 28/T(2) ReM: S
Weight: 1.00 E: 0.00 F: 0.00

Notes: One dish flot, preservation good. Recorded in flot and on filter paper, remains to tube. A modern mite noted. List includes some remains from residue ex ARH. Piece of ??weevil cuticle to own tube

	n	sq	ec
Carpelimus ?bilineatus	4	-	rt-sf
Carpelimus fuliginosus	3	-	st
Trox scaber	3	-	rt-sf
Platystethus degener	2	-	oa-d
Anotylus nitidulus	2	-	rt-d
Aphodius granarius	2	-	ob-rf
Ptinus ?fur	2	-	rd-sf
Saldidae sp.	1	-	oa-d
Clivina ?fossor	1	-	oa
?Laemostenus terricola	1	-	ss
Acritus nigricornis	1	-	rt-st
Histerinae sp.	1	-	rt
Omalium sp.	1	-	rt

Carpelimus pusillus group	1	-	u
Anotylus rugosus	1	-	rt
Stenus sp.	1	-	u
Leptacinus sp. A	1	-	rt-st
Leptacinus sp. B	1	-	rt-st
Gyrophypnus sp.	1	-	rt
Neobisnius sp.	1	-	u
?Philonthus sp.	1	-	u
Staphylininae sp. A	1	-	u
Staphylininae sp. B	1	-	u
Aleocharinae sp. A	1	-	u
Aleocharinae sp. B	1	-	u
Euplectini sp.	1	-	u
Aphodius sp.	1	-	ob-rf
Anobium punctatum	1	-	l-sf
Kateretes sp.	1	-	oa-p-d
Cryptophagus sp.	1	-	rd-sf
Atomaria sp. A	1	-	rd
Atomaria sp. B	1	-	rd
Lathridius minutus group	1	-	rd-st
Corticaria sp.	1	-	rt-sf
Aglenus brunneus	1	-	rt-ss
Phyllotreta nemorum group	1	-	oa-p
Apion sp.	1	-	oa-p
Curculionidae sp.	1	-	oa
*Acarina sp.	15	m	u
*Pulex irritans	1	-	ss
*Aranae sp.	1	-	u
*Cladocera sp. F (ephippium)	1	-	oa-w
*Syrphidae sp. (larva)	1	-	u
*Diptera sp. (puparium)	1	-	u

Context: 5015 Sample: 27/T(1) ReM: S
Weight: 1.00 E: 0.00 F: 0.00

Notes: Two-dish flot, preservation moderately good, though some fossils rotted. Recorded in flot and on filter paper, remains to tube

	n	sq	ec
Cryptophagus sp. B	3	-	rd-sf
Cercyon ?nalis	2	-	rt-sf
Carpelimus ?bilineatus	2	-	rt-sf
Anotylus nitidulus	2	-	rt-d
Trox scaber	2	-	rt-sf
Lathridius minutus group	2	-	rd-st
Cimicidae sp.	1	-	oa-p
Clivina ?fossor	1	-	oa
Pterostichus ?melanarius	1	-	ob
Helophorus aquaticus or grandis	1	-	oa-w
Cercyon analis	1	-	rt-sf
Cryptopleurum minutum	1	-	rf-st
Xylodromus concinnus	1	-	rt-st

Coprophilus striatulus	1	-	rt-st	Carpelimus ?bilineatus	1	-	rt-sf
Carpelimus fuliginosus	1	-	st	Carpelimus fuliginosus	1	-	st
Carpelimus pusillus group	1	-	u	Carpelimus pusillus group	1	-	u
Platystethus arenarius	1	-	rf	Carpelimus sp.	1	-	u
Anotylus complanatus	1	-	rt-sf	Platystethus ?degener	1	-	oa-d
Anotylus rugosus	1	-	rt	Oxytelus sculptus	1	-	rt-st
Oxytelus sculptus	1	-	rt-st	Neobisnius sp.	1	-	u
Gyrohypnus sp.	1	-	rt	Philonthus sp.	1	-	u
Xantholininae sp.	1	-	u	Falagria or Cordalia sp.	1	-	rt-sf
Neobisnius sp.	1	-	u	Aleocharinae sp.	1	-	u
?Crataraea suturalis	1	-	rt-st	Euplectini sp.	1	-	u
Aleocharinae sp.	1	-	u	Trox scaber	1	-	rt-sf
Aphodius sp.	1	-	ob-rf	Aphodius sp.	1	-	ob-rf
Anobium punctatum	1	-	l-sf	Anobium punctatum	1	-	l-sf
Ptinus sp.	1	-	rd-sf	Tenebrio obscurus	1	-	rt-ss
Lyctus linearis	1	-	l-sf	*Pulex irritans	1	-	ss
Omosita discoidea	1	-	rt-sf	*Acarina sp.	1	-	u
Cryptophagus sp. A	1	-	rd-sf	*Cladocera sp. (ephippium)	1	-	oa
Atomaria sp.	1	-	rd				
Orthoperus sp.	1	-	rt				
Corticaria sp.	1	-	rt-sf				
Aglenus brunneus	1	-	rt-ss				
Tenebrio obscurus	1	-	rt-ss				
Halticinae sp.	1	-	oa-p				
Apion sp.	1	-	oa-p				
*Acarina sp.	15	m	u				
*Diptera sp. (pupa)	15	m	u				
*Coccoidea sp.	6	s	u				
*Diptera sp. (puparium)	6	s	u				
*Hymenoptera Parasitica sp.	3	-	u				
*Proctotrupoidea sp.	3	-	u				
*Coleoptera sp. (larva)	2	-	u				
*Apis mellifera	1	-	u				
*Cladocera sp. F (ephippium)	1	-	oa-w				
*Diptera sp. (adult)	1	-	u				
*Siphonaptera sp.	1	-	u				
*Insecta sp. (larva)	1	-	u				
*Melophagus ovinus (puparium)	1	-	u				

Context: 5015 Sample: 27/T(2) ReM: S

Weight: 0.80 E: 0.00 F: 0.00

Notes: One dish flot, preservation fairly good but some fossils rather fragmented. Recorded in flot and on filter paper, remains to tube

	n	sq	ec
Helophorus sp.	1	-	oa-w
Cercyon ?nalis	1	-	rt-sf
Cercyon ?terminatus	1	-	rf-st
Cercyon ?unipunctatus	1	-	rf-st
Omalium ?rivulare	1	-	rt-sf
Xylodromus concinnus	1	-	rt-st