

Technical Report: Environment, land use and activity at a medieval and post-medieval site at North Bridge, Doncaster, South Yorkshire

by

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Summary

*The results of analyses of plant, invertebrate and vertebrate remains from a large number of deposits of medieval and post-medieval date from excavations at North Bridge, Low Fisher Gate, Doncaster, are described. Many deposits gave very few remains, though there was a consistent background of charred plant material, including cereal grains and small twig fragments which were probably heather (*Calluna vulgaris*). Shoot fragments and leaves of this plant were also regularly recorded and with them remains of plants thought likely to represent the remains of burnt turves. In some other cases, there were charred or uncharred leaf fragments of the saw-sedge (*Cladium mariscus*), perhaps most likely to have been used for thatching.*

Many deposits contained small groups of fish bones and these, and some of the plant remains such as hazel nuts, are interpreted as 'snack' foods consumed by people working, but probably not living, at the site.

*A few contexts gave rich and well preserved assemblages of plant and animal remains, notably several of the fills of a large pit dated to the 15th/16th centuries in which the layers rich in organic remains were found to include concentrations, in one case, of willow twigs, and in another of abundant twigs and shoots of heather and gorse (*Ulex*). The insect assemblages from the more richly organic levels in this feature pointed to the likely presence of a body of water in the pit—it may have functioned as a pond or reservoir—but also to quantities of herbivore dung in the surroundings. There is a strong possibility that animals were kept, at least from time to time, in the vicinity. It is also very likely that flooding brought sediment and biological remains into the pit. In the upper most layers of the pit there were concentrations of bones interpreted as waste from small-scale carcase or hide preparation (indicating that the 'pond' was used to dump waste at least in its later stages of use) whilst concentrations of cattle horncores from other features almost certainly represent waste associated with one of several craft activities.*

Many layers at the site gave resting bodies (statoblasts) of bryozoans, and other aquatic organisms were intermittently present, indicating a continuing contribution of sediment from flooding.

Although biological remains were rather localised at this site, the strategy of intensive sampling using 'General Biological Analysis' samples backed up by a broad survey of material in the laboratory and the use of larger-than-usual subsamples for analysis of plant and invertebrate macrofossils, has provided much useful information.

Keywords: DONCASTER; NORTH BRIDGE SITE; LOW FISHER GATE; MEDIEVAL; POST-MEDIEVAL; PLANT REMAINS; INVERTEBRATES; MICROFOSSILS; INSECTS; BRYOZOANS; BONES; CHARCOAL; OCCUPATION DEPOSITS; ASH; OVERBANK DEPOSITS; FLOODING; TURF; ROOFING; THATCH; BUTCHERY; HORNWORKING

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Introduction

Deposits of 12th century to post-medieval date from a riverside site at North Bridge in Low Fisher Gate, Doncaster, were excavated under the direction of Jane Lilley (JML) in the latter part of 1993 and early 1994, prior to the development of a new circulatory road system on the north side of the town. The stratigraphic sequence consisted largely of traces of stone buildings with associated floors and hearths, and yard areas to the rear, and with a few cut features including at least two very large pits. Preservation of plant and animal material other than charcoal was often rather sparse but, on the basis of a preliminary assessment (Carrott *et al.* 1994) it was considered profitable to pursue further bio- and geoarchaeological analyses to address questions concerning the nature and mode of formation of the deposits and to characterise evidence for activities and aspects of the daily life of the inhabitants of the area.

Sampling and laboratory methods

The sampling strategy adopted was to retain separate 'general biological analysis' (GBA) and 'bulk sieving' (BS) samples (*sensu* Dobney *et al.* 1992) from all substantial contexts (and in the early stages a few 'site-riddled' (SR) samples were also recovered and processed). These samples provided the material for analysis of plant and invertebrate remains and also yielded controlled samples of bone. In addition, bone was recovered by hand-collection during excavation. Further samples of small concentrations of particular kinds of biological remains or of unusual sediments were taken as 'spot' samples. In choosing material for processing and examination, the authors have been very largely guided by JML.

Processing of most of the BS samples was undertaken on site using 1 mm meshes for residue and washover, although many of the samples were not fully disaggregated and these, and any samples of unprocessed BS material, were sieved latterly at the EAU. Unfortunately, no record of the weights of BS samples was made at the time of sampling, though for those samples processed in the laboratory weights were recorded prior to sieving. Both 'washovers' and residues from BS samples were examined, though for the most part components other than artefacts and bone were not sorted in their entirety—rather, representative subsamples were removed for identification and recording. In a few cases, there was a record of sorting of plant remains but the material picked out could not be located at the time identifications were made; these cases are noted individually in the text. No attempt was made to identify charcoal systematically; here, too, a representative selection has been examined during the identification process.

For the GBA samples, the 1 kg 'test' subsamples used for the assessment exercise were found to yield only very small amounts of biological material, mostly charred plant remains. To provide larger assemblages, 3 kg subsamples were used in most cases for the main post-excavation analysis reported here, using a 'washover' (Kenward *et al.* 1980) where it appeared that no more than a trace of uncharred plant or invertebrate material was present. For the rest, paraffin flotation (*ibid.*) was used to recover invertebrate macrofossils; flots, washovers and wet or dry residues were all checked for plant remains and other components.

Plant remains from 'test' samples were recorded on a semi-quantitative four-point scale of abundance (from 1—one or a few individuals or fragments, or a minor component of the sample, to 4—abundant individuals or fragments, or a major component of the sample). For plant material from the BS samples,

a three-point scale was used ('few', 'some', 'many'). Material was identified using reference collections in the EAU and standard reference works. For recent accounts of interpretative methods employed in the Environmental Archaeology Unit for plant macrofossil assemblages, see Hall and Kenward (1990) and Kenward and Hall (1995).

Insects were identified by comparison with modern reference material and using the standard works. Adult beetles and bugs, other than aphids and scale insects, were recorded fully quantitatively and a minimum number of individuals estimated on the basis of the fragments present. In one case, numbers of a very abundant taxon were estimated more crudely. Other invertebrate macrofossils were recorded semi-quantitatively using the scale described by Kenward *et al.* (1986) and Kenward (1992), again using estimates for extremely abundant taxa.

Data pertaining to both plant and invertebrate remains were recorded directly or transferred from a paper record to computer databases (using Paradox software) for analysis and long-term storage.

In total, 54 boxes (each box approximately 19 litres) of animal bones (including both SR and hand-collected material) were recovered from the excavations. Only material from 14 selected contexts was recorded, amounting to approximately 37 boxes. Twenty-seven of these contained bone from just two contexts (1001, 1404). Bone from the SR samples from the chosen contexts was mostly present in small amounts and has not been included in the calculations of numbers of fragments in the data tables (see Appendix). Vertebrate remains were selected for recording from individual contexts where fifty or more fragments were present or, in particular cases, on the basis of information supplied by the excavator.

Vertebrate data were recorded electronically directly into a series of tables using a purpose-built graphical input system and *Paradox* software. Briefly, semi-subjective, non-quantitative data were recorded for the material from each context regarding the state of preservation, colour, and the appearance of broken surfaces ('angularity'). Additionally, semi-quantitative information was recorded for each context concerning fragment size, dog gnawing, burning, butchery and fresh breaks. Identification was carried out using the reference collections of the Environmental Archaeology Unit. Detailed recording of the assemblage followed the protocol outlined by Dobney *et al.* (forthcoming). Selected elements ('A' bones) were recorded using the diagnostic zones method described by Dobney and Rielly (1988). Remaining elements which could be identified to species ('B' bones) were merely counted. Other fragments, (classified as 'unidentified') were, where possible, grouped into categories: large mammal (assumed to be horse, cow or large cervid), medium-sized mammal (assumed to be sheep, pig or small cervid) and bird. As well as counts of fragments, total weights were recorded for all identifiable and unidentifiable categories.

Caprovid tooth wear stages were recorded using those outlined by Payne (1973; 1987), and those for cattle and pigs followed the scheme of Grant (1982). Cattle, pig and caprovid mandibles were assigned to the general age categories outlined by O'Connor (1989) whilst, in addition, recording of caprovid mandibles and isolated teeth followed the age categories detailed by Payne (1973; 1987).

Mammal bones were described as 'juvenile' if the epiphyses were unfused and the associated shaft fragment appeared spongy and porous. They were recorded as 'neonatal' if they were also of small size.

Measurements (unless otherwise specified) followed von den Driesch (1976). Additional measurements, not detailed by von den Driesch, followed those described by the sheep-goat working-party (Davis 1992 and Dobney *et al.* forthcoming).

Withers height for horses was estimated using calculations devised by Kiesewalter (in von den Driesch and Boessneck 1974), for cattle those detailed by Fock (1966) and Matolcsi (1970) and for sheep following Teichert (1975). (Withers height for horses is expressed in hands (hh), where 1 h = 4 in =

101.6 mm.)

Although similarities between the bones of sheep and goat often make it difficult to distinguish between them, certain elements can readily be differentiated and recorded to species level with the aid of good comparative specimens and using the criteria outlined by Boessneck (1969). For the Doncaster assemblage, sheep/goat differentiation was typically attempted for horncore, distal humerus, distal radius, metacarpal, distal tibia, calcaneum, astragalus, metatarsal and all phalanges. Goat remains were represented by only one definite and two tentative identifications and consequently those fragments identified as caprovid are taken to represent mainly sheep.

Several standard methods of species quantification for bone have been employed. They involved simple fragment counts, and estimation of the minimum number of individuals (MNI). Calculation of the total number of bone fragments involved the simple counting of all recorded identifiable fragments (number of individual skeletal parts or NISP). Unidentifiable fragments were recorded and quantified separately. Calculation of the MNI was achieved by using the most frequently occurring diagnostic zone (recorded as more than 50% of that zone present) for any element and from any side (Dobney and Rielly 1988). At best, quantification using simple variations in numbers of fragments provides data of limited value with regard to absolute numbers of individuals present in the assemblage.

Presentation of results

Tables conveying the results of the analyses discussed in this report appear as an Appendix. They include a complete list of taxa (Table 1), species lists for plants and other components recorded during the plant macrofossils analyses (Table 2), some statistics concerning selected plant macrofossil assemblages (Table 3), a table showing the temporal distribution of records for selected plants and other components (Table 5), species lists for the invertebrate macrofossil assemblages (Table 6), main statistics for the invertebrates (Table 7), and a key to the ecological groupings applied to adult beetles and bugs (Table 8).

Data concerning the numbers and kinds of bones from this site and details of biometry are presented in Tables 9-35 and Figures 1-10.

A further appendix (p. A103) contains a report by Peter Skidmore on the fly puparia from selected samples; his results have been drawn upon for the main text.

Unless otherwise stated, all plant and invertebrate remains were preserved by anoxic 'waterlogging'. However, much of the plant material was charred and in some cases even preserved as silica 'skeletons' through incomplete combustion of certain kinds of plant material at temperatures high enough to fuse cell silica and remove carbon (a process discussed by Robinson and Straker 1991). For brevity, this material is referred to as 'silicified' in the text.

Note that '*' is used for some context descriptions where a definitive archaeological interpretation is lacking at the time of writing this report.

Structure of this report

The following account considers the results of the analyses by phase, context group and context, and as far as possible integrates the results of examination of the various lines of evidence. For each sample, a sediment description is given; these descriptions were made in the laboratory and in some cases the sediments may have changed during the period of up to three years between excavation and examination. '/T' indicates a 'test' subsample, '/TA' a test subsample examined during the assessment

phase. The weight of the subsample used is given in parenthesis. Most of the samples produced no invertebrate macrofossils, or only unidentifiable traces, and invertebrates are only mentioned for those samples where they were recovered. However, the policy of processing a substantial number of subsamples was fully vindicated by the results for those samples which *did* yield useful remains (see Discussion). As noted above, for most of the BS samples (designated '/BS'), no weight of sediment processed was recorded on site, though most samples will have been of about 25-30 litres (~35 kg). The concentration of remains in them was thus generally very low. Where a weight is recorded as 'moist residue' or 'wet residue' these are the weights recorded in the laboratory of samples already partly disaggregated on site.

Some of the samples had developed growths of mould, moss or algae on their surfaces within the tubs during the somewhat protracted period of storage between excavation and analysis; no suitable cool dark store was available for part of the storage period so this problem was unavoidable. In addition, a few of the plant and insect remains observed must have entered the deposits or samples on site. All modern material was, however, undoubtedly recognisable.

By their nature, certain analyses of vertebrate remains cannot easily be integrated into the main report or the discussion of results at context or context group levels and these are dealt with separately before the Discussion.

Note that the use of square brackets in this report indicates material taken verbatim from the copy of the excavator's 'Level III' report available during the preparation of this account.

Phase 2 (?Anglo-Saxon)

Context Group 02.01.02

Context: 2851 (clay dump in pit/river silt)

Sample: 820/T (1 kg) mid brown-grey (mottled on mm to cm scales), stiff, slightly sandy silty clay with traces of stones 6-20 mm, and charcoal or very rotted uncharred plant material.

The small washover of about 30 cm³ consisted of fine plant detritus, much of it very decayed rootlets (presumably ancient) and wood, the latter rather orange in colour and oxidised; there were a few rather poorly preserved seeds, mostly types resistant to decay, though the rush (*Juncus*) seeds present were quite well preserved. The assemblage recorded is not readily interpreted: it probably represents a random accumulation of remains of plants associated with occupation but including some from plants growing in the vicinity, or deposited in river silt. The small residue was of sand with a couple of oat (*Avena*) spikelets. There were no invertebrate remains.

Sample: 821/BS (33 kg moist residue)

The only plant remains recorded were some wood fragments and some very lumpy bark, hazel (*Corylus*) nutshell, and cereal grains (a moderate amount, mostly well preserved cultivated oats, *Avena sativa*).

For the vertebrate remains, only two gadid vertebrae were recovered from this sample; one of them had been chopped.

Timber identifications

Context 2851:

Sample 827: *Salix* (willow), with bark; moderately well preserved.

Sample 828: *Salix* (willow), with bark; mostly soft and flaky but with a firm, ?slightly mineral-replaced, core; growth of modern algae.

Sample 829: cf. *Salix* (?willow): very strongly decayed and with growth of modern algae and moss.

Phase 2 summary

Bioarchaeological evidence from the few deposits assigned to Phase 2 which were examined was very limited and offers little information concerning conditions and activity at the site beyond demonstrating human occupation and small insights into the use of resources.

Phase 3 (Norman-12th or possibly 13th century)

Context Group 03.08.07

Context: 2718 (pit fill)

Sample: 809/T (3 kg) mid orange-brown (with cm-scale patches of light-mid grey), working slightly sticky when wet, clay sand with traces of stones 20-60 mm, pottery and charcoal; locally more sandy and more clayey; looks burnt but does not appear to be ash.

There was a very small washover of about 20-25 cm³ and a small to moderate-sized residue of sand and gravel with a little pottery and some iron-rich concretions. The washover contained rare charred elder (*Sambucus nigra*) and grass (Gramineae) seeds and uncharred elder seeds but no other plant remains than charcoal. There were no invertebrate remains.

Sample: 810/BS (30 kg) mid orange-grey-brown, brittle (working crumbly, soft, and just plastic and slightly sticky) slightly sandy clay silt or ash, with traces of stones 2-6 and 20-60 mm, with lumps of varicoloured mm-scale granules, again probably ash; some fine pores, perhaps from decay of rootlets.

A little charcoal, charred root/twig fragments of ?heather (cf. *Calluna vulgaris*) and charred hazel nutshell were the only plant remains recorded, but 19 unidentifiable and ten identifiable bone fragments were recovered. The identifiable material included herring, eel and gadid vertebrae, and a gadid dentary. Mammals were represented by three pig maxillary teeth, one of which was burnt.

This deposit appears likely to have been burnt sediment from occupation.

Context Group 03.11.02

Context: 2709 (pit fill, ?tanning)

Sample: 791/T (3 kg) mid-dark grey-brown, soft, sticky, slightly 'crunchy' (working plastic) sandy clay silt with traces of stones 2-20 mm and of charcoal, and internally reduced to dark grey; much pale orange/yellow ?iron salt precipitation.

The very small washover of about 5-10 cm³ at most included quite a few distinctive structures similar to anthers, although no pollen was observed; they may actually be internal structures from seeds as some appeared not to have pores, splits, or filament attachments. Also present were traces of rush (*Juncus*) seeds and a single *Sphagnum* moss leaf. The small residue was of sand and gravel. There were no invertebrate remains.

Sample 792/BS (39 kg) Mid-dark grey-brown, crumbly (working soft and plastic) very slightly sandy clay silt with traces of stones 2-20 mm, charcoal and bone.

There was no record of sorting.

Context: 2787 (pit fill (?tanning) [=2709])

Sample: 812/BS (36 kg) jumbled light grey and light-mid brown, brittle to crumbly (working sticky and plastic when wet) very slightly sandy silt clay with traces of stones 2-60+ mm (including sandstone and flint, some as rounded pebbles), slag and charcoal.

Charcoal, charred nutshell and charred seeds were all recorded during sorting but not seen at the time the bulk-sieved material was examined for identification.

Context: 3003 (pit fill, ?tanning)

Sample: 843/T (3 kg) mid grey to mid brown, crumbly (working plastic and slightly sticky) sandy clay silt with traces of charcoal and bone.

The minute flot contained a few scraps of very decayed amorphous plant detritus and a few seeds (including rush and elder); the small to moderate-sized residue of sand and gravel contained quite a lot of bone up to 130 mm. A fragment which was initially thought to be a faecal concretion yielded no eggs of parasitic nematodes on the preparation of a smear (using dilute hydrochloric acid as a disaggregant) on a microscope slide, but scraps of plant detritus which might have been (very decayed) wheat/rye 'bran' were noted.

The traces of invertebrate macrofossil remains noted were of no interpretative significance.

Context: 3011 (pit fill, ?tanning)

Sample: 846/T (3 kg) mid slightly brownish-grey plastic, sticky slightly sandy clay with traces of ?bark and of charcoal and with tiny (mm-scale) patches of organic matter; much recent growth of mould.

The minute flot yielded a trace of fine plant detritus and a few well-preserved seeds, mostly rush and reedmace (*Typha*), the former including at least two types; the moderate-sized residue of about 600 cm³ produced a washover of a few tens of cm³, with some coarse wood fragments, bark, and charcoal. The plant assemblage from this part of the subsample contained a distinct though small aquatic component. The <4 mm fractions consisted mainly of very decayed wood and charcoal; there were very few identifiable seeds and all seemed to be rather decayed (in contrast to the material from the flot), with only more resistant types surviving. The residue consisted mainly of iron-concreted sediment, gravel, and charcoal.

The small group of beetles (N = 13, S = 10) was a mixture of species from natural habitats and typical occupation site synanthropes (species favoured by human activity), but of no further interpretative value. *Heterodera*-type soil nematode cysts were numerous and perhaps indicate *in situ* soil formation processes or back-filling with soil from adjacent surfaces; this would be supported by the very poor preservation of the invertebrate remains.

Context: 3012 (pit fill, ?tanning)

Sample: 844/T (3 kg) light-mid grey and mid brown mottled (mm-scale) crumbly (working plastic and somewhat sticky) slightly sandy clay silt with traces of stones 2-6 mm, and of pottery.

The very small washover of about 20 cm³ was of fine plant detritus and fine charcoal, the plant detritus being very decayed. Amongst it were a few seeds of no particular interpretative value. The small to moderate-sized residue was of sand and iron-concreted material (?faecal) with some fish bone. There were no invertebrate remains apart from abundant *Heterodera*-type nematode cysts.

Context Group 03.12.03

Context: 2741 (pit fill, ?tanning)

Sample: 803/BS (24 kg) mid slightly greyish-brown, just consolidated (working plastic, crumbly and soft), slightly sandy silty clay with a trace of charcoal (subjectively described in the laboratory as bioturbated flood silt).

A single charred hazel nutshell fragment and a little charcoal were the only plant remains noted. A few fish bones were recovered from this sample: six vertebrae (one herring, four eel and one cyprinid), along with a ?perch proepimeral and a ?cod dentary. Domestic mammals were represented by a single caprovid metapodial fragment, whilst the unidentifiable material was mainly composed of large- and medium-sized mammal shaft and rib fragments (a total of 25). Three unidentifiable fish bones were also present.

Context Group 03.13.02

Context: 2549 (burnt ?dump deposit)

Sample: 731/BS (21 kg moist residue)

There were a few charred plant remains including some quite well preserved cereal grains identified as barley (*Hordeum*), wheat (*Triticum*) and rye (*Secale cereale*). For the bone, a single herring vertebra was recorded. Eleven bone fragments were unidentifiable, six of them being burnt.

Sample: 731/T (3 kg) dark grey-brown (locally light-mid slightly orange-brown to grey) brittle to crumbly (working slightly plastic where clayey) sandy ash or silty sand with moderate to abundant amounts of charcoal and some charred ?hay/straw and small clasts of grey clay.

The subsample produced a moderate-sized washover of about 200 cm³ of charcoal; the remainder of the processed sample was sand and ?burnt soil with some small lumps of charred compressed ?straw and chaff. There were also some fragments of whitish monocotyledonous stem represented by what was probably the silica deposited in the living cells. This included more clearly recognizable aerenchyma (pith tissue) from a rush (*Juncus*) stem (whose ridged exterior surface was also visible). There were also a few charred weed seeds, cereal grains and ?rye rachis ('ear-stalk') fragments. The vegetative material may have come from some kind of litter, as for example from house floors or in stable manure, but is perhaps equally likely to have been from roofing material.

Phase 3 summary

The biological remains from the several samples of fills from pits thought by the excavator perhaps to have been used for tanning did not illuminate the question; there were certainly no large quantities of decayed bark as might be expected in such a situation—and which have been noted from, for example, a 16th/17th century pit fill from Chartres, France (Hall 1997) and from riverside deposits at Foss Bank, York (Carrot *et al.* 1997) and, indeed, from post-medieval deposits at the present site (see below). The deposits in these pits may have been backfill soil, an interpretation based on the sometimes abundant remains of soil nematodes, although these may conceivably have been post-depositional invaders. The 'burnt' deposits yielded some evidence for charred cereals and, in one case, for 'silicified' rush stem and charred ?straw, material which may perhaps have originated in floor or stable litter but which might equally represent roofing.

Phase 4 (13th century)

Context Group 04.04.11

Context: 2779 (burnt ?floor)

Sample: 841/T (3 kg) light grey-brown to light orange-brown, crumbly, soft (working plastic and somewhat thixotropic) silty clay sand with traces of Sherwood sandstone 20-60 mm; within blocks of sediment, light-mid blue-grey colour and some dark grey to black lumps of organic material.

The small washover was about 20 cm³ in volume and consisted of fine charcoal and detritus including many *Cristatella* statoblasts (resting stages of a bryozoan) and some rather eroded seeds, perhaps mostly of the more decay-resistant types but with a small wetland component. Amongst the charred plant material were traces of ?oat

chaff and cereal awns (bristles). The tiny residue of only a few cm³ was a mixture of sand, coal and charred cereal awns and other chaff. The charred plant material seems likely to have come from fire ash, but the nature and former function of the material is open to discussion. One possibility is an origin in thatch.

A small group of beetles (single individuals of 18 taxa) was accompanied by numerous earthworm egg capsules. The former appeared to have been of very mixed, but mainly natural, origin, and the latter have little significance in a deposit of this type. However, the presence of abundant *Cristatella mucedo* statoblasts suggests a substantial component from river water.

Phase 4 summary

The single sample examined was not rich in biological remains but did suggest the possibility of flooding into the building (or of the trampling of flood silts onto the floor) and there was again evidence for plant remains which might have originated in litter or thatch.

Phase 5 (13th century)

Context Group 05.01.23

Context: 2915 (pit backfill)

Sample: 830/BS (27 kg) mid-dark grey-brown stiff, slightly layered in places, to crumbly (working soft ('fluffy') and slightly sticky and slightly plastic when wet) 'clay sand', probably mostly ash, with traces of stones 2-20 mm and wood fragments; variable: mostly with a distinct humic component (with a 'compressed amorphous organic' appearance), elsewhere entirely mineral.

The residue contained abundant fragments of organic sediment of which some seemed to be pellets (to about 15 mm) of undisaggregated compressed herbaceous detritus, others distinctly sandy, well-humified peat, the size of the clasts probably largely reflecting the washing process. Some clasts had ashy material adhering to them. The identifiable plant remains included hazel nut, sloe (*Prunus spinosa*) and blackberry (*Rubus fruticosus*).

Remains of only two invertebrates were found. Amongst the bones, there were four eel vertebrae (the only identifiable fragments noted) and a total of 27 unidentifiable fragments (of which eight were fish).

This deposit may have been ash with incompletely consumed fuel and some food waste.

Context Group 05.03.02

Context: 2716

Sample: 799/BS (33 kg) light-mid grey-brown, crumbly to unconsolidated (working sticky and plastic when wet), clay sand with traces of stones 2-60 mm, and of charcoal.

Charcoal, charred nutshell and charred seeds all recorded during sorting but not seen at time of identification.

Context Group 05.05.09

Context: 2706 (pit fill)

Sample: 793/T (3 kg) light grey to red-brown (mottled on mm and cm scales) stiff (working crumbly, then plastic when moist) sandy clay silt with mm-sized pores within lumps.

The tiny washover was of barely 1 cm³ and there was a very small residue of sand and undisaggregated silt/clay sediment. The only higher plant remains recorded were charred propagules of corn marigold (*Chrysanthemum segetum*) and hairy buttercup (*Ranunculus sardous*), both probably arable weeds arriving with straw or grain.

Apart from modest numbers of earthworm egg capsules, the only invertebrate recorded was an *Aphodius* dung beetle. As other remains appear not to have been preserved, it seems possible that these penetrated post-depositionally and they cannot be taken as indicative of *in situ* soil formation contemporaneous with the deposit.

Sample: 794/BS (32 kg moist residue)

There were traces of charcoal and ?heather root/twig fragments.

Phase 5 summary

Few samples were examined and they provided sparse biological remains of limited interpretative significance, although there was some evidence for flooding, the importation and burning of peat or turves and the disposal of ash, and the plant and invertebrate assemblages as a whole are more significant when viewed at level of the whole site.

Phase 6 (13th century)

Context Group 06.01.05

Context: 2647 (?cut fill)

Sample: 770/T (3 kg) light grey-brown, plastic slightly silty clay with locally more grey and more brown colour and very abundant dark brown patches of ?pan and ?very rotted organic matter; modern moss and algal growth.

There was a tiny washover of 2-3 cm³ of fine plant detritus and charcoal amongst which were a few uncharred seeds, mostly from weeds and damp ground taxa, but including leaves of heather. Only weld (*Reseda luteola*) was represented by more than trace amounts of seeds. (Although widely grown in the past as a source of yellow dye for textile colouring, weld is also an extremely successful weed, especially in urban environments, so its presence here may not be particularly significant.) The small to moderate-sized residue comprised sand and gravel with some iron-rich concretions.

Although few invertebrates were present (and only ten individuals of nine beetle species), the presence of two *Esolus parallelepipedus* and one ?*Normandia nitens* suggested a component deposited by river water. The remaining beetles were of little interpretative value. Several *Heterodera*-type soil nematode cysts were noted and suggested either that soil was incorporated or that a soil developed *in situ* (an interpretation supported by the very poor preservation); conceivably, however, they too were introduced in floodwater.

Context Group 06.02.02

Context: 2569 (surface in building 5)

Sample: 795/T (3 kg) mid grey-brown, brittle to soft (working crumbly) slightly sandy clay silt with traces of stones 2-60 mm, of mortar/plaster and charcoal, and with lumps of pinkish-orange-brown ?ash/burnt soil.

The small washover of about 30 cm³ consisted mainly of wood fragments and herbaceous charcoal, together with some small burnt ?peat fragments. Charred 'sclerenchyma spindles' of cotton-grass (*Eriophorum vaginatum*) probably originated in peat or turves, as no doubt did the charred *Polytrichum* stems and tentatively identified charred remains of heath rush (*Juncus squarrosus*) and heather. These may, in fact, indicate thin peat formed on an area of heathland rather than bog peat proper. That a large ash component was present is attested by the presence of moderate amounts of white 'silicified' herbaceous material, perhaps the tips of leaves of a grass such as one of the fine-leaved fescues (*Festuca*) or the tips of cereal chaff fragments. All of this material may well have originated in turves used as fuel, at least secondarily.

The small residue was of sand with a little burnt flint and pottery.

There were no macrofossil invertebrate remains. A small subsample examined for parasite eggs was found to consist mainly of inorganic sediment; no identifiable microfossil remains were recorded other than many phytoliths, some diatoms and a little ?modern pollen.

Sample: 796/BS (24 kg) mid grey-brown, crumbly to unconsolidated (working soft and plastic) slightly silty clay with lumps of light-mid grey-brown (locally tinged orange) crumbly silty clay with internal layering in buff, black and light grey), with traces of stones 2-20 mm, charcoal and (?bird) bone.

Charcoal, charred nutshell and charred seeds were all recorded during sorting but not seen at time the sorted remains were identified.

The most probable origin of the material forming Context 2569 is as raked-out ash.

Context Group 06.05.04

Context: 2595 (dump)

Sample: 752/T (3 kg) mid-dark grey-brown, crumbly (working plastic) sandy silt with traces of charcoal and inclusions of orange and orange-brown and white-yellowish material; ashy; a lump of white calcareous 'greasy' material and abundant clasts of other lithologies.

There was a very small washover of about 30 cm³, mostly of charcoal, and with a few charred seeds of no particular interpretative value. The moderate- to large-sized residue was of sand and gravel. There were no invertebrate remains.

Sample: 753/BS (19 kg moist residue)

The plant remains from this sample comprised moderate amounts of charcoal with traces of charred oat, rye and wheat grains and of hazel nutshell, together with a charred black bindweed (*Bilderdykia convolvulus*) nutlet, the latter no doubt a grain contaminant.

From the BS sample there were 30 identifiable and 76 unidentifiable bone fragments: 22 herring (*Clupea harengus*, 14 vertebrae, two articular, one ceratohyal, one maxilla, one opercular, one post-temporal, one quadrate and one subopercular), seven eel (*Anguilla anguilla*) and one gadid vertebra. The unidentifiable fragments included a bird vertebra (possibly goose), 53 fish fragments (not identifiable to species) and 22 unidentifiable mammal fragments, of which seven were burnt.

Thus the biological remains in this heterogeneous deposit were predominantly food waste, but of a rather restricted kind. Ash was almost certainly incorporated, too.

Context: 2646 (dump)

Sample: 788/BS (28 kg) mid grey-brown crumbly (somewhat layered in places, working soft and slightly plastic) ?slightly humic, clay silt with traces of limestone 2-60+ mm and patches of red clay, buff sticky clay, light brown clay and black patches.

Traces of charcoal, charred nutshell and charred seeds were recorded during sorting but not seen during the identification phase.

Context: 2654 (dump)

Sample: 776/BS (23 kg) very dark brown to black, layered, crumbly (working soft and sticky when wet) very slightly sandy clay silt with light brown and mid-dark brown clay in indurated lumps which crumbled when pressed; traces of stones 2-6 mm, and of burnt bone, and with abundant charcoal; ?modern root channels.

Moderate amounts of charcoal and some charred seeds were recorded during sorting but not located during identification phase.

Context Group 06.08.04

Context: 2401 (floor within small timber structure)

Sample: 710/BS (18 kg moist residue) mid grey-brown, ?slightly layered slightly silty sand with a trace of charcoal.

Apart from moderate amounts of charcoal and traces of charred ?heather root/twig and hazel nutshell, the only plant remains recorded were poorly preserved cereal grains, of which at least one was identified as oats and another as barley.

Thirty unidentifiable and five identifiable bone fragments were recovered. The latter included four herring vertebrae and a gadid supracleithrum. Most of the unidentifiable remains were also fish and included seven probable gadid fragments.

Context Group 06.08.07

Context: 2369 (floor within small timber structure)

Sample 672/T (3 kg) dark grey-brown, crumbly, layered (working plastic and slightly sticky, though also with an 'ashy' feel), slightly sandy, slightly clay silt with a major component of lumps of cm-scale-thick pale orange-brown brittle ash with grey and yellowish and orange-brown mm-scale granules and appreciable amounts of charcoal.

The very small washover was about 25 cm³ in volume and consisted mostly of fine charcoal with some charred seeds (black bindweed, corn marigold, hairy buttercup) presumably cornfield weeds arriving as grain contaminants or in straw. There were also some rather poorly preserved uncharred seeds including moderate numbers of the poppy *Papaver argemone* (perhaps sieved from the grain and discarded without being burnt or, again, originating in poppy plants incidentally harvested with straw) and moderate numbers of very poorly preserved heather leaves. Other taxa likely to have arrived with the heather (of which there were also some charred remains) were cross-leaved heath, *Erica tetralix* (leaves and seeds); the habitat exploited for these plants is likely to have been heathland or perhaps the wetter parts of a peat bog—once again suggesting the presence of burnt peat and that this deposit may have been raked-out fire ash.

There was a small to moderate-sized residue of sand with a little gravel and fish bone. No invertebrate remains were recorded.

Sample: 673/BS (30 kg dry residue)

A few moderately well preserved cereal grains (barley, rye and wheat) and hazel nutshell fragments were recovered, together with a single chip of conifer charcoal. The latter could not be identified precisely, but the presence of resin ducts suggests that it was probably pine, spruce or larch (*Pinus/Picea/Larix*).

Identifiable bones included the remains of herring (vertebrae). Of the 27 unidentifiable mammal fragments, 12 were burnt. Seven unidentified fish fragments were also present.

Context Group 06.10.02

Context: 2435 (backfill of cut 2469)

Sample: 691/T (3 kg) black charcoal and ash and a little clay and/or silt.

The small washover was of about 30 cm³; it was mostly fine charcoal and fine, very degraded fragments barely large enough to discern as wood. The small to moderate-sized residue also contained quite a lot of charcoal (which for some reason had not 'washed over'), but was otherwise a mixture of gravel and sand.

The only invertebrates recorded were poorly preserved remains of six individuals of four beetle taxa; they gave no indication of ecological conditions at the site of deposition.

Sample: 702/BS (25 kg waterlogged residue)

This sample yielded a rather large assemblage of charred grain, mostly oats but with a little barley. Some grains and the vetch (*Vicia*) seeds showed signs of having begun to germinate prior to charring. The residue was also quite rich in coarse charcoal.

There were 24 identifiable and 18 unidentifiable bone fragments. The former included 16 eel and five herring vertebrae, and three chicken bones (carpal, furcula and a femur fragment). Unidentifiable remains included 12 fish fragments (two burnt) and six mammal fragments.

The biological remains from this deposit were clearly primarily food remains, presumably kitchen or table waste, although their mode of entry may have been indirect.

Phase 6 summary

Although assemblages of plant and animal remains were rather small, the deposits from this phase gave some evidence which might represent burnt peat and/or turves, probable dumps of ash, and two contexts produced modest groups of bones, mainly from fish, presumably food waste. One small group of insects clearly included a waterlain component, on the basis of beetles associated with clean running water.

Phase 7 (13th century)

Context Group 07.01.03

Context: 2589 (backfill of cut 2592)

Sample: 748/T (3 kg) light-mid brown, stiff, slightly sandy silty clay with traces of brick/tile and large amounts of (mostly unburnt) coal; clay of various colours: pale greenish-grey and pale orange-brown to stronger orange-brown.

The minute flot contained a few scraps of plant material whilst the very large residue was almost entirely of coal, presumably from material imported as fuel. There were no invertebrate remains.

A small subsample examined for parasite eggs was found to consist mainly of inorganic sediment; no identifiable microfossil remains were recorded.

Context Group 07.01.05

Context: 2429 (backfill of cut 2436)

Sample: 690/BS (15 kg waterlogged residue)

Together with moderate amounts of charcoal this sample yielded a few poorly preserved charred cereal grains (oats and barley), charred hazel nutshell and tentatively identified pea.

There were 18 bone fragments: a single identifiable bone (a ?flatfish vertebra) and 17 unidentifiable fragments (two fish, 15 mammal). Thirteen of the mammal and all of the fish fragments were burnt. This was presumably kitchen or table waste which had been thrown onto a fire and the ash subsequently dumped in the cut.

Context Group 07.01.12 (contains C14th pottery)

Context: 2412 (abandonment/backfill deposit? not precisely interpreted in JL narrative)

Sample: 773/BS (34 kg) dark grey-brown, crumbly to sticky slightly humic slightly sandy clay silt with traces of stones 2-60 mm and ? of charcoal, with minor component of light grey clay

The residue was not sorted.

Context Group 07.01.18

Context: 1475 (burnt clay from oven/hearth)

Sample: 331/BS (11.5 kg wet residue)

Some plant remains were sorted by site staff during excavation: these comprised a rather large assemblage of charred grain, some well preserved, including many oats with sprouts; also identified were barley, ?rye and wheat, the last of these also with some 'sprouted' specimens. Other charred remains were nearly all likely to have been weeds of cereal fields; the most abundant were corn marigold and sheep's sorrel (*Rumex acetosella*).

There were 14 identifiable and 42 unidentifiable bone fragments. All were burnt, with exception of two mammal tooth fragments. Identifiable material included one pig second phalange, seven herring and four eel vertebrae, two gadid fragments (a post-temporal and a prevomer). Unidentifiable bone comprised seven fish and 35 mammal fragments. The material was generally rather fragmented.

It is not at all clear why the range of biological material observed should be present in burnt clay, though one explanation is that it was simply burnt floor sediment which already included material typical of this site. Given that it was a mixture of oats and wheat, the sprouted grain is perhaps more likely to be material which had become wet accidentally than grain deliberately sprouted for malting.

Sample: 332/T (3 kg) dark brown (with slight orange cast), crumbly, soft silt-grade ash with traces of charcoal and moss and algae contaminants.

The tiny washover of 1-2 cm³ consisted mostly of very poorly preserved charred cereal grains (oats, ?rye, barley and wheat, many of them with evidence of sprouting) and charred cereal weeds (again especially corn marigold and sheep's sorrel). The small to moderate-sized residue was of sand with some charcoal and further charred cereals (mostly rather damaged). Although none of the individual cereals was especially abundant, the combined score for charred grains for this sample would probably reach '2' or '3' on the four-point scale used, confirming the evidence from the BS sample.

There were no invertebrate remains.

Context: 1495 (silt/ash/charcoal from oven/hearth)

Sample: 567/T (5 kg) mid-dark grey-brown, crumbly (working soft), slightly sandy silt with traces of burnt soil and charcoal.

The washover of about 60 cm³ was of charcoal with moderate amounts of mostly poorly preserved charred cereal grains (although some of the barley and oat grains were well preserved) and some charred chaff. Many of the grains looked as though they were wet or had begun to germinate prior to charring since there was some blistering and exudation; some had coleoptiles (sprouts) and there were some detached coleoptiles. In some cases there was uncharred periderm attached to charred grains indicating that charring was not always complete and that conditions were suitable for some 'waterlogged' preservation. Charred vetch (cf. *Vicia*) seeds in the assemblage showed an extended radicle where the testa had fallen off; these, too appeared to have begun to germinate before being charred.

A wide variety of cornfield weeds was present with the grain and legumes, notably corn marigold and sheep's sorrel (both scoring '3') with smaller numbers of fat-hen (*Chenopodium album*) and *Centaurea* (perhaps cornflower, *C. cyanus*). These and the grains may well have originated in straw, perhaps in thatch, the grains having germinated when wetted, perhaps even in the ear, charring having occurred during an attempt to dry the spoiling crop.

The small residue was of sand and a little gravel with quite a lot of iron-rich concretions (?pan).

There were no invertebrate remains.

Sample: 568/BS (11.5 kg)

Further charred cereals were recovered from this sample. The barley grains (some of which were hulled) included some specimens with evidence of sprouting; there were also oats and rye grains.

There were seven identifiable and 21 unidentifiable bone fragments. All the unidentifiable mammal remains (18) were very small and highly fragmented and all were burnt or scorched. The single caprovid first phalanx recovered was also scorched. The fish remains included four cyprinid vertebrae (one possibly roach, *Rutilus rutilus*), one eel vertebra, and a pike (*Esox lucius*) dentary. This material is likely to have been kitchen or table waste thrown into the fire.

Context Group 07.01.20

Context: 2247 (fill in cut 2394)

Sample: 642/BS (28 kg wet residue) externally mid brown to internally mixed light-mid orangeish-brown and light grey crumbly, stiff, and soft, slightly humic slightly sandy silt with lumps of orange-brown sandy clay and traces of stones 6-60+ mm.

Only a small amount of charcoal was recovered from this sample.

Context Group 07.01.23

Context: 2202 (hearth use deposit)

Sample: 622/BS (22 kg waterlogged residue)

There were a few charred cereal grains (barley and rye) and hazel nutshell fragments together with heather root/twig fragments.

All of the 75 bones recovered from this sample were unidentifiable mammal fragments. Sixty-five of these were

burnt and all were very fragmentary.

Context: 2255 (hearth use deposit)

Sample: 644/BS

There were a few charred cereal grains including oats, ?rye, and barley, the oats and barley including sprouted specimens.

Otherwise there were moderate amounts of charcoal, traces of charred linseed (*Linum usitatissimum*) and some other foodplant remains.

Context: 2256 (hearth use deposit)

Sample: 650 (?) light-mid red-brown to light-mid grey (with darker patches), brittle (working crumbly, and plastic when wet) clay with a trace of charcoal; probably burnt soil with an ash component.

Not examined further.

Sample: 651/BS (17 kg waterlogged residue)

There was a moderate amount of charcoal, but no other plant material in the sample.

Context Group 07.02.14

Context: 2402 (ash dump)

Sample: 706/BS (16 kg waterlogged residue)

Moderate amounts of charcoal were recorded, together with traces of charred hazel nutshell, barley and a single charred field bean (*Vicia faba*), the only secure determination for this plant for the North Bridge site.

The 24 identifiable bone fragments included gadid, herring, eel, cyprinid and pleuronectid vertebrae (16, one, one, one and one, respectively), with one gadid supracleithrum and one gadid quadrate. The cyprinid and pleuronectid vertebrae were burnt. Of the 169 unidentifiable fragments, 76 (21 fish and 55 mammal) were burnt.

This is another context in which food or table waste burnt in a fire seems likely to have been present.

Context Group 07.03.06

Context: 2571 (backfill of linear cut 2621)

Sample: 745/BS (27 kg) mid-dark grey-brown, brittle to crumbly (working plastic and soft, and with some evidence of layering grey and brown within lumps), slightly humic very slightly sandy silty clay with traces of stones 6-60 mm, charcoal and ?bone.

The only biological material recorded from this sample was a moderate amount of charcoal.

Phase 7 summary

Several contexts yielded charred plant remains amongst which cereals with emerging coleoptiles were noted. Given that these 'sprouted' grains represented several kinds of cereal (and there were also sprouted vetch seeds), it is more likely that they are from material stored damp than that they were deliberately sprouted (e.g. for brewing). Possibly they were originally in animal food and started germinating within the deposits forming the floors of byres or stables, charring occurring when material was burnt for disposal, but it is also quite plausible that they were in wet thatch and fell onto floors, perhaps accounting for their mixing with burnt and unburnt bone; evidence for thatch discussed at greater length below. Much of the bone was presumably food waste thrown into fires or burnt in the floor layers on which fires were laid.

Phase 8 (13th century)

Context Group 08.02.05

Context: 2083 (external surface, yard)

Sample: 557/T (3 kg) red-black soft, distinctly layered clay silt or ash with modern algal growth.

There was a very small washover of only 1-2 cm³ and a very small residue of sand and gravel with a little charcoal. The few identifiable plant remains included traces of charred and uncharred weeds and charred cereals (wheat and barley), with a single charred fig (*Ficus carica*) seed. There were no invertebrate remains.

Sample: 558/BS (10 kg moist residue)

The few charred plant remains other than charcoal included linseed, oats, and rye as well as hazel nutshell.

Three herring vertebrae were the only identifiable bones. In addition, there were seven unidentifiable fragments, one medium-sized mammal vertebra, two fish and four unidentified mammal fragments (all burnt).

Context: 2180 (external surface, yard)

Sample: 600/T (3 kg) red-brown to grey, crumbly, soft (greasy when rubbed), slightly sandy ash with charcoal and modern algae.

The plant remains from the washover consisted of uncharred or slightly charred ('toasted') fragments, including heather leaves and shoot tips in varying states of decay and burnt and unburnt fragments thought to be peat. Some of the *Calluna* leaves were very ciliate, perhaps the form described by some authors as var. *hirsuta*. Other taxa consistent with the presence of peat or perhaps turf were bell heather (*Erica cinerea*) seeds and leaves, tentatively identified charred seeds of heath rush, and seeds of water-blisks (*Montia fontana* ssp. *chondrosperma*), the last perhaps part of a wetland component of which there were one or two other representatives. There was quite a large residue of approximately 700 cm³ of burnt soil and sand. All this material was perhaps from turf used originally in roofing.

There were no invertebrate remains.

Sample: 601/BS (15 kg dry residue)

The residue yielded a few charred plant remains including charcoal. The traces of charred root/rhizome fragments are consistent with the presence of turf interpreted from the /T subsample. Two herring vertebrae, and two unidentified fish and nine mammal fragments were also recorded.

Context: 2224 (external surface, yard)

Sample: 627/BS (13 kg waterlogged residue)

There was abundant charcoal and a moderate amount of charred grain in the residue; the preservation of the latter was rather variable, but mostly quite good. Cultivated oats, barley, rye and wheat were all present, together with charred hazel nut and sloe, charred twig fragments (including ?heather) and a seeds of a few cereal weeds.

Context: 2245 (external surface, ?yard)

Sample: 639/T (1 kg) mid-dark brown, crumbly (working soft) sandy silt with traces of sandstone >60 mm and of charcoal; orange and yellow flecks of sandstone (mm scale).

The very small washover consisted of a few cm³ of charcoal which included traces of ?burnt peat and two fragments of barley rachis (one node and a strip of three). Also present were a few weed taxa and charred hair moss (*Polytrichum*) shoots, the latter perhaps part of a turf component. The small residue was of sand and gravel. There were no invertebrate remains.

Sample: 640/BS (14 kg waterlogged residue)

The residue was found to contain a few charred cereal grains and some nutshell, with a single fragment of charred saw-sedge (*Cladium mariscus*) leaf, the significance of which is discussed further below.

There were 38 unidentifiable bone fragments, of which 20 were mammal (including 11 burnt fragments together with three mandible fragments which were probably of cow), and 18 were fish. Fish remains were represented by three cyprinid vertebrae (one was possibly rudd, *Scardinius erythrophthalmus*) and one ?roach, three eel and one herring vertebrae.

Context Group 08.03.04

Context: 2164 (external surface, ?yard)

Sample: 591/T (3 kg) mid greyish-brown with a slightly orangeish cast, crumbly (working slightly plastic), slightly sandy silt with traces of coal and charcoal and hints of a crumb structure.

The very small washover of about 5 cm³ consisted of charcoal and small lumps of orange concreted material <2 mm. There were traces of charred cereals and cornfield weed seeds. The small residue was of sand. There were no invertebrate remains other than several *Cristatella mucedo* statoblasts, these testifying to the presence of a waterlain component in the sediment.

Sample: 592/BS (10.5 kg wet residue)

There were moderate amounts of charcoal in the residue, with a few poorly preserved charred cereal grains and ?heather twig fragments.

Sixty-four unidentifiable bone fragments were recorded, of which seven were burnt fish vertebrae (there were also 12 neural spines). In addition, one amphibian, one bird and 43 mammal fragments, including medium-sized mammal vertebrae and large mammal shaft fragments, were recorded. Ten of these fragments were burnt. The identifiable fraction included a single cow second phalange, pig phalange and metatarsal, two goose fragments (one of which, a carpometacarpus, might represent a domestic bird), and a duck coracoid. Herring and eel remains made up the bulk of the fish bone; 20 of the 21 fish fragments were vertebrae. A gadid tooth was also present.

Context Group 08.03.05

Context: 2425 (floor)

Sample: 683/T (3 kg) light-mid grey-brown to mid orangeish-brown, crumbly, brittle, layered, slightly silty sand with moderate amounts of charcoal and modern algal growth and a modern arthropod (?psocid); some blackish bands and streaks and red flecks of ?burnt soil.

The washover of about 20 cm³ volume contained some uncharred heather leaves and elder seeds; charred material included crop weed seeds and a 'clubrush' (*Scirpus maritimus/lacustris*) nutlet, perhaps from litter destroyed by burning. The small to moderate-sized residue was of sand with some gravel and coal and a few poorly preserved cereals. There were no invertebrate remains.

Sample: 685/BS

Charred cereals, hazel nutshell, and ?burnt peat fragments were present, together with charcoal.

There were 23 identifiable bone fragments, of which all but one were from fish. These included vertebrae from eel (10), gadid (3), herring (3) and ?ballan wrasse (*Labrus bergylta*). In addition, a single caproid incisor was recorded. There were 140 unidentifiable fragments, including 89 from fish and 51 from mammals.

Context: 2467 (floor)

Sample: 705/T (3 kg) mid grey-brown, crumbly (working plastic and sticky, and with slight layering within lumps) silty clay sand with traces of charcoal (to 20 mm) and butchered large mammal vertebra; small patches of red ?burnt soil and a modest ash content.

The very small washover of about 10 cm³ included oak (*Quercus*) and ash (*Fraxinus*) charcoal and tentatively identified charred oats and linseed; the small residue was of sand and gravel. There were no invertebrate remains other than a single mite.

Context Group 08.03.06

Context: 2174 (hearth deposit)

Sample: 598/T (3 kg) varicoloured—mainly light grey-brown to light grey to mid red-brown—crumbly (working plastic) silty clay with moderate amounts of charcoal and traces of ?very rotted wood; some modern mould and algal growth.

The tiny washover was of charcoal with a few charred seeds, probably mostly from arable weeds; there was a moderate-sized residue, much of it undisaggregated, possibly somewhat concreted, sediment (perhaps simply lightly burnt soil), with a little sand and stone.

Context Group 08.03.07

Context: 2130 (backfill of cut 2131, ?hearth)

Sample: 549/T (3 kg) mid reddish-brown ash with patches of grey silt and clay and indurated lumps of burnt soil to 40 mm.

The small washover of about 30 cm³ consisted almost wholly of charred herbaceous material <5 mm and mostly <2 mm, perhaps from straw; a ?barley rachis fragment was also present. There was only a trace of wood charcoal present, together with two small (<5 mm) fragments of ?twisted fibres, apparently not charred but dark red-brown in colour. The small to moderate-sized residue of sand also contained much baked clay/daub and further charcoal.

There were no invertebrate remains.

Context: 2254 (charred timber within cut 2266)

Sample: 649/SPT

A sample of the charred timber consisting of chunks of charcoal to 60 mm in maximum dimension; the wood was oak.

Context Group 08.03.11

Context: 2253 (internal surface)

Sample: 647/T (3 kg) dark, slightly greyish-brown, crumbly (locally working plastic), stony silty sand, with traces of stones 2-60 mm and lumps of lighter clay as frequent inclusions, the lumps having internal layering.

The very small washover about 10-15 cm³ contained traces of charred weed seeds of various kinds, notably moderate numbers of poppy, *Papaver argemone*; the small to moderate-sized residue was of sand and gravel. There were no invertebrate remains.

Sample: 648/BS (18 kg waterlogged residue)

There were a few moderately well preserved charred cereal grains identified as rye and wheat, and moderate amounts of charcoal.

Eighteen identifiable and 47 unidentifiable (27 fish, 20 mammal) bone fragments were recovered from this sample. Fish remains were represented by a range of species, including eel and herring vertebrae (six and five respectively). Also present were a pleuronectid vertebra, an isolated pike tooth, and three scale fragments tentatively identified as bream (*Abramis brama*). Additionally, a maxillary molar, identified as field vole (*Microtus agrestis*), was recovered.

Sample: 653/SPT

A small sample of burnt soil and charcoal with some modern moss growth. The charcoal was identified as oak (of 30 mm maximum dimension).

Context Group 08.03.18

Context: 2177 (internal surface)

Sample: 602/T (3 kg) bright orange-brown, light grey, grey-brown and black coarse-grained ash with much charcoal (there were a few cm of free water standing on this sample in the tub).

The very small washover of about 30 cm³ included some uncharred fine plant detritus but was mostly of charred herbaceous detritus including charred moss stems (such delicate remains are rarely recorded as fossils and perhaps suggest that the material had undergone no redeposition after charring). There were some other charred structures which may have been culm bases and leaf fragments from a species such as heath rush (charred seeds of ?heath rush were also present). From the remains recorded, it is likely that this deposit includes remains of burnt heathland turves, quite possibly originally from roofing material.

The moderately large residue was of sand with lumps of burnt soil—almost fused like brick—rich in plant impressions (one lump to 50 mm, but small fragments of only 5 mm show stem impressions), and charcoal including oak.

Only two beetles, with no interpretative value, were recorded, and other invertebrates were absent.

Context Group 08.04.04

Context: 2644 (fill of ditch/pit cut 2691)

Sample: 760/BS (30 kg) mid grey-brown locally tinged orange (and mottled more brown and more grey on cm scale) crumbly to sticky (working plastic) silty clay with some mould growth.

Apart from a little charcoal, the residue was found to contain many structures interpreted as 'moulds' formed by mineralisation in the walls of root channels.

Context Group 08.05.02

Context: 2567 (yard surface around well)

Sample: 741/BS (18 kg) very varicoloured—mid red grey-brown to dark grey; primarily ash, with traces of stones 20-60 mm and of charcoal; modern algal growth.

Together with traces of charcoal, charred hazel nutshell, ?heather twig/root and ?rye grains, there were the remains of about nine charred holly (*Ilex*) seeds; the significance of the last of these is not clear unless holly branches bearing berries were used deliberately or incidentally as kindling. A single eel vertebra was also identified; the remaining 15 bone fragments recovered were from mammals (but unidentifiable) and were all burnt.

Context Group 08.06.01

Context: 2081(?internal/external surface against wall)

Sample: 537/BS (13 kg waterlogged residue) mid-dark brown, crumbly, slightly brittle, just unconsolidated humic sand with traces of stones 6-60 mm.

The residue included some charred hazel nutshell and cereal grains; preservation of the cereals (oats, ?rye, barley and wheat) was variable but mostly good.

In total, 150 identifiable and 254 unidentifiable bone fragments were recovered from this sample. The bulk of the remains were fish, although 220 of these could not be identified to species, being spines, fins and scale fragments. The identifiable material consisted of 99 scale fragments identified as ?bream, and five scales of perch (*Perca fluviatilis*). Herring (25) and eel (13) vertebrae were present, along with one cyprinid and two perch vertebrae. Cyprinids were represented by two scapulae (one possibly chub, *Leuciscus cephalus*) and a pharyngeal bone. A single eel dentary was noted and a chicken quadrate bone was also present. This sample was rich in food remains, perhaps scattered from a fire, while there may also have been traces of roofing material. It was perhaps more likely to represent an internal surface than an external one.

Context Group 08.06.05

Context: 2052 (levelling within Building 10)

Sample: 522/BS (10 kg dry residue) dark grey-brown to slightly yellow brittle, unconsolidated slightly silty sand with traces of stones 2-20 mm, mortar/plaster, pottery and bone.

The residue yielded a small assemblage of rather poorly preserved charred cereal grains: oats, ?rye, barley and wheat, together with ?pea and ?field bean and charred hemp (*Cannabis sativa*) seed; ?heather twigs were also present.

Sixteen identifiable and 201 unidentifiable bone fragments were recovered. Fish remains included herring, eel, ?haddock (*Melanogrammus aeglefinus*), pleuronectid and salmonid vertebrae (four, four, one, two and two, respectively). A gadid palatine was also present. Domestic species included a pig radius and a ?chicken phalange. The unidentifiable fraction was made up of 83 fish and 118 mammal fragments.

This context may represent levelling but if so it appears likely that it consisted of redeposited floor material.

Context Group 08.06.09

Context: 1918 (large spread of charcoal in hearth deposit)

Sample: 467/BS (9 kg dry residue) light-mid grey-brown brittle, unconsolidated (working just plastic) silty sand.

A trace of charcoal (to 10 mm) was the only plant material recovered from the residue. However, 146 unidentifiable bone fragments (138 fish and 8 mammal) were recorded. There were 64 identifiable fragments, all fish, and mostly herring vertebrae (48), but also a herring dentary. In addition, 11 eel and two perch vertebrae and two pharyngeal bones (one cyprinid and one gadid) were noted. All are likely to have been food debris.

Context Group 08.07.03

Context: 2460 (infill of hollow way)

Sample: 716/BS (28 kg moist residue) varicoloured buff to brown to orange-brown to red-brown crumbly (working slightly plastic) ?ash with rare patches of clay silt and abundant charcoal.

There was quite a lot of coarse charcoal (making up most of the residue); identifiable plant remains were small numbers of poorly preserved oats, ?wheat and rye grains, charred hazel nut and sloe fruitstones.

Only four identifiable and 28 unidentifiable bone fragments were recorded. The bulk of the unidentifiable fragments (25) were from mammals, with one bird long-bone shaft and two fish fragments. Fish remains were all vertebrae and represented both haddock and herring.

This may be redeposited sediment, ultimately from a floor, or may represent trampling of small amounts of remains.

Context Group 08.08.02

Context: 2217 (backfill of linear (wall/fence) cut)

Sample: 621/BS (14.5 kg waterlogged residue)

There were moderate amounts of charcoal and small numbers of moderately well preserved cereal grains: oats, barley and rye.

Context Group 08.08.03

Context: 2156 (ashy dump/build-up)

Sample: 614/BS (17 kg waterlogged residue)

There were moderate amounts of charcoal and traces of poorly preserved cereal grains (which were not identifiable further). Twenty-five unidentifiable bone fragments were present, (two fish and 23 mammal), all of the latter being burnt. There were also three identifiable fish vertebrae, two identified as herring and one battered specimen as gadid.

Context Group 08.09.01

Context: 2165 (soil/dump)

Sample: 597/BS

This sample yielded a few poorly preserved cereal grains, some of which were identifiable as barley and rye; there were also traces of charred ?heather twig and grass/cereal culm-nodes, and moderate amounts of charcoal.

Context Group 08.09.03

Context: 2094 (surface associated with wall 2097 of small stone structure)

Sample: 564/BS (10 kg dry residue) mid orange-brown unconsolidated silty clay with traces of stones 6-60 mm, burnt soil, ash?, charcoal and fish bone.

Together with moderate amounts of charcoal up to 20 mm, there were a few poorly preserved charred cereal grains (oats, barley, rye and unidentifiable), charred hazel nutshell and ?heather twigs and goosegrass (*Galium aparine*) seeds. Amongst the bones, six eel and seven herring vertebrae were identified, along with 15 unidentifiable fish (mostly spines and fins) and five unidentifiable mammal fragments of which four were burnt.

Context Group 08.09.04

Context: 2112 (floor)

Sample: 586/BS (11 kg moist residue)

Moderate amounts of charcoal were accompanied by traces of wheat and barley grains, charred ?heather twigs and ?pea and ?vetch seeds. There were 134 unidentifiable bone fragments, of which 119 (60 burnt) were mammal. Four of the fish bones were burnt vertebrae. The eight identifiable fragments included one cattle femur, and caprovid femur, tibia and cuboid. Fish were represented by three eel vertebrae and one battered, burnt and freshly broken Pleuronectidae vertebra. Yet again, this deposit appears to have contained substantial quantities of kitchen or table waste.

Sample: 587/T (3 kg) mid-dark grey-brown ash with a small amount of silt and clay and traces of charcoal.

The minute washover contained only a few scraps of plant material; there was a small residue of sand and gravel with some bone (including several fish vertebrae and other elements), with a little charcoal and charred ?heather twigs and uncharred elder seeds. The only invertebrate remains present were modern contaminants: a thrips, a spider and a *Meligethes* pollen beetle.

Phase 8 summary

As for Phase 7, there was some evidence for possible burnt turves from several contexts, and one case in which a charred saw-sedge leaf fragment was recorded—perhaps originating in burnt thatch. Again, some assemblages with moderate numbers of fish bones were recorded and there was a background of charred cereals and pulses and also linseed. Although food debris was present, there little evidence for domestic occupation. The charred cereals may have originated in thatch.

Phase 9 (13th/14th century)

Context Group 09.01.01

Context: 2120 (?abandonment dump (charcoal deposit))

Sample: 545/T (3 kg) mixture of amorphous to structured charcoal (to 10 mm) with light to mid orange-brown ?ash, locally with a distinct clay content.

There was a modest residue with about equal volumes of sand and gravel and of charcoal (probably mostly from roundwood, the largest fragments up to 20 mm); no other plant remains were observed.

Context: 2129 (?abandonment dump (charcoal-rich deposit))

Sample: 551/BS

Together with moderate amounts of charcoal, there were a few charred grains, mostly oats, but also ?rye and some unidentifiable specimens.

Context Group 09.01.03

Context: 2095 (backfill of cut 2107)

Sample: 535/BS (two sheets record 16.5 and 14 kg moist residue)

The sample was found to contain moderate amounts of charcoal (some of it oak), amongst which were a few charred cereals (barley, rye), charred ?heather twigs and charred hazel nutshell. There were 59 unidentifiable bone fragments, of which 39 were fish and 20 mammal. All the 32 identifiable fragments were fish and included herring, gadid, eel and cyprinid vertebrae (20, seven, two and two, respectively) and a single cyprinid pharyngeal bone.

It is not clear whether this material represented primary waste discarded into the cut or whether the bone component was simply introduced with redeposited sediment in backfill.

Context Group 09.04.15

Context: 2225 (fill of square cut 2238)

Sample: 629/BS (12.5 kg waterlogged residue)

There were moderate amounts of charcoal in this sample, together with traces of charred cultivated oat, rye, and wheat grains and charred hazel nutshell.

Context Group 09.04.23

Context: 2021(dump with burnt material)

Sample: 531/BS

Along with a few well preserved charred cereal grains (cultivated oats, barley, including hulled specimens, rye and wheat), were traces of charred leaf fragments of saw-sedge (see below), charred culm fragments (including nodes) of grass or cereal straw, and a charred cherry (*Prunus* Section *Cerasus*) stone. The sedge and grass/straw nodes must surely have originated in thatch.

Context: 2121 (dump with burnt material)

Sample: 547/BS (28 kg) mid orangeish-brown, crumbly (working slightly plastic) slightly clay sand with traces of stones or burnt soil 6-60 mm.

There were moderate amounts of charcoal, together with a few very poorly preserved cereal grains: barley, and tentatively identified specimens of oats, rye and wheat. One identifiable and 21 unidentifiable bone fragments were present. The single identifiable specimen was a large gadid (cod family) vertebra. The unidentifiable fraction included three fish and 18 mammal fragments.

Context: 2214 (dump with burnt material (=2208/2209))

Sample: 635/T (3 kg) mid grey-brown (with reddish cast), brittle and somewhat indurated (working sticky) sandy clay silt with traces of Magnesian limestone 6-20 mm, of pottery, and moderate amounts of charcoal to 20 mm (mostly smaller), and a quite high ash content; internally very varicoloured at mm scale.

The very small washover of about 10 cm³ or less and the small residue of sand and gravel with several sherds of pot and a little bone yielded a small assemblage of charred and uncharred plant remains including material perhaps from heathland turf (heather and ?heath rush) as well as plants likely to have grown in the vicinity of buildings (greater celandine, *Chelidonium majus*—the only record of this plant for the site—and elder). There were no invertebrate remains.

Sample: 636/BS (20 kg waterlogged residue)

There were a few charred grains (including barley, some twisted and therefore indicative of the 6-row form) and some charred hazel nutshell. There was also a tentatively identified charred field bean seed. Eleven identifiable and 41 unidentifiable bone fragments, of which 37 were mammal and four were large mammal, were recorded. Fish were represented by herring and eel vertebrae and a ?chub vertebra. Additionally, two caprovid fragments (a radius and a very worn incisor) were present.

Context Group 09.04.28

Context: 2019 (dump with burnt material)

Sample: 520/BS (16 kg moist residue + 10 kg moist residue recorded on two sheets) black, red, grey, brown and yellowish crisp, crunchy ash, clearly laminated in places, with traces of charcoal; some lumps to 100 mm of burnt soil or ash with mineralisation evident—plant detritus preserved as moulds or casts and with very vesicular internal structure.

The moderate amounts of coarse charcoal (to 40 mm) in this sample were accompanied by single specimens of charred barley grain and ?pea seeds. Two fish vertebrae, one being ?Pleuronectidae and one gadid (the latter chopped and burnt) were recorded. Bird remains were represented by a single Turdidae coracoid. Also noted were 33 unidentifiable mammal fragments of which 30 were burnt.

Context Group 09.04.34

Context: 2233 (clay lining of pit)

Sample: 634/BS (8 kg moist residue) mid greyish-brown, brittle (working crumbly, and sticky when wet) slightly sandy clay silt with traces of mortar/plaster and fish bone; modern algal and mould growth.

This sample yielded a moderate amount of charcoal, with traces of coal and some ?burnt peat. There was a very

large component of amphibian bone fragments (222), with a wide range of sizes and elements represented, but no material which could be identified more closely within project constraints. There were 41 unidentifiable fish and 23 unidentifiable mammal fragments. Identifiable fish remains included herring (22 vertebrae, one articular), eel (10 vertebrae), perch (five vertebrae), gadid (one vertebra) and haddock (one dentary, one opercular). There were also three fragments of *Apodemus* sp?p. (single specimens of maxilla, pelvis and scapula).

The presence of so much bone in a 'lining' seems peculiar and it might be that this context was in fact a thin silt layer representing a phase of disposal.

Context: 2555 (clay lining of pit)

Sample: 735/T (3 kg) (very heavily trowelled) light yellow-grey stiff pure clay and light grey-mid brown mottled silt (brittle, crumbly, working slightly plastic); rotten limestone and patches of red-brown sand also present; traces of charcoal and charred twigs.

There was a minute flot containing a few charred plant remains and a moderately large residue (for a 3 kg subsample) of sand and gravel with quite a lot of charcoal and burnt soil. The only identifiable remains were cereal grains (unidentifiable and ?oats) and charred grass and pale persicaria (*Polygonum lapathifolium*) seeds. There were no invertebrate remains.

Context Group 09.04.35

Context: 2145 (dump)

Sample: 561/T (3 kg) light orange to mid blueish-grey crumbly, brittle (working plastic, locally) sand with traces of burnt soil, ?ancient root traces, and charcoal; locally somewhat clayey; ashy.

The very small washover of about 5 cm³ of (primarily) charcoal contained a few scraps of uncharred plant and insect material; the small to moderate-sized residue was of undisaggregated (?burnt) sediment and sand with a little charcoal. The few identifiable plant remains included uncharred heather leaves and a few (mostly fragmentary) seeds of no particular interpretative value. There were no invertebrate remains.

Sample: 562/BS

There were moderate amounts of charcoal, together with traces of tentatively identified charred cereal grains (?barley, ?rye) and also ?vetch seeds.

Context Group 09.05.01

Context: 2397 (well fill; the stratigraphically lowest deposit)

Sample: 680/T (1 kg) mid brown to olive (speckled with mm scale orange ?iron deposits), indurated ?pan with traces of stones 2-20 mm and inclusions of mid-dark brown sandy silt with amorphous organic material and very rotted wood.

There was a very small washover of about 10-15 cm³ of fine plant detritus and insect cuticle; the modest-sized residue of about 200 cm³ was also mostly of plant detritus (with sand) and from this a second washover was taken. Preservation was rather variable, but often quite good. Food remains, perhaps from faeces, were clearly present here (though see below concerning the analysis of parasite eggs). There were traces of fine wheat/rye 'bran', and remains of some other foodplants: fig, strawberry (*Fragaria* cf. *vesca*), linseed, apple (*Malus sylvestris*), sloe (*Prunus spinosa*), blackberry (*Rubus fruticosus*), and raspberry (*R. idaeus*), mostly in very small numbers (though strawberry, raspberry and blackberry all achieved a score of '2' on the four-point scale of abundance used). Also present were several taxa likely to have originated in grassland habitats, notably field scabious (*Knautia arvensis*), bladder campion (*Silene vulgaris*) and upright hedge-parsley (*Torilis japonica*)—perhaps grassland bordering a path or by a hedgerow. Other remains were essentially weeds of various kinds; some, such as corncockle

(*Agrostemma githago*) were probably a flour contaminant (only fragments of the seeds of this species were found in the sample).

A rather small assemblage of beetles was present (28 taxa, 44 individuals), with a small but distinct house fauna component and some species likely to have co-existed with them. The remaining fauna would have been able to exploit an occupation site; outdoor forms were rather rare (there were only four individuals of two ground beetles, of taxa able to tolerate extreme disturbance). More informative were the abundant puparia of the fly *Thoracochaeta zosteræ*, believed to indicate very foul conditions—perhaps even urine-soaked material (the fly puparia as a group indicated foul wet conditions, with some organic matter of animal origin present). The absence of a substantial corresponding component amongst the beetles (*Creophilus maxillosus*, however, being very tolerant of wet foul matter) may indicate an environment too vile for most beetles, or that there was not time for substantial populations of foul decomposer beetles to develop.

A small subsample of concretion examined for parasite eggs was found to consist mainly of inorganic sediment; no identifiable microfossil remains were recorded.

Sample: 681/BS (25 kg wet residue)

This sample yielded some small (up to 20 mm) lumps of peaty sediment into which seeds of blackberry, raspberry or strawberry had impacted. It appeared that some of these were lumps of peat proper and others simply richly organic sediment from the matrix of the deposit which had formed into rounded clasts during processing and onto which the seeds had become impressed during drying.

Other food remains present were stones of plum/bullace (*Prunus domestica* ssp. *insititia*), cherry and sloe and traces of poorly preserved charred cereal grains.

There were some lumps of concreted material to 80 mm consisting largely of sand and other mineral material, with a little bone. Two 'squashes' gave a little organic detritus and amorphous organic material but was mostly mineral grains; there were no eggs of intestinal parasites or cereal bran and the concretions are not, therefore, thought to be faecal.

With regard to the bone assemblage from this sample, there were 30 identifiable and 33 (20 fish and 13 mammal) unidentifiable fragments. The identifiable fraction included six chicken phalanges and a carpal, of which one phalanx and the carpal were acid-etched. Additionally, a goose carpal (barnacle goose-sized) was acid-etched, as was one of the fish vertebrae. This vertebra was also squashed, consistent with having been eaten. Most of the 18 fish bones were eel vertebrae (12); also present were vertebrae of gadid (2), herring (3) and pleuronectid (1). Two Turdidae (thrush family) fragments were present: a scapula and a coracoid. All of these may have been food remains, although the Turdidae are as likely to have been wild birds living in the vicinity.

Contexts 2366 and 2231, stratigraphically between 2397 and 2230, were not examined.

Context: 2230 (well fill)

Sample: 662/BS (33 kg) light-mid orangeish-brown, plastic to crumbly (working plastic), slightly sandy clay with traces of stones 6-60 mm (including flints) and of charcoal.

No record of sorting.

Context: 2229 (well fill, above 2230)

Sample: 658/BS (14 kg waterlogged residue)

This sample yielded only a few very poorly preserved and unidentifiable charred cereal grains, charred hazel nutshell, ?heather twigs and ?vetch seeds, along with moderate amounts of charcoal up to 45 mm in maximum dimension. The unidentifiable fraction of the bone material from this sample included eight fish and 24 mammal

fragments. The identifiable fish remains (9) included herring, eel and pike, all in the form of vertebrae with the exception of a herring urohyal.

It seems likely that this layer consisted of redeposited surface deposits rather than representing primary waste disposal.

Context 2228, stratigraphically above 2229, was not examined.

Summary of Context Group 09.05.01

The fills of this well gave evidence for foul matter in the earliest stages of infilling, presumably representing the use of the feature for disposal after it had gone out of use. Though foul, the material could not *certainly* be proved to contain human faecal material. The uppermost fill examined appeared to contain material similar to that recorded from many of the floor and other surface deposits and it is probably redeposition of such deposits into the well which accounts for this.

Context Group 09.05.05

Context: 2143 (hearth/furnace deposit)

Sample: 556/BS mid greyish-brown indurated sandy silt, locally mid orange brown, ?burnt sediment.

Moderate amounts of charcoal up to 15 mm in maximum size were recorded, together with charred spikelets of cultivated oats and tentatively identified grains of rye.

Context: 2148 (hearth/furnace deposit)

Sample: 569/T (3 kg) mid-dark grey-brown to mid red-brown to black crumbly ?ash with patches of paler grey-brown silty clay and some large lumps of charcoal.

The washover of about 60 cm³ consisted of charcoal (some of it oak) and charred and 'silicified' herbaceous detritus; the residue was small to moderate in size and was mainly charcoal, burnt soil and sand. Charred shoot fragments of heather (and tentatively identified charred twig/root fragments, too), all perhaps from turf, were recorded and there were a few charred seeds of no particular significance at the context level. There were no invertebrate remains.

Sample: 570/BS (21 kg waterlogged residue)

There were moderate amounts of charcoal (to 40 mm) in this sample, together with flakes of charred bark and a few charred cereal grains, mostly oats (with grooves suggesting the endosperm had begun to be used before charring, presumably because of the initiation of germination), but also barley. Charred sloe stones and ?pea seeds were also present.

Context Group 09.05.08

Context: 1605 (dumps in yard)

Sample: 399/BS

Preservation of charred plant material in this sample was moderately good, but apart from modest amounts of charcoal, the only remains identified were grains of (?cultivated) oats, ?rye, and barley, with ?pea and vetch seeds.

Context: 1758 (dumps in yard)

Sample: 401/T (3 kg) mid-dark slightly greyish-brown, crumbly (working slightly plastic) sandy clay silt with traces of brick/tile or burnt clay and moderate amounts of charcoal (including oak) to 25 mm.

The very small washover of about 10 cm³ was of charcoal with a little fine plant detritus, including some very decayed ?wood fragments to 2 mm. There were leaves and buds of heather which were only lightly charred ('toasted') but rather few other identifiable remains. A trace of pine (*Pinus*) charcoal to 3 mm was noted, along with cultivated oat spikelets. The small to moderate-sized residue was of burnt soil and charcoal. There were no invertebrate remains.

Again, these deposits appeared to contain a large proportion of material derived from fires.

Context: 1787 (dumps in yard)

Sample: 422/BS (10.5 kg dry residue) light grey crumbly (very slightly sticky when wet) slightly silt sand with ?red burnt soil/ash.

There were moderate amounts of charcoal with traces of charred grass/cereal culm nodes which resembled those of common reed (*Phragmites australis*). The few charred cereals present were barley, rye and wheat.

Context Group 09.06.03

Context: 2069 (burnt clay)

Sample: 528/BS (10 kg waterlogged residue)

Moderate amounts of charcoal were accompanied by traces of cereals, of which some were identified as barley (including hulled specimens) and there was some charred hazel nutshell.

Context: 2092 (organic deposit of unknown function)

Sample: 533/BS

Apart from moderate amounts of charcoal, the only identifiable plant remains recovered were a single ?wheat grain and a few very poorly preserved oat grains.

Sample: 574/BS

There were moderate amounts of charcoal, together with a few charred cereal grains (poorly preserved barley and a single well-preserved rye) and one charred apple pip.

Sample: 575/T (4 kg) black to light reddish-brown ash and charcoal with lumps of clay.

The minute washover comprised a few scraps of plant detritus; in the small residue of sand and burnt soil there was quite a lot of charcoal to 25 mm, as well as traces of charred leather (to 20 mm) and a few identifiable plant remains, including charred cross-leaved heath leaves and uncharred heather leaves. Traces of cereals (oats, ?rye, barley) were also recorded.

There were remains of only five invertebrates, an assemblage with no ecological significance.

Though described by the excavator as 'organic', there were almost no biological remains, the appellation probably reflecting the dark colour resulting from the presence of fine charcoal.

Phase 9 summary

Overall, the assemblages from Phase 9 deposits were very similar to those from the two preceding phases: there was some evidence for burnt turves and perhaps also unburnt heather from turves or brushwood, and a further example of charred saw-sedge, presumably from thatch. Food remains, especially fish bones, were often a dominant component of the identifiable material. The rather rich biota from the well fill gave evidence for foul conditions, presumably because organic waste (perhaps including faecal material) was present. The presence of acid-etched and perhaps also chewed bone lends support to the inference that faecal material was amongst the fills. The large concentration of amphibian bone from the 'clay lining' of pit (Context 2233) is noteworthy; these animals seem much more likely to have entered the pit accidentally than to have been brought with clay to make the lining!

Phase 10 (13th/14th century)

Context Group 10.02.01

Context: 1930 (internal floor)

Sample: 494/T (3 kg) mid grey-brown (to light-mid red in patches, ?mineralised plant material), crumbly, brittle, ash, the matrix very varicoloured

There was a very small washover of about 10-20 cm³ containing white glassy/ashy slag 'beads' and some charred material, including several seeds and two capsule fragments of flax and some barley. The flax seeds were very distorted as a result of the burning process. Many fragments of 'silicified' herbaceous material were present; these were perhaps mainly from grass/straw but could not be identified further.

There was a large residue of bright red burnt soil (presumably strongly heated) with a little charcoal. Many fragments of the former bore impressions of plant detritus; there were also further 'silicified' plant fragments.

There were no invertebrate remains.

Sample: 495/BS (22 kg moist residue)

Small amounts of charred plant material including some flax capsule fragments (with their contained seeds intact) were present, along with modest amounts of charcoal and a few charred cereals (oats, ?rye, 6-row barley). Of particular significance were charred leaf fragments of saw-sedge (*Cladium*) and some charred grass/cereal stem fragments. There were 21 unidentifiable mammal bone fragments, of which 11 were burnt and some of the rest appeared scorched, together with three fish fragments. The identifiable fish fragments were all vertebrae and all were burnt; they included eel, herring and one pleuronectid (possibly plaice).

Like several in earlier phases, this context seems to have contained a mixture of food remains and debris likely to have originated in thatch.

Context: 1961 (internal floor)

Sample: 486/T (3 kg) mid-dark greyish-brown, crumbly (working slightly plastic) clay sand with traces of stones 6-60 mm and a trace of charcoal.

The washover of about 60 cm³ was of charcoal, especially fragments <1 mm. With the charcoal were small numbers of charred shoot fragments of heather, charred heath rush seeds, and a few charred seeds from plants of various origins. The small to moderate-sized residue was of sand and limestone. There were no invertebrate remains.

Context Group 10.02.11

Context: 1613 (floor surface)

Sample: 444/T (3 kg) mid olive-brown, stiff (working plastic and sticky) slightly sandy clay silt, with traces of stones 6-20 mm, of slag or burnt soil, and of charcoal, with darker coloured clay silt, crumbly 'ash' patches and cm-scale lighter grey 'clay'.

The minute washover was of charcoal and the very small residue of sand and iron-concreted sediment (?iron pan). Apart from traces of elder seed fragments, poorly preserved poppy (*Papaver argemone*) seeds and charcoal to 5 mm, no plant remains were recorded. There were no invertebrate remains apart from a few *Cristatella mucedo* statoblasts, indicating an aquatic influence, although whether primary or secondary could not be determined.

Context Group 10.02.14

Context: 1919 (floor surface)

Sample: 460/T (3 kg) mid grey-brown, plastic to slightly stiff sandy clay silt with traces of stones (chalk) 20-60 mm and of charcoal to 30 mm; varies in colour; locally feels slightly 'ashy', locally somewhat laminated.

The washover was about 80 cm³ of charcoal containing a modest range of charred plant remains, mostly seeds of weeds (though with some suggestion of wetland origins), but with heather twig/root fragments and charred barley grains. The small residue was of sand with gravel and iron-rich concretions. There were no invertebrate remains.

A small subsample examined for parasite eggs was found to consist mainly of inorganic sediment; no identifiable microfossil remains were recorded.

Sample: 461/BS (13 kg)

This sample yielded some well preserved cereal grains identified as oats, wheat, barley (including hulled material) and rye; a charred sloe stone bearing 'flesh' was also noted. There were 113 unidentifiable (30 fish, one large mammal and 82 mammal) and 25 identifiable bone fragments. Identifiable fragments included a burnt cattle carpal, 14 herring vertebrae, four eel vertebrae, three gadid vertebrae and a pharyngeal fragment, and one pike vertebra.

Context Group 10.02.16

Context: 1700 (floor surface)

Sample: 404/T (3 kg) mid-dark brown, crumbly, slightly brittle to soft (working just plastic), very slightly humic sandy silt—maybe largely ash—with traces of charcoal and red ashy lumps (burnt soil?) and greyish clay.

The washover of about 30 cm³ consisted largely of charcoal, though there was also some charred herbaceous detritus amongst which some specimens were clearly from stems with a spongy pith (perhaps from rushes?). Other remains included weed seeds, mostly charred. The moderate-sized residue was of sand and burnt soil with some lumps of baked (fused and presumably strongly heated) clay with plant impressions; there was also quite a lot of

(?roundwood) charcoal which had not been carried off in the washover. There were no invertebrate remains.

Sample: 405/BS (14 kg residue)

Though few, the charred cereals and grasses in this sample—wild oats (*Avena fatua*), barley (including hulled specimens), rye and hexaploid wheat—were rather well preserved. There were also quite a lot of coarse (to 25 mm) charcoal fragments and a few fragments of charred hazel nutshell, as well as charred linseed. A total of 25 unidentifiable bone fragments was recorded from the sample. The bulk of the identifiable fragments were herring vertebrae (11) and there was a single eel dentary.

Context Group 10.02.19

Context: 1598 (floor surface)

Sample: 389/T (3 kg) light greyish-brown stiff (working plastic to slightly crumbly) sandy, slightly silty clay with ?organic flecks and traces of charcoal; modern algae present.

The very small washover was barely 1-2 cm³ in volume. It contained a little charcoal to 10 mm, mostly <2 mm and a few very poorly preserved seeds including strawberry, henbane (*Hyoscyamus niger*), weld, ?raspberry, elder and stinging nettle (*Urtica dioica*). The small to moderate-sized residue was of sand and iron-concreted sediment with a little gravel.

Preservation of invertebrates was very poor. Of sixteen beetle taxa, only one was represented by more than one individual. However, the aquatic component seemed larger than is likely to have occurred by chance, over a third of the fauna falling in this category. There was a distinct group of flowing-water beetles, all elmids: two *Esolus parralelepipedus*, and single individuals of *Limnius* sp. and ?*Normandia nitens*. These species all indicate clean water and a firm substratum, so that an origin in floodwater seems likely (the alternative explanation that the beetles arrived in flight seems improbable in this case). Flooding (or at least the incorporation of waterlain sediment) is strongly supported by the abundant *Cristatella mucedo* statoblasts and the presence of *Chara* (stonewort) oogonia. The terrestrial fauna was of mixed ecological origins.

It is hard to be sure whether this material was redeposited river silt or was dropped *in situ* by an episode of flooding. The fact that remains preserved by anoxic waterlogging had survived perhaps just tips the balance in favour of *in situ* deposition by floodwater, since the remains might be expected to have decayed in a dry floor surface if it received prolonged use. Repeated deposition of water, deliberately or accidentally, by the inhabitants of these buildings onto floors during their use might also have introduced these organisms, however; many craft and industrial processes require plentiful water, the quality of which would perhaps not have been important.

Sample: 390/BS (25 kg)

This sample was found to contain a few scraps of wood (to 30 mm) with charcoal and ?heather root/twig fragments.

Context Group 10.02.25

Context: 1773 (floor surface)

Sample: 420/T (3 kg) mid brown plastic, slightly sandy silty clay with traces of stones 2-6 mm, of ?mortar/plaster and ?charcoal; traces of laminations locally, perhaps very slightly humic.

There was a volume of 2-3 cm³ of fine charcoal in the washover with a little fine plant detritus amongst which were uncharred heather leaves and a reedmace (*Typha*) fruit; the small to moderate-sized residue of sand and gravel was rich in iron slag. There were no invertebrate remains.

A small subsample examined for parasite eggs was found to consist mainly of inorganic sediment; no identifiable microfossil remains were recorded other than a few fungal spores and phytoliths.

Context Group 10.02.28

Context: 1571 (floor surface)

Sample: 365/T (3 kg)

Millimetre-scale laminations of nearly black to light brown with some more substantial patches; probably ash.

The washover was about 50 cm³ in volume and consisted almost wholly of fine charcoal and charred herbaceous detritus; the residue was small to moderate in size, mainly sand but with much iron slag to 40 mm and some more charcoal and a few very damaged charred cereal grains (including ?rye). Traces of charred cereal chaff were noted in this sample, along with charred stem fragments of moss (including *Polytrichum*) and charred *Montia* seeds, perhaps suggesting the presence of burnt turf. There were no invertebrate remains.

Sample: 367/BS (7 kg dry residue)

There were moderate amounts of charcoal together with a small amount of grain and some hazel nutshell; the preservation of the grain was mostly quite good, and oats, barley (including hulled and 6-row twisted grains) and wheat were all identified. The bulk of the identifiable fish remains were herring vertebrae (12) with a single eel vertebra. Also present were 90 unidentifiable bone fragments (33 fish and 57 mammal).

Context Group 10.02.39

Context: 1650 (floor surface)

Sample: 428/T (3 kg) mid slightly orangeish-brown, stiff (working crumbly, then plastic and sticky when wet) sandy silty clay with traces of ash and charcoal, locally pure clay and pure sand, and with some fine voids, perhaps resulting from desiccation, and mm- to cm-scale mottles varying from pale grey-brown to mid-dark brown.

There was a minute washover of charcoal and coal and a small residue of sand and iron-rich concreted sediment. The only identifiable plant remains recorded were charred seeds of two weed taxa and fragments of uncharred elder seeds. There were no invertebrate remains.

Context Group 10.03.02

Context: 2116 (burnt deposit - ?dump)

Sample: 542/BS

Moderate amounts of charcoal and of charred saw-sedge (*Cladium*) leaf fragments were present, along with traces of charred ?rye, ?wheat and barley grains, grass/cereal stem, and wheat/barley rachis (ear-stalk), the material together suggesting the presence of burnt roofing material.

Sample: 542/SPT (2 kg) black (with red-brown cast) charcoal with a little ?burnt soil.

The large residue consisted of about 400 cm³ of charcoal and 500 cm³ of burnt soil and sand; a washover was taken and both fractions dried. The charcoal was found to include some quite large pieces (up to 35 mm); it was mostly oak (of which most fragments came from quite well-grown trees, a few from narrow-ringed branches) and a little ?willow.

Much of the charred herbaceous material in this sample was found to consist of leaf fragments of saw-sedge (*Cladium mariscus*)—some still bore their characteristic coarse marginal teeth. All had quite coarsely ridged

surfaces and internally there were 'struts' of tissue interrupted by spaces, giving a very characteristic appearance in cross-section. Some fragments without teeth showed the whole blade folded at the midrib; these were presumably from lower parts of the leaf. Also present in this sample were moderate amounts of charred grass/cereal culm and culm-nodes; the presence of rye and barley grains may indicate that this was cereal straw rather than, for example, reed.

One likely explanation for this material is that it represents burnt thatch and perhaps roof supports (see Discussion).

Context Group 10.04.01

Context: 1774 (external floor surface)

Sample: 423/T (3 kg) light-mid brown, layered very slightly sandy silty clay with traces of charcoal and some natural mottled grey/red-brown clay and mid-dark brown slightly sandy silt; some algal and mould growth.

There was a very small washover of about 15-20 cm³ in which there were traces of charred ?heather twig/root and charred herbaceous detritus. The residue was of sand and iron-rich concretions. There were no invertebrate remains.

Sample: 424/BS (31 kg)

The only plant remains recovered were a few scraps of wood and twigs (some showing evidence of mineral replacement), a piece of woody root/rhizome, charred ?barley grain, and a little charred hazel nutshell. Amongst the bone there were 17 unidentifiable and 20 identifiable fragments, all fish. Most of the identifiable material was herring (13 vertebrae, one urohyal), but eel (three vertebrae, one dentary), pike (one vertebra) and one cyprinid vertebra were also present.

Context Group 10.04.05

Context: 1599 (floor/yard deposit)

Sample: 409/T (3 kg) mid-dark reddish-grey-brown, brittle ash with moderate amounts of charcoal (in flecks to 5 mm) and internal variation of colour: bright red/white/black and with slight layering.

The very small washover of about 10-20 cm³ included some charred herbaceous detritus amongst which were moss stems, charred and 'toasted' heather leaves and shoot fragments and charred cross-leaved heath leaves, perhaps betokening the presence of burnt turves. The small residue was of sand with more charred heather root/twig fragments and burnt soil.

There were no invertebrate remains.

Sample: 410/BS (4 kg moist residue)

There were a few charred cereal grains (oats and barley, as well as unidentifiable specimens), as well as ?pea and three charred root or rhizome fragments, the last perhaps from turves. Twenty-three unidentifiable bone fragments (11 fish and 12 mammal) were also present and there were some fish remains, mostly herring (17 vertebrae), but also a single cyprinid vertebra.

Context Group 10.04.06

Context: 1615 (floor/yard deposit)

Sample: 392/T (1 kg) mid-dark reddish-brown, crumbly silty sand with traces of charcoal; root channels observed; some lumps sandier and redder.

The very small washover, a few cm³ only, was mainly charcoal but charred heather root/twig and root/rhizome fragments were present, together with charred cotton-grass (*Eriophorum vaginatum*) 'sclerenchyma spindles' suggesting that burnt peat and/or turf was present. There was a very small residue of sand with a little more ?heather and ?peat. There were no invertebrate remains.

Sample: 393/BS (10.5 kg moist residue)

There were moderate amounts of charcoal in this sample, with traces of charred cereals (?rye, barley—including hulled specimens—and wheat), charred hazel nutshell and tentatively identified pea and field bean seeds.

Context Group 10.04.16

Context: 1545 (hearth (use) deposit)

Sample: 356/T (3 kg) mid-dark grey-brown crumbly (often layered) (working plastic) sandy clay silt with traces of charcoal; clay content variable and layering reflected in variations of both colour and mineral component. Bone material from this sample was very fragmented. All 53 fragments were unidentifiable and 23 of these were burnt.

There was about 30 cm³ of washover which was mainly charcoal to 15 mm, amongst which were charred moss and root/rhizome fragments suggestive of the presence of burnt turves. The small to moderate-sized residue was of sand with small amounts of charred ?heather root/twig and also some ?root/rhizome fragments. There were no invertebrate remains.

A small subsample examined for parasite eggs was found to consist mainly of inorganic sediment; no identifiable microfossil remains were recorded other than some phytoliths and a few diatoms and fungal hyphae.

Sample: 357/BS (3 kg moist residue)

Together with moderate amounts of charcoal, this sample yielded a few very poorly preserved charred cereals (oats, ?barley, ?rye and ?wheat) and ?pea seeds, as well as ?heather root/twig fragments. Identifiable bone fragments comprised herring (5) and eel (2) vertebrae. Additionally there were 21 unidentifiable fish fragments and ten burnt and tiny unidentifiable mammal fragments.

Context Group 10.04.20

Context: 1140 (external surface, ?dump)

Sample: 336/T (3 kg) mid-dark orangeish-brown crumbly (working soft, some lumps compacted) sandy silt with traces of charcoal and burnt and unburnt bone; locally a few lumps of clay; modern contaminant moss.

The washover of about 50 cm³ was of charcoal amongst which there was rather a lot of charred ?heather root/twig fragments, some charred weed seeds and some poorly preserved cereal grain (oats, barley and ?bread/club wheat). The small to moderate-sized residue was of sand. There were no invertebrate remains.

Sample: 337/BS (6 kg dry residue)

Oats, ?rye, barley and wheat grains were all present; some of the oats and barley showed evidence of having begun to sprout. Also present were moderate amounts of charcoal, ?heather root/twig, and ?pea seeds.

Context Group 10.04.25

Context: 1168 (pit fill)

Sample: 142/T (3 kg) mid slightly greyish-brown, plastic to crumbly (working plastic) sandy silty clay and sandy clay silt with some pale brown to orange lumps and mottled red-brown clay in patches.

The very small washover, a few cm³ only, was mainly charcoal and charred herbaceous detritus with a few weed seeds (including one of only three records of charred corncockle seeds for this site). There were also traces of wood showing some mineral replacement. The moderate-sized residue of sand and gravel contained with iron-rich concretions (?pan or natural ironstone). There were no invertebrate remains.

Sample: 143/BS(7 kg dry residue)

There were moderate amounts of charcoal, together with traces of charred seeds (corncockle, again), cereal grains (?rye, barley, including hulled specimens, and wheat) and hazel nutshell. Seventy unidentifiable (26 fish and 44 mammal) and seven identifiable bone fragments were recorded. Identifiable fish included herring (4), cyprinid (1) and gadid, one quadrate and one parasphenoid.

Context Group 10.05.01

Context: 1916 (garden soil)

Sample: 473/BS

The sample yielded a few poorly preserved charred cereal grains (?barley, ?wheat), ?heather root/twig and moderate amounts of charcoal. These remains were presumably secondary, derived from the same source as those in the floors and other layers.

Context Group 10.05.03

Context: 1590 (external surface)

Sample: 386/T (3 kg) mid grey-brown, crumbly (working sticky and slightly plastic) silty sandy clay with traces of rotted limestone and of pottery and modern algae and moss; locally slightly more grey and brown internally; hints of internal crumb structure.

The small washover of about 30 cm³ consisted of charcoal with traces of charred herbaceous detritus and ?heather root/twig and rare weed seeds; the small residue was of sand and gravel with a little more charcoal and charred ?heather root/twig. There were no invertebrate remains.

Phase 10 summary

Much the same kinds of plant and animal remains were recorded from deposits of this phase as from the preceding ones; saw-sedge was present in several contexts and remains probably from burnt turves were regularly recorded. One invertebrate assemblage from a floor surface clearly indicated a waterlain sediment; from the sample it is uncertain whether it formed *in situ* or was redeposited. Most floors seem to have been kept very clean, with no self-preserving build-up of litter; most of the biological remains were bone or charred plant remains, the latter giving the impression that they may largely have originated in ash or part-burned fire debris. If ash was regularly being spread across the floor it may have accelerated the decay of such soft material as was discarded. The 'turf'

and cereal remains here and elsewhere in the deposits at the North Bridge site may indicate material which gradually fell from turf and thatch roofs, or which were trampled into the floor during construction or roof repair, and subsequently charred when fires were lit on floor surfaces. Alternatively—and, bearing in mind the probable industrial use of these buildings, just as likely—the charred turf and ?straw remains, and wood charcoal, may represent accidentally burnt roofs.

Phase 11 (13th/14th century)

Context Group 11.01.04

Context: 1904 (floor within building)

Sample: 443/T (1 kg) mid-dark orangeish-brown, crumbly (working soft), silty sand with traces of stones 2-20 mm, charcoal, and pottery.

The very small washover, a few cm³ only, contained some charred heather shoot fragments and cereal grains (rye and unidentifiable specimens) as well as some charred herbaceous detritus which might be grass/sedge culm—these, with the heather and charred ?heath rush seeds suggest the presence of burnt turf (burnt ?peat was recorded, too). The small residue was of sand with traces of gravel and one pot sherd. There were no invertebrate remains apart from a single *Daphnia ephippium*.

Context Group 11.01.06

Context: 1418 (floor within building)

Sample: 417/T (3 kg) mid-dark greyish-brown, crumbly, sandy clay silt with traces of ash and charcoal, and very dark grey patches and light orange-brown patches of ash.

There was a tiny flot containing only a few scraps of poorly preserved seeds and a few fragments of charred herbaceous material (?from straw—barley rachis fragments were present) and a few charred seeds; the small to moderate-sized residue was of sand and burnt soil. There were no invertebrate remains.

Context Group 11.01.09

Context: 1595 (floor within building)

Sample: 387/T (3 kg) mid-dark greyish-brown, crumbly to brittle (working soft and plastic when wet), sandy silty clay with traces of charcoal and modern algae; internally flecked light grey and orange-brown (very variable); also flecks of organic detritus; slight layering internally, too.

The small washover of about 15-20 cm³ was very rich in pale, very degraded poppy seeds, of which some, at least, were apparently *Papaver argemone*. There was a small residue of sand. There were no invertebrate remains.

Sample: 388/BS

There were a few poorly preserved charred cereal grains (oats and wheat) and ?heather root/twig in this sample, together with moderate amounts of charcoal.

Context Group 11.01.14

Context 1757 (surface accumulating against Building 13)

Sample 403/BS

A few charred remains were recorded from the washover from this sample; they included heather shoots and ?heather root-twig fragments, and bread wheat and barley grains, together with charred rhizome fragments and hair moss (*Polytrichum*) stems, the last two (?with the heather) perhaps from burnt turves.

Context Group 11.02.03

Context: 1586 (floor surface)

Sample: 380/T (3 kg) mid grey-brown (with orange cast), crumbly (with clay patches working plastic when wet), slightly silt sand and sandy silty clay, with mm-scale voids, abundant ash and moderate amounts of charcoal.

The very small washover of about 10-15 cm³ contained charred herbaceous detritus, root-rhizome fragments and *Montia fontana* ssp. *chondrosperma*, together perhaps suggesting the presence of burnt turf. The small residue was of rather clean sand and charcoal.

The only invertebrate recorded was a single indeterminate beetle.

Sample: 381/BS (14 kg moist residue)

Four poorly preserved cereal grains (not identifiable to genus) were recovered from this sample, along with moderate amounts of charcoal (including oak) and some burnt bark. There were five identifiable and 36 unidentifiable (35 mammal, all very small and all burnt) fragments. Identifiable fragments were also all burnt: a single herring vertebra and four gadid vertebrae.

Context Group 11.03.02

Context: 1489 (external surface)

Sample: 416/BS (5.5 kg dry residue)

There were moderate amounts of oak charcoal and traces of charred ?heather root/twig in this sample, with traces of charred cereals (oats, barley) and ?pea seeds. The bone assemblage comprised 25 unidentifiable mammal fragments, 18 of them burnt, and three fish specimens. Fish present in the identifiable fraction included eel (three vertebrae), pike (one vertebra, ?chopped and burnt), ?pleuronectid (one vertebra, burnt) and a herring ceratohyal.

Context: 1801 (external surface)

Sample: 411/T (3 kg) mid brown, crumbly to slightly compressed silty clay with traces of stones 6-20 mm and of charcoal and with orange flecks throughout.

The very small washover of about 20-30 cm³ contained a few charred and uncharred seeds of no particular significance with ?heather root/twig and charred herbaceous detritus. The small residue was of clean sand and gravel. There were no invertebrate remains.

A small subsample examined for parasite eggs was found to consist mainly of inorganic sediment; no identifiable microfossil remains were recorded other than a few fungal hyphae and phytoliths.

Sample: 412/BS (8.5 kg wet residue)

There were a few poorly preserved charred cereal grains (?wheat, barley) with moderate amounts of charcoal in this sample. Sixty-seven unidentifiable bone fragments were recorded representing mammals (55 fragments, of which 22 were burnt, mostly commensurate with those of sheep), fish (12, two burnt and one squashed, probably through mastication). There were also seven identifiable fish fragments, all vertebrae: eel (4), herring (2) and ?pike (1).

Context Group 11.03.03

Context: 1744 (internal surface in building)

Sample: 407/BS (5 kg wet residue)

The sample yielded a few charred remains: moderate amounts of charcoal, with traces of ?heather root/twig, ?rye, barley and wheat grains, and ?pea seeds. There were 134 unidentifiable bone fragments of which 80 were mammal (mostly commensurate with those of sheep), 56 of them burnt. The identifiable fraction included pig (one fourth deciduous premolar), and chicken (one pelvis). Amongst the fish remains, eel predominated (26 vertebrae, one prevomer), but there were also remains of herring (four vertebrae), pike (two vertebrae) and a ?cyprinid vertebra.

Sample: 408/T (3 kg) mid brown (locally more grey and darker), crumbly (working plastic locally) silty clay sand with traces of stones 20-60 mm and of charcoal; some variation in texture—more clayey and ?layered within lumps, also patches of orange ?burnt soil.

The washover of about 20 cm³ contained charred herbaceous detritus with a few charred grains (?wheat and barley, as well as some unidentifiable grains); a few uncharred and well preserved deadly nightshade (*Atropa bella-donna*) seeds seem likely to have originated in a plant growing close to the point of deposition. There were, however, no other uncharred plant remains. The small to moderate-sized residue was of sand with burnt soil. There were no invertebrate remains.

Phase 11 summary

The relatively few samples yielding more than traces of plant remains again pointed to the presence of burnt turves or similar material. The floor deposits contained only charred plant remains and small or fragmentary bone, indicating the kinds of materials trampled into them during their life. The biological remains were thus much the same as in earlier phases, suggesting continuity in site use.

Phase 12 (13th/14th century)

Context Group 12.01.01

Context: 1505 (floor of building)

Sample: 350/T (3 kg) dark grey-brown crumbly sandy silt and mid yellow-brown to light grey stiff (working plastic) sandy silty clay with stones 2-20 mm present; voids/burrows and fish bone also noted.

The washover of about 50 cm³ consisted principally of charcoal; a few other charred plant remains were recorded, but there was no evidence for any material which might represent the 'organic lenses' recorded by the excavator. The small residue was of sand and iron-rich concretions (?pan) with a little gravel and bone. There were no invertebrate remains other than a few *Cristatella mucedo* statoblasts, indicating the incorporation of flood silt, either *in situ* or redeposited.

Sample: 360/BS (37 kg in tub, but sample full of water!)

Only a trace of charcoal was recorded as plant material from this sample. There was some bone, however: 22

identifiable and 29 unidentifiable (21 fish and eight mammal) fragments. Fish remains included eel (10 vertebrae), herring (nine vertebrae, one ceratohyal), one cyprinid vertebra and a ray dermal denticle.

Context Group 12.05.03

Context: 1614 (external surface)

Sample: 394/T (3 kg) mid grey-brown, crumbly (working slightly plastic locally) sandy clay silt with traces of pottery, charcoal and bone.

The small washover of about 20 cm³ was mostly of charcoal to 10 mm with uncharred heather leaves and charred ?heather root/twig fragments; there were a few other charred and uncharred remains, probably from cornfield weeds and weeds growing locally to the site. The small residue of sand contained a little bone.

Invertebrate macrofossils were present in only trace amounts. The presence of a single *Daphnia* ephippium hints at the incorporation of a waterlain component, but no more.

Sample: 395/BS (12 kg dry residue)

A few charred cereals (hulled barley and wheat), charred hazel nutshell and uncharred elder seeds were all recorded, together with moderate amounts of charcoal. There were also some charred ?heather root/twig fragments. Eight of the 15 unidentifiable bone fragments were burnt. Fish remains included eel (1) and herring (2) vertebrae. One herring vertebra was burnt.

Phase 12 summary

Very little can be said about the rather few biological remains recorded from the two contexts examined. They were similar in general to those from much of the rest of the site, and if not residual indicate broad continuity of site usage.

Phase 13 (13th/14th century)

Context Group 13.01.01

Context: 1364 (floor in Building 13)

Sample: 232/T (3 kg) mid brown (slightly grey), stiff (working plastic) sandy silty clay with traces of charcoal and traces of ?burnt soil and of light grey clay.

The very small washover of about 15-20 cm³ was mainly coal and charcoal with traces of charred herbaceous detritus and ?heather root/twig; the small residue consisted of sand and iron-rich concretions with a little gravel. Apart from three *Cristatella mucedo* statoblasts (indicating a waterlain component) and a single mite, there were no invertebrate remains.

Context: 1387 (floor in Building 13)

Sample: 295/T (3 kg)

(No laboratory description made.)

The washover of about 20 cm³ was of fine plant detritus and charred herbaceous detritus. Most of the identifiable remains were charred: weed seeds, ?heather root/twig fragments, hazel nutshell. There was a small to moderate-sized residue of sand and burnt soil with quite a lot of charcoal (including ash and oak). There were no

invertebrate remains.

Sample: 296/BS (12 kg)

Some well-preserved cereal grains were present (oats, ?rye, barley and hexaploid wheat, some of the oats showing signs of germination), with charred ?pea and hazel nutshell. Most of the 34 identifiable bone fragments were fish and included 26 herring vertebrae (three of them burnt), one otic bulla, and one basioccipital. Four other vertebrae were identifiable: two eel, one gadid (burnt) and one cyprinid. There were also two cattle fragments (one second molar, one carpal). The unidentifiable fraction comprised 13 fish and 84 mammal fragments, 82 of the latter being burnt.

Context: 1413 (floor in Rooms C and D, Building 13)

Sample: 285/BS (8.5 kg moist)

This sample yielded a few charred cereal grains (including barley and wheat), moderate amounts of charcoal and traces of charred ?leather.

Sample: 305/T (3 kg) clasts of coarse varicoloured brittle sand, mid-dark grey-brown ?ash and small lumps of light greyish clay; some 'silt' lumps have internal layering; traces of stones 20-60 mm.

The very small washover, no more than about 10 cm³ contained charcoal, charred herbaceous detritus and ?heather root/twig fragments and uncharred seed fragments of elder; the small to moderate-sized residue was of sand with a little gravel (including ?burnt Magnesian limestone) and more ?heather root/twig.

There were only single individuals of two beetle species.

Sample 320/BS

There was a variety of plant remains in the washover, perhaps unusually rich in uncharred remains given the context type. They included saw-sedge nutlets, leafy shoot fragments of gorse, holly leaf prickles, charred linseed, and several charred remains: barley, ?field bean, bread wheat and charred arable weed seeds. No particular group predominated.

A total of 43 unidentifiable and four identifiable fragments were recovered. The unidentifiable fraction included 17 fish fragments; identifiable fish remains included cyprinid and herring vertebrae.

Context Group 13.01.09

Context: 1356 (floor from building)

Sample: 230/T (3 kg) light brownish-grey, perhaps slightly layered, slightly sandy silty clay jumbled with mid-dark grey-brown crumbly sandy clay silt ?with an organic content.

The very small washover, a few cm³ at most was mainly charcoal with a little coal; there were a few very poorly preserved charred cereal grains (?oats, ?wheat) and a hint of possible charred peat (though this is very uncertain; interestingly, a single seed fragment of the bogbean, *Menyanthes trifoliata*, was recorded—this plant is commonly found as seeds in fen and bog peats). The small residue was of sand with iron-rich concretions/pan/ironstone. There were no invertebrate remains other than a *Cristatella mucedo* statoblast and some earthworm egg capsules.

Context Group 13.03.01

Context: 1440 (pit fill)

Sample: 313/T (3 kg) light grey to light-mid grey-brown to mid brown to yellow/grey-brown crumbly (working slightly plastic and sticky when wet) silty clay sand (with occasional small patches of light grey clay) with traces of coal and charcoal; veins of ?iron-rich material.

The tiny washover, 1-2 cm³ at most contained only a few plant remains of probable local origins, except for some Characeae (stonewort) oogonia (resting bodies of certain freshwater green algae) which seem likely to have arrived in aquatic sediments; the very small residue of about 100 cm³ consisted of ±rounded lumps of concreted sediment which seemed to be iron-rich and not faecal. There were no invertebrate remains apart from a few earthworm egg capsules, quite possibly of much later origin than the deposit.

Context Group 13.03.08

Context: 1798 (backfill of hollow)

Sample: 440/T (3 kg) mid grey-brown, crumbly (working slightly plastic), slightly sandy silt with flecks of ?rotted lime and modern moss growth.

The very small washover, no more than a few cm³ was mostly charcoal and coal; there was a little very decayed and mineral-replaced wood and a few charred and uncharred seeds, mainly from weeds. The small residue was of sand and gravel and contained 85 amphibian bones represented by a range of elements and sizes. There were three fish vertebrae (one eel and two herring). There were no invertebrate remains.

Phase 13 summary

Again, the rather few contexts examined yielded only small numbers of biological remains, though one floor (1413) gave small amounts of plant material which may have originated in litter or roofing material and there was some bone, probably mostly representing food debris. The concentration of amphibian remains in Context 1798 is interesting and could indicate hibernating or sheltering animals which were accidentally buried. Alternatively, they may be remains of a breeding population in a wet hollow.

(No material from **Phase 14** was examined.)

Phase 15 (14th/15th century)

Context Group 15.02.01

Context: 1111 (floor in building)

Sample: 100/T (3 kg) mid brown, stiff (working plastic), slightly sandy silty clay, with small patches of lighter, greyish, and darker (?humic) material and traces of charcoal.

The very small washover of about 10-15 cm³ contained traces of charred ?heather root/twig and ?heath rush seeds and some burnt ?peat fragments—these three suggesting the presence of burnt turves or peat; the small residue consisted about equally of sand and sand- to gravel-sized iron-rich concretions. There were no invertebrate remains apart from a few *Cristatella mucedo* statoblasts which indicated a waterlain component.

A small subsample examined for parasite eggs was found to consist mainly of inorganic sediment; no identifiable microfossil remains were recorded other than a few fungal hyphae and phytoliths.

Sample: 101/BS (8 kg dry residue)

There were traces of charcoal and charred ?heather root/twig fragments.

Context: 1112 (floor in building)

Sample: 76/TA (1 kg) mid-dark orange-brown crumbly (working plastic) clay silt with traces of stones 2-60 mm and of charcoal; has the appearance of flood deposit.

There was a small washover of charred material mostly charcoal and charred ?heather root/twig fragments with some charred herbaceous fragments. The small residue was of sand and gravel.

Sample: 77 /BS (2 kg dry residue)

The sample yielded only traces of charred cereal grains (?wheat and unidentifiable specimens) and charred ?heather root/twig fragments, with moderate amounts of charcoal.

Context: 1184 (floor in building)

Sample: 156/T (1 kg) mid olive-brown, stiff (working soft and plastic), slightly sandy silty clay with traces of charcoal.

The tiny washover, < 1 cm³ was mostly charcoal and coal; there were traces of fine plant detritus, but scarcely anything identifiable; the small residue was sand and gravel. There were no invertebrate remains.

Context: 1197 (floor in building)

Sample: 161/T (3 kg) light-mid greyish-brown, stiff (working plastic), sandy clay silt with traces of stones 2-20 mm, charcoal, and patches of darker and paler sediment.

The tiny washover was mainly coal and charcoal < 2 mm. Rather extraordinarily, there was a flattened uncharred plant fragment which appeared to be a duckweed (*Lemna*) frond. It is rather difficult to see how this could be modern, but its presence unaccompanied by other uncharred remains (other than traces of elderberry seed fragments) is suspicious, although a similar phenomenon has been noted from Roman deposits with almost no other uncharred plant material from excavations in Peasholme Green, York (Carrott *et al.* 1997). The small to moderate-sized residue was of sand and iron-rich concretions (?pan). Two *Cristatella mucedo* statoblasts and an earthworm egg capsule were also noted.

Context: 1248 (floor (infill of hollow) in building)

Sample: 191/T (3 kg) light greyish-brown, plastic to slightly crumbly (locally more plastic or more crumbly) silty clay with occasional patches of blue-grey and mid brown crumbly sandy silt with ?humic matter; a trace of pottery.

The very small washover, a few cm³, was mainly charcoal, but there were also rare charred and uncharred heather leaves/shoot fragments, and charred ?heather root/twig fragments; three charred cereal grains were also present (wheat and unidentifiable). There was a small residue of sand with a little gravel and iron-rich concretions.

The only invertebrate recovered was a single unidentified weevil.

Context Group 15.02.04

Context: 1117 (floor in large house)

Sample: 75/TA (1 kg) dark brown plastic and layered very slightly sandy silty clay with amorphous organic sediment in layers and traces of charcoal; some parts pale brown and locally more grey stiff (working plastic) silty clay.

The small washover was of charcoal with traces of coal and cinder; there was quite a lot of charred ?heather root/twig fragments and some charred herbaceous stem, perhaps including sedge (*Carex*); the small residue was of sand and gravel with a little coal.

Context Group 15.02.13

Context: 1237 (hearth deposit in Room C)

Sample: 179/T (3 kg) reddish-brown, brittle, unconsolidated sand and brownish-grey plastic sandy clay silt; perhaps waterlain and jumbled *in situ* or redeposited; locally has a distinct laminar structure at mm to cm scale.

The washover of about 20 cm³ was of charcoal with traces of uncharred elder seed fragments; the large residue was almost purely of sand and fine iron-rich concreted sediment (?pan). There were no invertebrate remains.

A small subsample examined for parasite eggs was found to consist mainly of inorganic sediment; no identifiable microfossil remains were recorded other than some fungal hyphae.

Context Group 15.03.01

Context: 1309 (burnt (hearth) deposit)

Sample: 215/T (1 kg) mid orangeish-brown, crumbly (working soft) sandy silt with traces of stones 6-20 mm and charcoal; some lumps with slight layering with orange sandy material and a layer of mottled sediment with very rotted charcoal and very rotted wood.

The moderate-sized washover of about 50 cm³ contained coal, charcoal and burnt and unburnt peat/mor humus (one small fragment of greyish-brown sediment broke up to give amorphous organic sediment, sand/silt, and well preserved pollen/spores, principally *Sphagnum* and is therefore very likely to have been bog peat). The small residue was of sand with more (?lightly burnt or unburnt) peat or peaty soil. There were no invertebrate remains. Presumably the peat component in this sample originated in material brought as fuel.

Context Group 15.04.04

Context: 1328 (?floor surface)

Sample: 228/BS (11 kg)

There were traces of charred cereals (oats, ?wheat and unidentifiable), with charred ?heather root/twig fragments, charcoal and uncharred elder seeds. Only six unidentifiable mammal fragments (four of them burnt) and two unidentifiable fish bones were noted from this sample.

Sample: 229/T (3 kg) mid greyish-brown crumbly (working plastic) slightly sandy clay silt with traces of stones 2-6 mm (including chalk) and of charcoal; a slightly 'earthy' texture with fine peds and ?burrows (some with iron-salt linings).

The washover of about 20 cm³ contained a few charred and uncharred weed seeds with charred ?heather root/twig fragments; the small residue was of sand and small iron-rich concretions (?pan). Other than a few *Cristatella mucedo* statoblasts (indicating flooding or redeposition of flood silt) there were no invertebrate remains.

Context Group 15.04.06

Context: 1262 (backfill of (cess) pit 1366)

Sample: 213/T (1 kg) mid-dark reddish-brown, crumbly (working soft) sandy silt with traces of stones 2-6 mm and

rotted charcoal, and a few lumps with a clay component and reddish lumps of ?rotted sandstone.

The washover about 30 cm³ was of charcoal to 20 mm with a few very poorly preserved cereal grains (with iron-rich sediment adhering in places); the small residue was of sand. There were no invertebrate remains.

Sample: 214/BS (5 kg moist residue)

The small assemblage of charred and uncharred remains accompanying the moderate amounts of charcoal included charred ?heather root/twig fragments, cereal grains (?rye, barley, wheat) and a few weed seeds. A single small mammal pelvis was also recovered but could only be identified as vole/mouse. Additionally, the identifiable component included two gadid vertebrae. Unidentifiable fragments amounted to 39, of which seven were fish spines and finrays and the remainder were large- and medium-sized mammal shaft and rib fragments.

Context: 1310 (backfill of (cess) pit 1366)

Sample: 216/T (3 kg) mid, slightly orange grey-brown brittle (working crumbly, then plastic) sandy clay silt with a trace of charcoal; may have a variable content of ash.

The approximately 70 cm³ of washover was mostly charcoal, though a few charred cereals (barley, wheat), charred ?heather root/twig fragments, charred ?heath rush seeds and weed seeds were also present; the small residue was of sand with some pottery and charcoal and iron-concreted sediment, including root-channel moulds. There were no invertebrate remains.

A small subsample examined for parasite eggs was found to consist mainly of inorganic sediment; no identifiable microfossil remains were recorded other than a few diatoms.

Sample: 217/BS (9 kg moist residue)

Moderate amounts of charcoal were accompanied by charred cereals (oats, barley and wheat, the oats showing evidence of sprouting), ?pea seeds and hazel nutshell. This sample also produced 23 unidentifiable bone fragments: eight fish, and 15 mammal (11 of the latter burnt). Fish remains included two herring vertebrae and a battered gadid articular.

Context Group 15.05.01

Context: 1327 (dump/build-up to rear of building 16)

Sample: 226/BS (9 kg dry residue) mid grey-brown, unconsolidated, slightly clay silty and with traces of limestone 6-20 mm and 60+ mm, brick/tile and charcoal.

The few charred cereals present were poorly preserved and obscured by adhering sediment (they were identified as oats and barley, the latter including sprouted specimens); also present were some charred and uncharred weed seeds, charred ?heather root/twig fragments, and ?pea cotyledons. Bones from this sample tended to be small, battered and fragmented. Pike and herring vertebrae were identified, all being burnt. A pig mandible and isolated mandibular tooth were also present, with scorching noted on the mandible. Thirty of the 40 unidentifiable fragments were also burnt.

Context Group 15.05.03

Context: 1232 (backfill in ditch 1260)

Sample: 204/BS (6 kg dry residue)

There were moderate amounts of charcoal and also of uncharred elder seeds with traces of weed seeds, ?pea seeds, cereals (barley and wheat) and linseed. Four identifiable and 42 unidentifiable fragments were recovered from this sample. Mammals were represented by a caprovid phalanx and a small mammal (vole/mouse) ulna. Single vertebrae from eel and herring were also present.

Sample: 205/T (3 kg) mid grey-brown, crumbly (working plastic and sticky) silty sandy clay with traces of (?coal) shale 2-6 mm and charcoal; some internal structure on very small scale, as if penetrated by roots/burrows.

The very small washover of 10 cm³ or so contained charred ?heather root/twig fragments, root/rhizome fragments and a few other remains of no particular significance; the small residue was of sand with a little gravel. There were no invertebrate remains other than an earthworm egg capsule.

Phase 15 summary

Although only a few contexts were examined, several samples gave some possible evidence for burnt turves and perhaps peat. As before, the floors were generally rather clean.

Phase 16 (14th/15th century)

Context Group 16.02.02 (all fills of massive, roughly rectangular cut 1222)

Context: 2642, the lowermost context [Context 2642 was a grey-blue clayey-silty-sand with lenses of organic matter. Copious quantities of leather from this context date from the late 14th and/or 15th centuries.]

Sample: 807/SPT (0.5 kg) light to mid grey-brown to mid brown, crumbly, working plastic, clay silt locally with abundant plant detritus, including whole mature inflorescences of burdock (*Arctium* sp(p).), tree leaf fragments (including willow) and some twigs (including elder and willow).

The rather large residue (from 0.5 kg), mostly > 2 mm, was of very decayed twig fragments and herbaceous detritus (including many tree leaves, probably mostly willow) with remains of a variety of woody plants: ash (*Fraxinus*), holly (*Ilex*) oak, and sloe, with a very little undisaggregated silt. There were abundant well preserved seeds of a variety of annual, biennial and perennial herbaceous plants, especially hemlock (*Conium maculatum*), burdock, oraches (*Atriplex* sp(p).) with white horehound (*Marrubium vulgare*) and various *Polygonum* spp. Taken together, the assemblage and its matrix strongly suggest this deposit formed as an accumulation of flood silt and flood debris, but the presence of a single fig seed and the vegetative remains of gorse and bracken perhaps suggest some occupation material had become mixed with it (they may have been in the pit fill into which this flood deposit swirled as it formed)—here, the presence of abundant leather fragments recorded by the excavator accords with an interpretation involving mixing of rubbish and flood debris.

Only 17 beetle and bug taxa were recorded from the 0.5 kg spot sample, all represented by single individuals apart from the leaf beetle *Gastrophysa viridula*, associated with docks and knotgrasses (*Rumex* and *Polygonum* spp.). The remaining beetles were predominantly outdoor forms, which accounted for two-thirds of the assemblage. Deposition by river water seems entirely possible, but there were no characteristic indicators for this mechanism. The few invertebrates other than beetles were of little interpretative value.

Sample: 813/SPT

No subsample was processed, but the sediment was essentially the same as in Sample 807, though with a much lower content of plant material—but still many leaves (including willow and alder/hazel) and small twigs bedded in a fine clay silt.

A small assemblage of animal bones was recovered from this deposit by hand collection, most of the fragments representing cattle. Caprovid, pig and horse remains were present, although in much smaller numbers than those of cattle. The cattle and caprovid elements mainly comprised horncores, maxillae, mandibles and isolated teeth, with few elements representing major meat-bearing bones. Fragments recorded in the unidentifiable fraction included both large- and medium-sized mammal cranium, mandible, shaft, and rib fragments. It is highly likely that this assemblage represents a dump of primary butchery waste.

Context: 1390

Sample: 247/T (3 kg) mid greyish-brown, brittle (working crumbly, and plastic when wet) clay with traces of stones 6-20 mm, ?brick/tile and pottery and moderate amounts of charcoal.

The washover of about 100 cm³ washover consisted of coal with a little charcoal and traces of charred ?heather root/twig fragments and charred wheat and barley grains; the residue was small, mostly sand with a little gravel. There were no invertebrate remains apart from numerous earthworm egg capsules.

Sample: 248/BS (11 kg moist residue)

There were moderate amounts of charcoal with traces of ?wheat grains, ?pea seeds and uncharred elder seeds. Only 16 unidentifiable bone fragments were recovered.

Context: 1450

Sample: 734/BS (29 kg) light-mid grey, plastic (working plastic and soft) clay with traces of stones 2-6 mm and of charcoal.

The only plant remains recovered were fragments of charcoal, present in moderate amounts.

Context: 1199

Sample: 375/BS (10 kg dry residue)

There were moderate amounts of charcoal in the sample together with traces of very heavily silt-covered cereal grains (?wheat) and some burnt ?peat fragments. The few pieces of bone recorded from this sample were very poorly preserved. They included cattle tooth fragments and seven unidentifiable fragments.

Sample: 376/T (3 kg) mid grey-brown, crumbly (working slightly sticky when wet) slightly clay silt with tiny flecks of charcoal and of red burnt soil; the crumb structure may reflect the former presence of roots or of decayed matter.

The very small washover of about 30 cm³ contained a little very decayed wood, but was mostly charcoal along with some vesicular charred material (probably not peat), charred herbaceous detritus, charred ?heather root/twig fragments and a few (mainly uncharred) weed seeds. The very small residue of no more than about 150 cm³ was mostly sand and a little gravel, but with some more charcoal and modest amounts of coal. There were no invertebrate remains.

Phase 16 summary

The samples of the fills of Pit 1222, the only material examined, mostly gave small numbers of biological remains. The basal deposit, however, contained material suggestive of flood debris, although perhaps incorporating waste material (leather, butchery waste) already in the pit. The weedy/woodland margin plants may have been growing locally, but their presence in a silt of this kind is more reminiscent of a transported component in a deposit formed under water than the fill of a pit.

Phase 17 (15th/16th century)

Context Group 17.01.01

Context: 1215 (floor)

Sample: 172/T (3 kg) varicoloured (light-mid grey-brown to light brown to dark grey, with some layering within lumps), slightly sandy, slightly clay silt, with traces of stones 2-6 mm and charcoal.

The very small washover of about 20 cm³ was of charcoal with traces of charred weed seeds, charred herbaceous detritus and charred ?heath rush seeds; the small residue was of sand. There were no invertebrate remains apart from a single *Cristatella mucedo* statoblast.

Context Group 17.02.07

Context: 1030 (fill of cut within building)

Sample: 10/T (3 kg) mid-dark brown, crumbly (working plastic and sticky), slightly sandy clay, with limestone 20-60 mm, traces of mortar/plaster and moderate amounts of charcoal.

The washover of about 10 cm³ was of charcoal and cinder with abundant elder seeds; a few charred cereal grains were also present and a single charred ?bugle (*Ajuga* cf. *reptans*) seed whose presence is rather difficult to explain in isolation. The small to moderate-sized residue was mainly of sand and coal. There were no invertebrate remains.

A small subsample examined for parasite eggs was found to consist mainly of inorganic sediment and to contain a few phytoliths, diatoms and fungal hyphae, but no eggs.

Context Group 17.03.01

Context: 1113 (floor in building)

Sample: 91/T (3 kg) mid grey-brown, plastic (working somewhat sticky when wet), sandy silt clay with root traces/burrows evident and distinct humic appearance locally and tiny patches of pale material.

The washover of about 50 cm³ contained few plant remains other than moderate amounts of charcoal: there were traces of uncharred saw-sedge nutlets, elder seeds (including fragments), unidentifiable cereal grains, and a tentatively identified charred rush capsule. The small residue was of sand. There were no invertebrate remains.

A small subsample examined for parasite eggs was found to consist mainly of inorganic sediment; no identifiable microfossil remains were recorded.

Sample: 94/BS (1.5 kg dry residue)

There was a trace of charcoal to 10 mm. Most of the bone fragments (16) were unidentifiable, with the exception of two herring vertebrae.

Context Group 17.03.06

Context: 1045 (hearth/associated deposits in Room C)

Sample: 22/TA (1 kg) varicoloured (mid red to pale grey to pale pinkish-grey-brown), stiff to crumbly (working plastic) clay.

There was a vanishingly small washover of fine charcoal and a very small residue of sand and gravel with burnt soil with a little brick/tile to 10 mm.

Context: 1058 (hearth/associated deposits in Room C)

Sample: 32/TA (1 kg) mid grey-brown (mottled on mm and cm scales), plastic sandy silty clay with traces of stones 2-6 mm and of coal and/or charcoal.

The modest-sized washover was of charcoal with no identifiable plant remains; the small residue was of sand and gravel.

Sample: 33/BS

The sample contained traces of uncharred saw-sedge nutlets and a few other plant remains of no particular interpretative value at context level. There were 42 unidentifiable bone fragments, of which 13 were burnt. The 13 identifiable fragments were mainly herring (eight vertebrae, one urohyal), but with three eel vertebrae and one ray dermal denticle.

Context Group 17.04.02

Context: 1107 (floor in building)

Sample: 55/T (3 kg) mid yellowish-brown, plastic clay and mid to dark brown humic silt forming extensive mm-scale laminations which vary in humic content; also some pale and thin clay/silt laminae; stones 2-6 mm present in trace amounts.

The washover of about 20 cm³ was of charcoal with traces of charred heather root/twig fragments, burnt peat fragments and tentatively identified cereal grains. There were no invertebrate remains.

A small subsample examined for parasite eggs was found to consist mainly of inorganic sediment; no identifiable microfossil remains were recorded other than a few fungal hyphae.

Sample: 74/BS (4.5 kg dry residue)

The only plant remains recorded were uncharred seeds of elder (including fragments). Amongst the bone, there were 161 unidentifiable fragments, of which 36 were fish, including 23 scales and 13 rib and vertebrae fragments. Of the 92 identifiable fragments, most were eel (44 vertebrae) and herring (27 vertebrae, one ceratohyal). There were also a pike scale, nine scales and seven vertebrae of perch and three roach vertebrae. Some of the fragments were burnt.

Context Group 17.05.02

Context: 1020 (?flood deposit from within house)

Sample: 29/TA (1 kg) mid brown plastic silty clay with grey clay, mid-brown silt and crumbly orange clay, with traces of coal and flecks of charcoal.

The very small washover was of coal and charcoal and the very small residue of sand and gravel with one large lump of coal; modern moss was also present.

Context Group 17.08.06

Context: 1217 (pit fill)

Sample: 170/BS

The residue consisted of stone, only.

Context Group 17.09.16

[from JML text: Context 1519 was a [roughly] circular cut 8.50 m x 8.00 m. This cut was not fully excavated and the upper portions of the sides were not initially recognised during excavation. The parts of the sides which were seen were almost vertical.]

The fills are discussed in order, from earliest to latest.

Context: 1456 (fill of huge pit 1519 (clay)) [Context 1456 was a grey silty-clay with 15th/16th century pottery and a penny from the third coinage of the reign of Henry VIII c. 1544-47 (SF 10966).]

Samples: 446/T (3 kg), described in the laboratory as a mid grey-brown, crumbly to plastic clay silt with traces of twigs, nutshell and bone and riddled with small fragments of wood decayed to different extents; some algal and mould growth; and 447/BS (31 kg).

There was a flot of about 50 cm³ of herbaceous detritus from the subsample of 446, including many well preserved seeds and a small residue of only about 400 cm³ consisting mainly of twigs and further herbaceous detritus, with about 25% sand. The rich assemblage contained several taxa indicative of wetland and woodland/woodland margins—and it was unusual in having moderate numbers (more than 5 per kg) of red campion (*Silene dioica*) seeds. Willow buds and twigs were present in abundance and there were several other woody taxa, but the only other plants recorded in more than trace amounts were weeds of various kinds. A tentatively identified lamb's succory (*Arnoseris minima*) fruit was recorded from this sample and there was at least one grape (*Vitis vinifera*) pip.

There were very large numbers of insect remains, with a minimum number of individuals (MNI) of beetles and bugs estimated at 717 and an astonishing 179 taxa. Other invertebrates were also numerous, especially *Daphnia* (water-flea) ephippia, adult flies, ants, unidentified insect pupae, and mites. There were also modest numbers of fly puparia, earwigs and earthworm egg capsules, but few other remains.

The residue from the BS sample consisted mainly of twig fragments and stones, the washover twigs and seeds and abundant large beetle fragments and earthworms—perhaps consistent with flood debris. Material identified included wood (including chips) and twigs and range of fruits (apple, cherry, 'plum', blackberry) and nuts (hazel and walnut, *Juglans regia*). Hemp and hops (*Humulus lupulus*) were also present. Most taxa, however, were weeds or plants likely to have grown in tall grass by a hedge or perhaps on a river bank. There were 13 unidentifiable bone fragments, including a heavily chopped femur, probably cow, and seven cranium fragments. Of the nine identifiable fragments, four were horse carpals, four were cattle bones (horncore, humerus, radius, ulna, probably from same individual) and one was a caprovid tarsal.

The insect assemblage from the GBA sample was very unusual in being dominated by immense numbers (at least 291) of the dung beetle *Aphodius prodromus*. There were also 15 *Geotrupes spiniger*, and single individuals of three other true dung beetles. The presence of these species coupled with the rarity of other insects associated with dung and soil surely indicates that the insects arrived in flight rather than in dung or in turf cut from grazing land. It thus appears that there were large quantities of herbivore dung in the immediate vicinity; had dung been removed from surfaces and dumped in the pit much larger numbers of taxa such as various Sphaeridiinae (*Cercyon*, *Sphaeridium*) and Staphylinidae would have been predicted, and a substantially different component would

inevitably have been introduced with turf. The plant remains give rather sparse evidence for grassland habitats, reinforcing the impression that dung and grazing land turf were not substantial components of the deposit. Some *Aphodius* species, including *A. prodromus*, have been observed to migrate in large numbers, but mass migration seems unlikely to lead to such high concentrations of remains unless from very nearby—probably a few metres. Both *Aphodius* and *Geotrupes* species are unable to escape and soon drown if they land on water surfaces. The only other plausible origin for these beetles is in flood debris washed out of grazing land soil during their active season, although the numbers of dung beetles seem much too large relative to other species likely to be concentrated by flooding.

A further peculiarity of the dung beetle remains was their fragmentation, almost all of the sclerites being broken, the elytra (wing-cases) rather characteristically so. This might at first be considered to indicate an origin in bird-droppings (cf. Kenward 1976), but this is extremely unlikely since other insects predictably fed upon by (for example) starlings (*Sturnus vulgaris* L.) or jackdaws (*Corvus monedula* L.) are absent. A possible fragmentation mechanism is periodic, perhaps annual drying out of the sediment; drying typically causes fossils to break, often in fairly consistent ways in individual species.

These arguments apart, the data do, indeed, support a distinct impression that there was a component within this context which originated in flood debris. The sediment was described in the laboratory as a clay silt with some woody debris, including twig fragments which were dispersed randomly through it—it certainly did not have the appearance of a layer of brushwood, for example. The large proportion of plant remains from woody taxa, and in particular parts such as leaves, thorns, twigs and buds, rather than just fruits and seeds, is also highly consistent with the sorting inherent in flood deposition. The very mixed flora and invertebrate fauna, reflected in the long list of species recorded, the wide range of habitat types represented and in the very high mathematical diversity of the insect assemblage, suggests that some mechanism brought together material from a variety of sources. Flooding is a likely one. It is just possible that the mineral component originated from the steep sides of the cut, although the quantity deposited seems far too large unless soured out by flood water. If the willow and other twigs were introduced as flood debris it might explain why scale insects, abundant in two other fills from this pit (see below), were absent, as they may have been dislodged during transport.

Insect remains from the bulk sample were not recorded systematically and those noted were predominantly of large species. The impression from the BS material was of a fauna with much in common with that from the GBA subsample. The presence of some large weevils (mostly not identified, but including *Cleonus piger*) perhaps re-enforces the impression of a component deposited by flooding, for large weevils are sometimes rather common in flood debris, having been concentrated by the sorting effect of flowing water and a tendency not to emigrate quickly once deposited.

There were substantial numbers of water beetles in the GBA assemblage (53 individuals of 21 taxa, especially a *Helophorus* species, of which there were ten, and *Ochthebius minimus* and *Hydraena testacea*, nine of each). These may well have lived in water in the pit, an interpretation supported by the numerous water-flea resting eggs. However, the numerous and diverse aquatic insects seem more likely to be mixture of flood water and *in situ* fauna than the latter alone. The lack of aquatic plant taxa might be seen as an argument against an origin in flooding if aquatic insects and other plant remains were being deposited, but the nature of the vegetation in the nearby river at this period is unknown—it may be that it functioned as an open sewer and dumping place and was too foul for submerged and floating-leaved macrophytes such as pondweed (*Potamogeton*) and duckweed (*Lemna*).

A further group of species recorded from Context 1456 included those likely to have lived in or on organic mud, quite possibly at the edges of the pit. These species included *Carpelimus rivularis* (47 individuals), *C. bilineatus* (22), *Bembidion dentellum* (6), and *C. elongatulus* (3), and some of the fly puparia also suggested the presence of organic mud. While most of these are typical of waterside habitats, *C. bilineatus* is also known from occupation debris (Kenward and Hall 1995; Kenward and Allison 1994) and may have been associated with another component of the assemblage, house fauna. This category was represented by 15 or so taxa, of which *Tipnus unicolor* (13), *Lathridius minutus* group (8), *Anobium punctatum* (6), and *Xylodromus concinnus* and *Ptinus fur* (both 4) were the most abundant. Dumping of litter from within a fairly dry structure is much the most likely source of these remains. Whether some of the weevils, such as the five specimens of *Apion nigritarse*, were introduced via hay in stable manure (Hall and Kenward 1990; Kenward and Hall 1997) is not at all certain, and the single grain weevil was of no further assistance in determining whether stable manure was present. One of the fly puparia, a gall midge in the genus *Mayetiola*, present as a single individual, is scarcely strong evidence for the presence of cut grass. The botanical evidence offers no support for the presence of stable manure and, indeed, remains likely to have originated from domestic occupation or the stabling of animals were rather sparse—only traces of grape,

walnut, hazelnut, cherry and plum, all representing the former category—and all might well have originated with the ‘woody’ material considered perhaps to have been flood debris, perhaps from waste discarded into the river upstream of the site, and not represent material from the site under consideration.

Hand-collected bone from this context mainly comprised material interpreted as primary butchery waste—head, leg and feet bones of cattle and caprovids—though the presence of a single horse hind lower limb hints that not all the material originated in this way. The bone was notable for being either very well preserved or distinctly eroded (with a flaky surface), suggesting that it arrived by at least two pathways.

The most plausible explanation for this deposit is that it formed in a pit filled with water for at least part of the time, and with damp organic mud at edges or when the water level dropped, and with a certain amount of dumping of butchery waste (assuming that the bone did not sink through the soft sediment from later deposits). Aquatic insects seem unlikely all to have been introduced by flooding, although a proportion of them and part of the rest of the fauna may well have been, contributing to the exceptionally high diversity. Such may have been the source of the elmids (flowing-water beetles, *Esolus parallelepipedus* and *Oulimnius* species being recorded) and some of the ground-living species such as the weevil *Tropiphorus obtusus*. Possibly this large pit functioned as a pond, and was replenished by winter rains and floods, the water level gradually dropping as summer progressed. Conditions within it would presumably have been unfavourable for the colonisation of plants, though some of the perennial weeds may have grown in the vicinity if disturbance by mechanisms other than flooding did not operate. In fact it is difficult to reconstruct the surroundings beyond the presence of abundant dung (and thus livestock) as the very high diversity of the insect assemblages suggests that a rich ‘background fauna’ was present.

Thus this cut has the appearance of a pond in the middle of an area used to pen large herbivores. Horses perhaps might seem the most likely beasts to be kept in a built-up area, but the absence of any evidence for horse manure (including the rarity of grain pests) is notable. It is possible that other livestock were held in this area awaiting sale or slaughter; cow manure, for example, may have supported the beetles but have contributed little or nothing to the preserved plant assemblage. The steep sides of the cut rather suggest that it was not a watering-hole, however, so that it may have functioned as a storage tank for flood water.

Context: 1455 (fill of huge pit 1519 (organic deposit)) [Context 1455 was a red-brown organic deposit with 13th century pottery.]

Material from this context was only examined via BS samples

Sample: 321/BS (6 kg moist residue)

The residue consisted mostly of lumps of compressed monocot debris up to 50 mm (though not identified more closely, these may have been saw-sedge) and some twigs.

Sample: 322/BS

The material was very similar to that from 321, though some of the compressed plant debris had been charred after deposition.

Context: 1432 (fill of huge pit 1519 (clay)) [Context 1432 was a grey silty clay with 15th-early 16th century pottery and 16th century leather objects.]

Sample: 317/T (3 kg), described in the laboratory as a mid brownish-grey crumbly (working plastic, and sticky when wet), slightly sandy clay silt with traces of coal and charcoal (the latter in patches); some modern alga and mould growth; Sample: 318/BS (7 kg dry residue)

The small flot from 317/T contained a few seeds and fine plant detritus fragments; preservation was rather variable. The small residue of about 300 cm³ consisted of about two-thirds sand and gravel, the rest very decayed wood and charcoal and herbaceous detritus and twigs as in Sample 291 from Context 1415; there were quantities of uncharred stem epidermis which may have been saw-sedge.

A wide variety of plant remains was present in the subsample of 317, though mostly in small numbers, including weeds of waste places and cultivated soils, woodland and woodland margin taxa, and heathland/bog plants. The residue from the BS sample contained moderate amounts of wood fragments, accompanied by traces of, *inter alia*, wetland moss, saw-sedge nutlets, a 'plum' stone, and charred ?barley grains. There were also 13 unidentifiable bone fragments, including cattle crania and a single duck (?mallard, *Anas platyrhynchos*) beak.

The 3 kg subsample produced a large assemblage of beetles (and a few bugs)—253 individuals of a remarkable 135 species. There were also numerous scale insects (*Lepidosaphes ulmi*), fly puparia and mites, and other remains including two human fleas (*Pulex irritans*) and some *Daphnia* ephippia. Diversity of the beetle and bug assemblage was very high, both ecologically and mathematically ($\alpha = 117$, $SE = 12.8$). Despite this, one ecological group clearly dominated the assemblage, for the upper ranks were occupied by a series of 'house fauna' species (*sensu* Kenward and Hall 1995, fig. 184), and one which would co-exist with them: *Anobium punctatum* (17 individuals); a *Corticaria* species (also 17); *Tipnus unicolor* (15); *Ptinus fur* and *Lathridius minutus* group (both 12), and a *Cryptophagus* species and *Mycetaea hirta* (both 7). Some other species (including the two fleas) were likely to have lived with these, and the whole community must have been introduced in material from within a building which was dumped into the pit. The nature of the building is not certain from the insect evidence alone, for there is no significant component of very foul decomposers ($PNRF = 3$) or species found in open-textured foul matter, such as is commonly found in archaeological assemblages interpreted as stable manure (Hall and Kenward in press; Kenward and Hall 1997), and these and other species which might have exploited foul matter (eg. *Neobisnius villosulus*) may have invaded the material after it was dumped. The same is probably true of the fly puparia, which were indicative of organic matter at least partly of animal origin. Grain pests are typical of stable manure in some periods: a single grain weevil (*Sitophilus granarius*) was found in the present sample, but does nothing to clarify the interpretation. There was a possible grassland component (from wet to dryish areas) from the plant evidence, perhaps originating in hay.

The evidence for heathland/moorland plants was quite substantial, especially in the form of *Erica cinerea* seeds, but also *E. tetralix* leaves and moderate amounts of tentatively identified *Calluna* root/twig material. A likely means of entry is in cut heathland vegetation or maybe in turf from such a habitat. The four individuals of three moorland/heathland insect species noted seem more likely to have arrived in turf.

The outdoor component of the insect assemblage was large ($PNOB = 32$, 65 taxa) and very diverse ($\alpha OB = 152$, although $SE = 41$) and included some aquatics (nine individuals including two species of Elmidae, associated with flowing water), and waterside species (11 individuals). While these amounted to no more than might have arrived as background fauna or in floodwater, some may have lived in water or organic mud in the pit. The lack of aquatic plants makes it more likely that the caddis larval cases recorded originated in flood water than that the larvae lived in water in the pit.

A single specimen of the nettlebug *Heterogaster urticae* is noteworthy as a possible climatic indicator (see below); seeds of stinging nettle, its typical host, were amongst the most abundant plant remains.

Only rather small quantities of identifiable bone were recorded for this context; clearly, dumping of bone was not prevalent at the time this deposit formed.

Few insect remains were recovered from the BS sample, and not surprisingly they were of large species. They added nothing to the interpretative information from the GBA sample, although some additional taxa were noted.

The next context in the succession of fills in cut 1519, 1436, was a deposit of angular limestone blocks and grit with 13th century pottery, presumably representing debris from a much earlier structure. No analyses of plant and invertebrate macrofossils from it were undertaken and little bone was recovered. Spot sample 316 from it was described in the laboratory as 'a very clean silt, perhaps a flood deposit'.

Context: 1415 (fill of huge pit 1519 (organic)) [Context 1415 was a black organic deposit with 14th/15th century pottery and 16th century leather objects.]

Sample: 291/T (1 kg), recorded in the laboratory as a very dark grey-brown crumbly, layered, compressed woody and herbaceous detritus with moderate amounts of moss (including *Scorpidium scorpioides*) and of twigs; some

recent mould growth. Also examined: Sample 289/BS (8 kg wet residue) and 311/SPT (0.5 kg).

The large residue of about 800 cm³ from the /T subsample was almost all of plant material—twigs and herbaceous detritus—with a little fine sand. The twigs were superbly preserved, some still bearing bark. Amongst these, gorse (*Ulex*) fragments were very well preserved (some were 'twiggy', others soft, and up to about 5 mm diameter and 20 mm long). The bulk of the coarser twigs seemed to be heather (maybe with some *Erica*).

The very large flot of about 60 cm³ was of herbaceous detritus—mainly epidermis (perhaps saw-sedge) and *Ulex* leaves; there were also immature pods and flowers of gorse. Several taxa are likely to have originated in heathland or bog, especially the rather common seeds of bell heather and some of the mosses. There were only a few taxa unlikely to have lived with or been imported with gorse or heather; one was a tentatively identified fruit of lamb's succory, *Arnoseris minima*, a plant of sandy arable fields and now likely to be extinct in the British Isles (and also recorded from another context in this pit, 1456).

A large number of beetle and bug taxa was recorded from the small /T subsample: 99 species, represented by 180 individuals. This assemblage was very diverse (alpha = 90, SE = 12), and almost half of the individuals and species were from 'outdoor' habitats. The outdoor component was of rather low diversity (for such a component): alpha OB = 39. SE = 7, strongly suggesting the presence of one or more well-represented discrete habitats. Inspection of the species list supported this, for heath/moor species were abundant, occupying the first four ranks of abundance. There were eight individuals each of the groundbug *Scolopostethus decoratus* and the froghopper *Ulopa reticulata*, six *Micrelus ericae* (a weevil associated with heather), five *Bradycellus ruficollis* (a ground bug usually found under *Calluna* or *Erica* species), and four *Strophosomus sus* (similar habitats). Also belonging to this group was a single specimen of a shieldbug, *Rhacognathus punctatus*, while various other of the remains may have originated with them. These insects are most unlikely to have lived *in situ* and were undoubtedly imported in heathland turf or cut vegetation, together with the plants mentioned above. The argument for the presence of turf, whether with or without cut material, rests particularly on the presence of the highly active *S. decoratus* and *B. ruficollis*, which seem very unlikely to remain on plants during the process of cutting and transportation, whereas corpses might well be carried in turf. The evidence for cut vegetation is gross chunks of woody plant material which might conceivably be brought with turf (or the litter on its surface) but might also (in view of its great abundance and the variety of parts recorded) have been brought as a separate resource.

Much of the remainder of the insect assemblage may have originated as background fauna, an impression informed both by the overall high diversity and the presence of a large number of species as single individuals. A contribution from floodwater is possible, but there were very few water beetles, and not many species typical of flood deposits apart from some *Daphnia* ephippia (water-flea resting eggs), which may well have derived from individuals exploiting temporary water in the pit. There were hints that house fauna had been deposited in dumped material, since there were three each individuals each of *Tipnus unicolor*, *Ptinus fur* and an *Atomaria* species. The plant remains offered no evidence for domestic occupation. This absence of domestic plants in an assemblage containing appreciable amounts of house fauna might be explained if the heathland/moorland component originated in turf used for roofing (see Discussion).

A few ground beetles, plant-feeders, and some litter-dwellers may have lived on surfaces by the pit, but may equally have come from further away. The numerous fly puparia seem more likely to represent individuals which developed in the organic material in the pit—they included taxa consistent with the presence of wet organic matter—but there was no clear evidence that any of the beetles did so.

The residue from the BS sample was mostly wood fragments with a few twig fragments and traces of coarse charred heather root/twig fragments to 120 mm. A few invertebrate remains were noted as well as seven cattle cranium fragments and four caprovid maxillary molars.

Scale insects (*Lepidosaphes ulmi*) were extremely abundant in this deposit; they were presumably imported with plant material, probably twigs.

Sample: 311/SPT (0.5 kg)

The sample comprised a 10 litre tub of highly compressed dark brown to black coarse herbaceous and woody plant detritus (with modern algal and mould growth, and a mite!); it appeared to consist principally of short lengths of heather twig and straw. The subsample taken was only briefly examined—it was deliberately not fully disaggregated. The resultant residue consisted of many small lumps of compressed herbaceous material,

apparently of straw, although some fragments had a Cyperaceae-type epidermis and all were rather strongly ribbed. A few fragments bore marginal teeth and there seems little doubt that this material was largely saw-sedge (*Cladium*). The fragments were often pale in colour as if they were deposited dry and had never properly re-wetted after burial, or had dried out somewhat at some stage during or after burial.

With the saw-sedge were fragments of leaf, twig and bark and perhaps also buds of sweet gale/bog myrtle (*Myrica gale*), a plant very likely to have grown with the saw-sedge and perhaps collected inadvertently with it. Heather shoots and twigs were also present; they may have formed part of the thatch which the saw-sedge presumably represents, and the ?rye rachis may point to a third component of roofing material. There were only traces of invertebrate remains, of no special interpretative significance.

The hand-collected bone from this context, whilst rather limited in quantity, consisted almost exclusively of material interpreted as primary butchery waste: heads, lower limbs and feet. Some of the material was very well preserved whilst other fragments were eroded and in some cases bore surface impressions of plant remains which appeared to be straw-like fragments, though the mechanism by which these formed is unclear.

[Context 1417 was a group of timbers. These consisted of three parallel struts jointed by two further struts at right angles. 'Spot' Sample 286 from this context comprised metalwork or slag.]

Context: 1378 (fill of huge pit 1519 (clay)) [Context 1378 was a blue-grey silty-clay with 15th/16th century pottery. Context 1378 also contained a discarded architectural fragment (AF 65) which had claw tooling on the surfaces; this may suggest the fragment was of late 12th century or later date. Part of a wooden comb (SF 10638) was found in this context. Combs of this type occur from medieval times onwards, and this find could simply be residual.]

Sample: 254/T (3 kg) mid grey to light-mid orange-brown (locally) stiff to just crumbly (working plastic and sticky, when wet) silty clay with traces of stones 2-20 mm and of slag and coal; some blocks and patches of oxidised orange material. Also examined: Sample 255/BS (7 kg dry residue)

The washover from the /T subsample was about 60 cm³ of rather poorly preserved (mainly) uncharred plant remains (oxidation was evident, for example, on most of the *Solanum* seeds present). There was quite a high concentration of seeds, which included weeds and waste ground taxa (notably stinging nettle, *Urtica dioica*), and some wetland forms. Several taxa (including hemlock, vervain, *Verbena officinalis*, and red campion) might have grown on the river bank nearby or in the vegetation along a hedgerow. The small residue was of sand with quite a lot of coal.

Single individuals of eleven beetle taxa, two fly puparia and a single mite were the only invertebrate remains observed; the remains were of diverse ecological origins and cast no light on the nature or formation of the deposit.

The BS sample yielded charred ?heather root/twig fragments, and a few charred and uncharred seeds of no particular interpretative significance. There was a little bone: two identified fragments (a cattle incisor and a caprovid fourth premolar) and 45 unidentifiable fragments, including cattle and caprovid cranium fragments and few unidentifiable fish remains. The hand-collected bone from this context amounted to 171 identifiable fragments with over 200 unidentifiable ones. Again, they were probably from primary butchery waste—they were mainly jaw and skull fragments, isolated teeth and distal limb bones.

Context 1348 was a blue-grey silty-clay with 15th/16th century pottery and 16th century leather. No analyses of samples from it were made but there was a corpus of hand-collected bone which was very similar in composition to the material from Context 1378 (and also that from Context 1087, Phase 19, see below).

Vertebrate remains from Pit 1519

Cattle

Although a range of elements was present in the small assemblages from this group, it was clear that horncores,

maxilla and mandible fragments, teeth and distal limb elements predominated. Major (scapulae, humeri, pelvis and femora) and minor (radii, ulnae and tibiae) meat-bearing bones represented only 20% of all unidentifiable cattle fragments. Assemblages with a high proportion of heads and distal limb elements are generally interpretable as primary butchery waste and may suggest that slaughter and initial carcass preparation were being undertaken in the vicinity.

Large mammal fragments recorded in the unidentifiable fraction (and assumed to represent cattle) also showed a preponderance of cranium, horncores and mandible fragments, and teeth. However, shaft and rib fragments were also present in fairly large numbers. Vertebral centra had been chopped longitudinally, reflecting the practice of splitting carcasses into 'sides'. Most of the mandible fragments had been chopped through the gonial region; this was probably undertaken for easier access to and for removal of the tongue (O'Connor 1989).

Caprovids

Caprovid remains showed a similar picture to the cattle fragments, with 84% of unidentifiable bones being head or lower limb elements. Mandibles and metapodials, in particular, were well represented. As with the cattle assemblage, primary butchery waste is the most likely interpretation for this material.

The unidentifiable fraction again contained high proportions of medium-sized mammal (assumed to be caprovid) mandible and cranium fragments. Six cranial fragments had been split sagittally, presumably to facilitate the removal of the brain. Additionally, there was evidence that the horncores had been chopped through at their base. Two caprovid horncores were also recorded from this group, one being identified as goat.

Horse

Remains of horse were few—only 33 fragments, of which 19 were recovered from Context 1378. A range of elements was present, three of them (two ulnae and a radius) having been chopped.

Other species

Other species, recovered in smaller numbers, included pig, red deer (*Cervus elaphus*), dog, cat and tawny owl (*Strix aluco*).

Phase 17 summary

Apart from the fills of Pit 1519, plant and animal remains were rather sparse in deposits assigned to this phase. The lowest layer examined from Pit 1519 appears to have formed by the action of floodwater and there seem to have been livestock in the surroundings. The other layers seem to have had material dumped into them, notably turf, charred and uncharred saw-sedge leaves, gorse/heather brushwood, perhaps from roofing, and bone. There was no evidence of disposal of the usual kinds of domestic waste other than oyster shells (which were very rare in other deposits at the site), though there were consistently groups of bones representing primary waste from butchering. The 'house fauna' component of the insect assemblages is as likely to have come from roofing as from floor sweepings. The uppermost level examined gave an assemblage dominated by a weed flora but with only few insects; it perhaps represents material from vegetation in the surroundings.

Floors in this phase seem to have been even cleaner than those in the earlier phases.

Phase 18 (15th/16th century)

Context Group 18.02.01

Context 1052: (?flood silt reworked as garden soils)

Sample 31/BS

A few plant remains were sorted from this samples by SYAU prior to examination in the EAU. They included traces of charred cereals (bread wheat and ?rye) and elder seeds.

Context Group 18.03.01

Context: 1100 (?flood silt reworked as garden soils; spreads over whole site)

Sample: 61/T (1 kg) mid brown-grey, plastic, sticky clay with patches and lumps of ginger at mm scale, and with traces of stones 2-20 mm and of charcoal.

There was tiny washover containing small amounts of coal (and traces of charcoal) to 5 mm and a few poorly preserved seeds including some definitely modern grass fruits. The very small residue was of sand and burnt soil including ?cinder.

Invertebrate remains were very sparse, very poorly preserved, and of no interpretative significance; only single individuals of four beetle taxa were noted.

Sample 62/BS

A few plant remains were sorted from this samples by SYAU prior to examination in the EAU. They were a mixture of plants likely either to have been growing in waste places in the vicinity (including deadly nightshade) or, in the case of a few charred cereal grains and some charred ?heather root/twig, to have originated (at least secondarily) in ash.

Sample: 63 /T (1 kg) mid grey-brown, crumbly (working plastic), slightly silty clay with patches of pale grey clay locally and root channels/burrows, and with traces of stones 6-60 mm and of very rotted charcoal.

The very small washover of a few cm³ comprised coal and charcoal; small residue mainly of sand with charred ?heather root/twig fragments and charred rhizome/root fragments. There were no invertebrate remains.

Sample: 78/TA (1 kg) light-mid grey to orange-brown (mottle on mm to cm scales) crumbly (working plastic) clay with traces of charcoal.

There was a tiny washover of coal, charcoal and cinder containing moderate numbers of well-preserved elder seeds; the tiny residue was of sand and gravel.

Sample: 81/TA (1 kg) mid greyish-brown plastic slightly sandy silty clay with traces of ?brick/tile and coal; looks like a flood deposit.

The very small residue was of sand and gravel and there was a very small washover of coal and charcoal to 15 mm; a few elder seeds were present in the washover (and a few more in the flot).

Sample: 82/TA (1 kg) mid grey-brown, crumbly (working plastic) clay silt with moderate amounts of charcoal.

There was a small residue of sand and gravel, and a modest-sized washover of charcoal.

Sample: 114/T (1 kg) mid grey-brown, stiff, sticky (working plastic) clay with root channels, traces of stones 2-6 mm, ?rotted mortar/plaster and very rotted charcoal.

The small washover, a few cm³, was mostly coal with a little charcoal and moderate numbers of elder seeds; the small residue was of sand with a little gravel. There were no invertebrate remains.

Context: 1129 (grey deposit within extensive brown layer 1100)

Sample 102/TA (1 kg) mid grey-brown, slightly sticky and crumbly (working plastic), very slightly sandy slightly silty clay with iron-panning and ?worm burrows.

There was a small residue of sand and gravel and a small washover of coal and charcoal.

Context 1136 (grey deposit within extensive brown layer 1100)

Sample: 111/TA (1 kg) mid grey, crumbly (working plastic) very slightly silty clay.

The tiny residue consisted mostly of black ?root channel concretions; there were traces of elder, orache and stinging and annual nettle seeds in the tiny washover.

Phase 18 summary

Although extensively sampled and carefully examined for biological evidence, the deposits from this phase were remarkably free of identifiable material (even charred remains, which are robust and are easily preserved). Those few remains present did not confirm or deny the excavator's suggestion that these thick layers formed originally through the action of floodwater. The deposits were, however, rather typical of garden soils in their paucity of biological remains. This is to an extent supported by the presence of elder seeds in several samples, and of remains of some other plants likely to have established themselves in neglected corners of yards (though these seeds could, alternatively, have been water-transported)

No vertebrate remains were recorded from deposits dated to this phase.

Phase 19 (post-medieval)

Context Group 19.01.01 (probably C16th/early C17th)

Context: 1082 (?flood deposit within house)

Sample: 41/TA (1 kg) mid grey-brown (locally lighter and darker through oxidation/reduction) stiff to crumbly (working plastic) very slightly sandy silty clay with traces of cinder and moderate amounts of coal.

There was a small residue of sand and gravel with a modest washover of coal to 20 mm, which also contained a few fragments of uncharred organic detritus and a few seeds of no interpretative significance.

Hand-collected bone from this context was rather limited in quantity, but included caprovid mandibles and metapodials.

Context: 1087 (soil in hollow/pit above pit 1519)

Sample: 123/T (3 kg) mid grey-brown, soft to plastic (working sticky), slightly sandy clay silt with traces of stones 2-20 mm, charcoal and wood; probably homogeneous in composition but varying somewhat in texture.

There was about 30 cm³ of washover consisting of herbaceous detritus and ?very decayed wood fragments; there were quite a few seeds, reasonably well preserved and including traces of food (fig, hazel nutshell, strawberry, blackberry), but otherwise basically weeds. There were several seeds of flixweed, *Descurainia sophia* and fragments of swine-cress (*Coronopus squamatus*), both typical of places with nutrient enrichment.

There was a large residue (about 1.1 litres), in which all size fractions, including >10 mm, were well represented. Coal, cinder and sand were the chief components. The <4 mm fraction was re-washed-over, to produce quite a lot of light material, especially in the <1 mm fraction, perhaps 10-20% of the remaining residue. This was mainly very decayed wood. The seeds in the residue were often rather eroded (especially the buttercup, *Ranunculus* Section *Ranunculus*, achenes). The hemp achenes were all 'halves'. By contrast, the fig seeds present were all immaculate! This may indicate separate pathways into the deposit.

The plant remains presented a rather mixed assemblage, with weeds of arable land and waste places and some representatives of wetland, including wet pasture or meadows, and some probable food remains but no peatland taxa other than some *Sphagnum* leaves (including the peat-forming *S. imbricatum*).

A small subsample examined for parasite eggs was found to consist mainly of inorganic sediment; no identifiable microfossil remains were recorded other than some fungal spores and hyphae and a few phytoliths.

The subsample gave a moderately large assemblage of beetles (113 individuals, 58 taxa). There were also quite large numbers of fly puparia, modest numbers of *Heterodera*-type soil nematode cysts, beetle larvae, unidentified insect pupae, and mites. There was a moderately large and varied outdoor component (PNOB = 19; 18 taxa) including a few aquatics (only single individuals of four species) and a variety of ground beetles, mostly tolerant of human disturbance; the few plant-feeders included some from waterside and others typically associated with terrestrial herbaceous vegetation. (The record from this subsample of a single gall midge, *Mayetiola*, may perhaps point to the presence of grass, perhaps in the form of hay.) These outdoor insects may have lived in the surroundings and along the river bank, but may have travelled over greater distances since none of the species was represented by more than one individual (an exception was an *Aphodius* sp., a dung beetle, which may, however, have been attracted to foul matter *in situ*).

Decomposers contributed a little under two-thirds of the assemblage of beetles and bugs, and there was a distinct 'house fauna' component, including the woodworm beetle *Anobium punctatum* (11 individuals), *Lathridius minutus* group (8), and one or two individuals of six other beetle taxa, as well as a single human flea. This part of the assemblage seems certain to have originated within a building. There was also a range of other decomposers, many of them rather generalist, perhaps having invaded litter within a building or the dumped material after its removal. The fly puparia certainly indicated the presence of organic matter including substrates which were at least locally partly sodden and which were at least partly of animal origin.

The presence of house fauna is reflected in the quite large proportion of synanthropes (PNSA = 41), although facultative forms were predominant (31%), with only 9% of typical and 1% of strong synanthropes in the assemblage as a whole. It is not clear whether this fauna indicates short-lived or low-grade buildings, or whether most of the decomposers invaded after dumping, the latter explanation being favoured by the presence of *Anotylus tetracarinatus* (8 individuals) and *Megasternum obscurum* (3), typical 'compost heap' beetles.

The hand-collected bone from Context 1087 comprised a range of elements with horncores, maxillae, mandibles, teeth and distal limb bones predominant. They are thus likely to have originated as primary butchery waste and are very similar to the groups from Contexts 1348 and 1378 in Pit 1519 (see above), although preservation was generally more uniformly good.

On balance, the evidence from plants and invertebrates suggests that this deposit included refuse from within a building, with a component (some beetles and weeds such as swine-cress) which invaded or colonised after dumping. The vertebrate remains, on the other hand, point to continued dumping of primary butchery waste.

Sample: 124/BS

This sample yielded traces of wood and twig fragments and a few seeds including hemp, uncharred hazel nutshell, and a few charred cereal (?wheat) grains. The only invertebrate remains recovered were two muscid fly puparia.

Context Group 19.02.04

Context 1021 (fill of linear cut)

Sample: 7/BS

A few plant remains were sorted from this samples by SYAU prior to examination in the EAU. They comprised moderate numbers of elder seeds with traces of charred barley and bread wheat, together with some cinders.

Context Group 19.02.06

Context 1008 (fill of linear cut)

Sample: 2/BS

A few plant remains were sorted from this samples by SYAU prior to examination in the EAU. There were traces of barley grains and elder seeds with charred dock (*Rumex*) fruits.

Context Group 19.03.02 (the only biological material examined was hand-collected bone)

Context 1068

Only four hand-collected bone fragments were recovered from this context; all were identified as caprovid metapodials.

Context 1090

A group of poorly preserved caprovid metapodials and phalanges was identified, amounting to 159 fragments (Table 22). These remains (together with those from 1068) may represent tanners' waste but the assemblage is too limited in size to support a definitive interpretation.

This evidence does not support the excavator's original interpretation of the feature as a surface for the defleshing of carcasses.

Context Group 19.07.04

Context: 1089 (fill of well)

Sample: 48/TA (1 kg) dark brown layered and compressed coarse herbaceous detritus with mid to dark grey silty clay.

There was a very large residue, about 85% organic, the rest sand and gravel. The >4 mm fraction proved to consist mostly of bark to 15 x 15 mm. There were traces of food (fig, grape, wheat/rye 'bran', 'plum', blackberry), some 'straw' debris, and a few weed taxa.

The insect assemblage was recorded during assessment as being of limited size but with a distinctive character, subjectively suggesting dryish material, perhaps stable manure, with hints of insects originating in cut herbaceous vegetation such as hay.

Sample 49/BS

The washover from this sample consisted of perhaps 2 litres of bark fragments to 15 mm in maximum dimension (with a thin, flaky or 'skin-like' appearance) with a few twig and wood fragments. The bark was perhaps waste from tanning.

Sample: 50/TA (1 kg) dark grey to black clay silt with amorphous organic sediment and patches of mid grey clay and traces of stones 20-60 mm, cinder, wood chips and bone (including burnt fragments).

The residue was like that for the subsample from Sample 48, with some bark in the >4 mm fraction, but mostly in 'squares' to 25 mm (though it was not clear whether these resulted from deliberate cutting); there was quite a lot of coal and a little cinder; but about 40% of the residue was sand and gravel. It was less 'strawy' than 48 and generally less organic.

The insect assemblage was described during assessment as being of modest size, subjectively representing an ecologically diverse 'urban' fauna, including a single grain weevil *Sitophilus granarius*, and decomposers which were mostly indicative of conditions which were neither very wet nor very dry. There were some waterside species and some plant-feeders which may have been imported in hay-like material, although they may alternatively have originated from plants in the immediate surroundings.

Sample: 56/TA (1 kg) dark brown coarse woody and herbaceous detritus, slightly silty in places.

Again, there were a few squarish fragments of bark in the >4 mm fraction, but most of residue was 'grassy' or 'strawy' detritus and about 10% was sand; it was a smaller residue than that from Samples 48 or 50, but with suggestions of the presence of hay and or straw, perhaps from stable manure, given that legume flowers and hawkbit, buttercup, and yellow-rattle seeds were all recorded.

A small group of beetles was recovered during assessment, together with numerous fly puparia and a few ants. The beetles probably originated as elements of a stable manure community.

Context 1089 produced a small accumulation of well-preserved bone representing the three main domestic mammals (cattle, caprovid and pig). Cattle remains were by far the most numerous, forming 88% of the assemblage. Of the 50 cattle bones recorded, 33 were horncores, whilst the rest were a combination of major and minor meat-bearing elements. Many of the latter showed evidence of dog gnawing. The unidentifiable component contained small numbers of rib, shaft, vertebra and horncore fragments (all attributed to the 'large mammal' category).

Overall, this assemblage consists of a mixture of butchery and domestic waste; however, the horncores are a distinct deposit, probably representing a craft or industrial activity.

Since dog gnawing was wholly absent on the horncores, but common on all other post-cranial elements, it can be argued that the deposition of horncores into the deposit represents a separate dumping event within a short period.

Context Group 19.08.05

Context: 1001 (backfill of pit; probably C18th)

Sample: 11/TA (1 kg) mid grey-brown, stiff to crumbly (working plastic) clay silt with traces of stones 2-60 mm, of brick/tile, pottery and very rotted shell.

There was a small residue of sand and gravel with trace of glazed ?drain pipe; oyster, bone and a few lumps of concreted sediment ?burrows/root channels; the small washover was quite rich in seeds (many very poorly preserved fragments) but there was no particular character to the small assemblage, which was dominated by stinging nettle.

Sample: 12/BS

A small assemblage of plant remains was recovered, mostly in very low concentrations (though there were moderate numbers of elder and stinging nettle seeds and also of earthworm egg capsules). Of the identifiable fraction of the bone, 152 fragments were fish and included 92 scales. Large mammal fragments included 59

cranium and horncore fragments and 20 shaft and vertebra fragments. The identifiable fish remains were mostly ?bream (33) and perch (19) scales, along with ?salmon and pike teeth, a pike dentary and vertebra. Small mammals were represented by a single ?wood mouse (*Apodemus sylvaticus*) femur.

The hand-collected bone from Context 1001 consisted predominantly of cattle horncores (more than 200) with numerous bones of horse (these were mainly post-cranial elements, although distal limb bones were sparsely represented). The former may have originated from the workshops of tanners, horners or butchers; the latter are more difficult to explain.

Context 1404 [black-grey clay with frequent cow horns and bones with 16th/17th century pottery]

The hand-collected bone from this context was strikingly similar to that from Context 1001.

General comments on bones from Contexts 1001 and 1404

The assemblages from these pit fills were very similar, consisting almost entirely of cattle horncores and horse post-cranial elements. Cattle fragments represent 66% and horse 29% of the entire assemblage, the remaining 5% consisting of a variety of taxa.

Cattle

Few of the horncores for which data concerning age, size or shape could be recorded were complete, most comprising the basal portion and associated cranial fragment. Numerous small and fragmented cattle cranium and horncore fragments were also present in the unidentifiable fraction.

Almost all the cores showed evidence of removal from the skull. Although some were chopped at the very base of the core, more typically they had been removed along with a varying portion of the adjacent frontal and parietal bones. Occasionally, knife and cut marks were noted at the very base of the core, this damage possibly having occurred when the horn sheath was detached from the bony core. Additionally, nineteen of the more complete cores had their tips removed (eight tips were noted from the unidentifiable fraction).

Horse

A similar number of fragments and range of elements were recovered from both deposits. All parts of the skeleton were represented (including ribs and vertebrae, recorded in the unidentifiable component), although it is clear that elements from the 'head' (i.e. crania, maxillae, mandibles and isolated teeth) and distal limbs (metapodials and phalanges) were far less numerous than scapulae, humeri, radii, femora and tibiae. Indeed, the almost complete absence of mandibles and cranium fragments suggest that only portions of carcasses were discarded. Evidence of butchery was almost entirely lacking, with only eight of 204 identified fragments showing chop marks.

Context Group 19.09.02

Context 1009 (cut fill*)

Sample 3/BS

A few plant remains were sorted from this samples by SYAU prior to examination in the EAU. There were traces of charred ?wheat grains, with uncharred dock, deadly nightshade and elder seeds.

Context 1023 (cut fill*)

Sample 8/BS

A few plant remains had been picked from the washover by SYAU prior to examination in the laboratory. They included moderate numbers of elderberry seeds and a few weed taxa, together with some charcoal fragments.

Context: 1031(fill of linear cut)

Sample: 18/BS (9 kg wet residue)

The sample was examined but no plant remains were recorded.

Sample: 19/T (1 kg) dark grey-brown amorphous organic sediment with a little fine herbaceous detritus and patches of light grey clay and traces of stones 2-6 mm.

The small flot of a few cm³ was essentially fine decayed wood detritus. The large residue of about 600 cm³, consisted largely of wood fragments in all fractions—perhaps debris from woodworking. Many fragments appeared to be ash, *Fraxinus*. There were traces of uncharred gorse shoots.

This subsample gave only six individuals of five beetle taxa, 'several' mites and earthworm egg capsules, and a single snail, *Pupilla muscorum*. Apart from indicating at least some penetration by earthworms (or incorporation of soil as the deposit formed) these remains were of only slight interpretative value.

Phase 19 summary

Most samples examined yielded rather small numbers of plant and animal remains, but the fill of a depression, perhaps formed by the settling of the fills of the huge pit 1519 (Phase 17), probably contained some domestic refuse and was certainly used to dispose of large quantities of cattle horn-cores and various horse bones, the bone being indicative of craft activities. Small amounts of plant food remains were recorded from a fill of well 1089, but there was consistent evidence from the plant and insect remains for the presence of material which may have been stable manure.

General comments on the vertebrate material from North Bridge

The late medieval and post-medieval hand-collected assemblages of bone were dominated by the remains of the common domestic mammals (i.e. cattle, caprovid, and horse), whilst pig bones were scarce (Table 9). Minor domesticates (such as dogs and cats), wild mammals and birds made up a very small proportion of the remaining material. Additionally, the bulk-sieved samples produced a small assemblage of fish remains (Tables 10 and 11).

Tables 12 and 13 show the basic quantification methods used to compare the relative frequencies of cattle, sheep, horse and pig remains. Results obtained from these methods are roughly similar and show that the remains of cattle are those most frequently represented in the assemblage, followed by sheep and then horse. It is only in the 16th century deposits that sheep show a marked predominance, more striking in the simple fragment counts than the MNI estimations. However, numbers of cattle are largely boosted by the numerous horncores from both 16th-17th and 18th century deposits. In this case, the relative frequencies of species represented in the hand-collected assemblage reflect almost exclusively the obvious craft or industrial nature of the vast majority of the vertebrate remains for all periods.

Bird remains are extremely poorly represented in the hand-collected assemblage (Table 9) and were only recovered from 16th century deposits. Species present included chicken, goose, ?red kite (cf. *Milvus milvus*) and ?tawny owl (cf. *Strix aluco*). A small number of Turdidae (thrush/blackbird family) bones were recovered from the bulk-sieved samples.

A total of 885 fish fragments was recovered (all from the bulk-sieved samples), the vast majority (722 fragments) from 13th and 14th century floors and yards. A wide range of species was represented, the most frequent being herring (*Clupea harengus*) and eel (*Anguilla anguilla*), although numerous ?bream (cf. *Abramis brama*) fragments

(mostly scales) and a few gadids were also present (Table 10).

It is apparent that some of these fish were consumed at site, a small number of vertebrae showing characteristic damage consistent with passage through the gut. The remains can perhaps be interpreted as a component of the diet, although the absence of quantities of mammal and bird remains from medieval deposits renders interpretation difficult. The lack of convincing evidence for domestic occupation and the obvious industrial characteristics of the area, certainly during the post-medieval period, points to the fish being consumed by workers involved with a variety of commercial activities. This 'snackfood' interpretation is somewhat corroborated by the scarcity of any edible food plants other than hazel nuts (which could also be interpreted in a similar fashion) and cereals (which, as argued elsewhere may well have originated in straw).

The marine fish were obviously imported from coastal fisheries, whilst freshwater species may well have been caught in the adjacent river. One possible explanation for the range of fish and the burnt condition of many of the bones might be that they were being smoked or otherwise processed. However, there is no other evidence to support this conjecture, and the actual skeletal elements present are far more likely to have originated as kitchen or table waste, this material having been charred when it was thrown into the fire.

Age at death data

Cattle

Only half of the thirty mandibles from which mandibular tooth eruption and occlusal wear were recorded could be assigned to an age category. As can be seen from Table 14 and Figure 1, most of the cattle were adult or elderly, i.e. about eight years or older. The exceptions were three individuals from the 17th-18th century levels and a single example from the 16th century, all of which were assigned to the juvenile category. Additional data supplied by isolated teeth (only from 16th century deposits) also indicated both adult and elderly individuals.

Limited epiphyseal fusion data (Table 15) also indicate an emphasis towards adult animals, although skeletally immature individuals are also well represented.

The numerous cattle horncores were assigned to the age categories devised by Armitage (1982). Table 16 shows that in all periods adult individuals dominated (ranging from 65 to 92%). However, it must be noted that the 'unidentifiable fraction' contained fragments from juvenile and sub-adult individuals, although it was impossible to estimate how many individuals they might represent.

The apparent predominance of adult and elderly cattle during the post-medieval period appears to be rather unusual when one compares these data with those from other sites. Fusion data from late post-medieval Lincoln (Dobney *et al.* 1996) indicate a higher proportion of juvenile and immature individuals, whilst at Exeter, Maltby (1979) reported a marked increase in young cattle from the 16th century onwards. Assemblages from other sites, such as Launceston Castle, Cornwall (Albarella and Davis 1996) and St Andrew's Priory, Fishergate, York (O'Connor 1993), also include a preponderance of juvenile individuals and it has been suggested (Albarella and Davis 1996; Dobney *et al.* 1996) that during the post-medieval period there was a general trend away from cattle being used primarily as multi-purpose beasts towards a more intensive husbandry regime centred on beef, veal and dairying. Although data from Doncaster do not appear to support this theory, they are extremely limited and may not reflect a true picture of the slaughter pattern. In addition, the apparently specialised nature of much of the assemblage (particularly material from 18th century deposits) may mean that the remains merely represent a subset of the population, in which selected skeletal elements had been utilised for various industrial activities.

Caprovids

Data from caprovid mandibles are largely restricted to material of 16th century date, with 92 mandibles (of 106) being recorded for this period (Table 17). Using Payne's age categories (Payne 1987), it is apparent that there is a preference for animals between 3 and 6 years in age, with some older animals aged 6 to 8 years (category H) and 8 to 10 years (category I) also present (Table 18; Figure 2). Very few individuals appear to have been slaughtered before 3 years of age. Use of O'Connor's (1989) more general groupings shows that 90% of all mandibles can be assigned to the adult 3 category (i.e. over 4-6 years of age).

Epiphyseal fusion data (Table 19) largely support the age distribution seen from the mandibles, which indicates that few individuals were slaughtered prior to 2-3 years (intermediate stage 2, after O'Connor 1989). Numbers are

again small, however, the exception being the groups from the 16th century deposits.

The overall picture suggests that sheep were kept primarily for their fleeces, the older individuals perhaps representing breeding stock that was past its prime and/or wethers which were surplus to requirement or which were no longer producing good quality fleeces. Although a similar age profile was noted from Launceston Castle (Albarella and Davis 1996) and from medieval assemblages at Lincoln, the later post-medieval material from Lincoln showed a greater emphasis on younger animals (Dobney *et al.* 1996).

Pig

Both mandible wear stage and epiphyseal fusion data were extremely limited for all periods. Little information can be gleaned from the five mandibles present or from the small number of isolated teeth. Most of the skeletal elements present were unfused, suggesting a predominance of young individuals, but again the restricted numbers cannot necessarily be considered a representative sample.

Biometry

Although limited in the number and range of skeletal elements represented, a useful biometrical archive is available from the North Bridge assemblage. Its importance lies in its mainly early and later post-medieval date, and the contribution it makes as further important evidence in our understanding of livestock improvements associated historically with the so-called 'Agricultural Revolution' of the 18th century.

Cattle

Cattle horncores were the only elements represented in the Doncaster assemblage in any numbers suitable for statistical analyses. Figures 3-5 show a number of bivariate plots of the various horncore measurements available. It can be seen that values from each major period overlap considerably and that no clear patterns are evident.

Although all but one of the horncores recovered from the site were either medium or shorthorn varieties (as defined by Armitage 1982), five of the those from the 17th-18th century well fill appear as outliers in terms of horn length (Figure 3). The specimens appeared long and narrow, with the horn curvature similar to those interpreted as steers (after Armitage *loc. cit.*). Conversely, four horncores from the large horncore pit (dated to the 16th-17th century) appeared broader around their bases in relation to their length when compared with the remaining values. Comparison of the minimum and maximum diameter measurements of the base of the horncores shows a close correlation for all periods (Figure 4), whilst comparison of greatest length with basal circumference shows a group of five outliers from the 16th-17th century well fill (Figure 5).

When these data are compared with biometrical data from the 16th century horncore pit at St Mary's Guildhall, Lincoln (Scott 1986), a generally similar pattern can be seen. Horncore measurement data are notoriously difficult to interpret since several explanations for the observed patterns are possible. Thus the presence of cows, bulls and steers may explain the distributions, the few large outliers representing bulls, whilst the long, slender specimens are from steers. Superimposed onto this pattern or separate from may be smaller subsets representing of different varieties of cattle. From the length of the measurable horns it is clear that improved varieties of cattle (as indicated by the presence of the longhorned individuals) are absent from the North Bridge assemblage, although several specimens from the well fill do approach them in size.

Caprovids

When the limited metatarsal data from North Bridge are compared with the well dated post-medieval data from Lincoln, there is little overlap (Figure 6). Proximal breadth and depth measurements of the metacarpals also show a large proportion of early 16th century Lincoln values to be well outside the range of North Bridge values (the post-medieval group, pm1, in Figure 7). Since the large sheep from Lincoln have been tentatively interpreted as early evidence for an improved breed (Dobney *et al.* 1996), it follows that those from Doncaster probably represent a non-improved variety.

Comparisons of further limited univariate data from other sites in York (Table 20) appear to confirm that (with the exception of Lincoln) little change in the size of sheep from these sites occurred before the 19th century (O'Connor, 1995). Reconstruction of mean withers heights for these sites also supports this hypothesis although withers height values for medieval and post-medieval sheep from the Hall Garth site, Beverley, East Yorkshire (formerly North Humberside, Dobney *et al.* 1994) show that those from the 19th-20th centuries were shorter than sheep from earlier periods (Table 21).

Horse

The horse remains, recovered mainly from Contexts 1001 and 1404, show an interesting dichotomy of shape between the early and later post-medieval period (Figures 8 and 9), although extrapolated mean withers heights for all periods remain relatively constant (Table 24). It is clear from comparisons of the breadth and depth of the distal humerus (Figure 8) that all individuals from the 18th century were of different conformation to those from the 16th and 17th centuries. A similar pattern can be seen from the astragalus, although numbers are more limited.

Estimates of the withers heights were calculated from greatest lateral length measurements of complete elements. These calculations produced a range of height values, from 1209 to 1515 mm for the three periods represented (Table 23). Mean values for extrapolated height (Table 24), when converted to 'hands', indicate the presence of ponies and horses of between 12 and 15 hh, with mean heights for each period of 13 hh (16th century), 13.2 hh (16th-17th centuries) and 13.3 hh (18th century). In contrast, the horses from 15th/early 16th century deposits at Nunnery Lane, York (Jaques and Dobney 1996) have a mean height of 14.2 hh and, although there is much overlap with the Doncaster values, smaller individuals appear to be absent in the York assemblage (Figure 10). When plotted against data from three modern breeds (data from Johnstone 1996), two-thirds of the Doncaster individuals fall within the size range for Exmoor ponies, the remainder overlapping with the Arab range. This does not, of course, indicate that the horses from Doncaster had the same conformation (i.e. build) as these modern breeds, since we are only dealing with withers heights. They do, however, provide a useful guide to approximate size.

Cranial perforations

Although evidence of a number of pathological conditions was noted on the vertebrate remains from North Bridge, most were single occurrences of little interpretative significance. However, the presence of perforations in the occipital region of a number of cattle crania is worthy of more detailed discussion. From the whole assemblage, a total of 27 examples of this condition was recorded. Since skull fragments (other than those of horncores and mandibles) are not normally recorded using a diagnostic zone approach, quantification of the occurrence of these perforations cannot usually be made. However, in this instance, once they had been observed in several contexts, it was decided to select one of the largest contexts (in this case Context 1001) and record the cranial portion of all cattle skulls using a diagnostic zone system similar to that already employed for the post-cranial skeleton. Thus the occipital region of a complete cattle skull was divided conceptually longitudinally along its mid-line and horizontally by the nuchal crest (the area to the left of the mid-line and above the nuchal crest representing zone 2, whilst that to the right of mid-line and above the nuchal crest was defined as zone 4). All cattle cranial fragments which included >50% of either zones 2 or 4 were recorded.

A total of 45 cattle occipital cranial fragments was recorded in this way from Context 1001, 16 of which (35.5%) showed evidence of cranial perforations.

A number of possible clinical factors (congenital, infectious, parasitic, neoplastic and direct pressure through yoking) have been proposed as the most likely aetiology of this condition. These factors have been most recently discussed by Brothwell *et al.* (1996) and on the basis of their brief survey, which includes the evaluation of additional archaeological evidence for some of the assemblages they consider, it would appear that parasites, tumours, and infection can be ruled out as causal factors. Although it could not be clearly established, they suggest that the cause is either congenital or yoking pressure. The high frequencies of the condition in the material from post-medieval Doncaster parallel those observed in assemblages from 16th century Brugge in Belgium (Brothwell *et al., op. cit.*) and form another important quantified late record of this condition. Only a wider survey of both archaeological and modern comparative material (including other bovid species) will enable a full appraisal of this condition to be made.

General discussion of the plant and animal remains from North Bridge

Although close to the modern river and only a matter of a metre or two above present river level, all of the sampled deposits at North Bridge were remarkable for the sparseness of biological remains preserved by anoxic 'waterlogging'. Apart from a few contexts, notably the fills of Pit 1519, most layers yielded few plant or invertebrate remains other than those preserved by charring; even mollusc shell was exceptionally rare, the near absence of shellfish from most phases being extraordinary for an urban occupation site. Bone, too, was mostly thinly dispersed in the bulk-sieved samples, and rather small quantities were recovered during excavation although, again, there were several deposits with high concentrations. Other components regularly recorded from the North Bridge samples were sand and gravel, coal (and pre-Quaternary megaspores derived from it), charred hazel (*Corylus avellana*) nutshell fragments, fish bone, uncharred seeds of elderberry (*Sambucus nigra*), charred seeds of corn-marigold (*Chrysanthemum segetum*) and iron-rich concretions (some perhaps associated with industrial activity but mostly probably 'iron pan' formed within soil). (The temporal distributions of the more abundant plant remains and some other components of the samples are shown in Table 5; apart from some concentrations of certain remains such as charred *Cladium* leaf fragments, for the most part a thin scatter through time is indicated.)

Charred plant remains (other than charcoal from timber) were present in almost all the deposits examined, usually in low concentrations; however, they consistently included remains of twig or root fragments at least tentatively identified as heather (*Calluna vulgaris*). Also present in many samples were charred and sometimes uncharred remains of fragments of organic material which were probably peat, or at least 'mor humus', the formless organic matter below the surface litter from an area of heathland or moorland. Charred cereal grains were widely distributed, too, again usually in low concentrations, though there were a few cases where concentrations in the order of 5-50 per kilogramme of raw sediment were encountered. Chaff was occasionally recorded, mostly in the form of rachis ('ear stalk') fragments, and even these were at very low concentrations.

A feature of some of the deposits was the presence of plant material in which the tissues were represented by siliceous material, apparently forming through burning (though the precise mechanism seems not to have been investigated in detail, cf. Robinson and Straker 1991).

One explanation for much of the plant material—and, indeed, perhaps some of the accumulation of mineral material—at this site is that it originated in turves. Given the presence of materials quite likely to have been used in roofing, it is tempting to suggest that the turves were also used in this way, being burnt secondarily either to dispose of them or deliberately for their content of combustible material. Some of the turves are likely to have come from bogs or mires, given the presence of burnt peat and bog taxa such as *Sphagnum*, *Erica tetralix*, and *Eriophorum vaginatum*, whilst other material may have been largely sods with a turf mat of heathland plants and much mineral sediment beneath. The former seem much more likely to have been used as primary fuel, the latter to have been burnt secondarily. One argument against the use of the less richly organic turves as a primary fuel is the abundant evidence for other sources of fuel in the form of charcoal and coal.

The use of materials such as saw-sedge, heather, gorse and turves in roofing is variously discussed by many writers, e.g. Innocent (1916), Billett (1979), Clifton-Taylor (1972) and Godwin (1978). Innocent notes (pp. 213-14) that saw-sedge was the 'main, though uncultivated crop of the fen, 'as it makes a beautiful durable thatch': its sharp, serrated edges keep away birds and rats'. Moir and Letts (in prep.), however, point out that the use of saw-sedge for this purpose may not be of great antiquity, the historical references seeming not to date much further back than the early years of the present century. They cite references to the use of the plant directly as fuel, e.g. for malting.

Remains of *Cladium* have been recorded from a variety of archaeological sites of Roman and medieval date in England, mostly in York and Beverley (data held in *Archaeobotanical Computer Database*, EAU, University of York), but in all but one case it is the fruits which have been noted. The one

exception is tentatively identified leaf epidermis of saw-sedge from a deposit broadly dated as pre-12th-14th century from the Dominican Priory site in Beverley (Foreman 1996). It is very likely that much if not all of the material from a variety of sites in York and Beverley recorded by ARH and colleagues as 'papillose leaf epidermis' and assigned to the sedge family (Cyperaceae) is actually *Cladium* and represents vestiges of material used in thatching. The charred and uncharred vegetative material from North Bridge, Doncaster, however, is much more securely determined and it is present in sufficient quantities in at least three contexts to suggest it has served some purpose—thatching perhaps being the most likely one.

The records of saw-sedge from Doncaster are also of interest as an example of a plant which was probably much more widespread in the region in the past. Today, the plant has one well-known station in lowland Yorkshire (Askham Bog near York, Fitter and Sith 1978) but even by the early years of the last century it had a very restricted distribution: Baines (1840, 112) records it from Askham Bog and 'In a ditch on the road from Doncaster to the decoy', whilst Lees (1888) repeats Baines' records and adds one from 1849 for Askern (a small town a few kilometres N of Doncaster).

Aquatic organisms were fairly common in those deposits at North Bridge where there was adequate preservation, although in the case of the insects only marginally more so than for typical occupation site fauna (6% of the individuals for the site taken as a whole). 'Outdoor' insects were more abundant than in most occupation deposits and accounted for over half of the remains; many of these may have been deposited by water. The resting bodies (statoblasts) of the bryozoan *Cristatella mucedo* were frequently present and sometimes quite abundant; this gelatinous creature occurs on plants and other objects in clean fresh water. The influence of the nearby river is thus strong, and it was possibly the source for an appreciable part of the fauna, both as 'background fauna' in the normal sense and via flood deposits. The same is true to a lesser extent of the uncharred component of the plants, and almost certainly there was substantial deposition of mineral sediment by floodwater. Aquatic insects seem to have become established on the site itself during at least one phase of the infilling of the massive Pit 1519.

The component of the insect fauna which is regarded as strongly favoured by human occupation (synanthropes) provides interesting insights into the nature of the site. Synanthropes were proportionally only half as abundant as at most of a series of occupation sites discussed by Kenward (in press). The synanthropes as a whole (SA in Table 7) provided only 23% of the adult beetles and bugs, in strong contrast to a mean of 52% for fourteen other sites represented in total by over 1000 assemblage—this in a site whose deposits mainly date to the period in which synanthropes were becoming dominant in York (Kenward unpublished). Dilution by outdoor forms may account in part for these observations, but cannot be seen as the full explanation. It appears that artificial decomposer habitats were not common at this site through the period represented by useful numbers of insect remains. This may indicate activities at the site did not produce large quantities of organic waste or that waste disposal was very efficient at most times. The presence of quite large numbers of the spider-beetle *Tipnus unicolor* rather suggests the presence of waste from long-lived buildings, following arguments of Kenward *et al.* (1995), and evidence from biological remains as a whole rather suggests that floors were kept reasonably clean, although some bones and charred plant remains usually became incorporated.

In addition to its overall rarity, the internal composition of the synanthropic component was notable: after correction for grain pests and the burrowing beetle *Aglenus brunneus*, 67% of the synanthropes were forms currently regarded as facultative (opportunistic) in lowland Britain (SF), compared with an average of 44% for the sites examined by Kenward (in press), while 29% were species categorised as typically synanthropic (ST), compared with a mean 45% for the aggregated sites. The proportion of strong synanthropes was about normal, however. The ratio of facultative to typical synanthropes was thus about twice the average value. What do these observations imply? There were house fauna communities at the North Bridge site which were unlikely to have occurred except within buildings. It is possible that the rather odd synanthrope structure results from the addition of two quite different

communities, one (with a distinctive and restricted group of synanthropes including *Tipnus unicolor* and the rare *Sitophilus granarius*) from within structures, and the other from natural or semi-natural habitats, dominated by facultative forms. If this is so, it may be that (as suggested above) the buildings from which litter was being ejected were of good quality, or at least very clean. The hypothesis that a preponderance of facultative synanthropes is indicative of new or intermittent occupation, or extreme isolation (Kenward, in press), is thus not applicable to the present site, a good example of the need to examine each case on its particular merits and not to argue from statistics alone.

One of the particular features of the plant and animal assemblages from Doncaster is the paucity of evidence for what may have served as food. If we can discount the charred cereals as perhaps having largely originated in burnt straw, we are left, for the plants, with a few burnt legumes and a background of hazel nutshells and a few records of seeds from fruits (many of which may have arrived in bird droppings or in flood debris), and a variety of fish which seem to have been exploited. The general nature of these remains, and the rarity of marine shell from almost all of the deposits, for example, perhaps points to the consumption of 'snack foods' by people who were working at this site but not living there all the time. The absence of any feature incontrovertibly interpretable as a cess pit also requires some explanation. Poor preservation cannot account for the lack of evidence, since there are good precedents for recognising even very well decayed human faeces where 'mineralisation' has occurred. Perhaps the nearby river received most or all of this kind of waste? Or perhaps the number of people using the site was small and they used it only during 'working hours'.

Marine shell (all recorded as oyster) was noted by the excavators and discarded. According to these records, oysters were effectively absent from the earlier medieval phases, although there were sporadic finds from Phase 16 onwards, and a concentration of shells occurred in the large pit (1519) in Phase 17. This is echoed by the results of analysis of the bulk-sieved samples which yielded only five records of shellfish, all in very small amounts, two of them (one specifically for oyster) from Pit 1519.

The very large pit, 1519, lying approximately in the middle of the excavated area, gives the strong impression of a pond which, on the bioarchaeological evidence, was occasionally flooded by the adjacent river. This would represent a useful way of refilling a cut used for water-storage. Refilling may perhaps have been deliberately managed, or may have just taken advantage of the inevitable winter floods. The nature of the sediment in some of the fills suggests that some were waterlain, whilst others included litter from within buildings and other waste materials. The 'pond' does not seem to have been used primarily for waste disposal. Some of the debris from human occupation may have entered accidentally or by neglect, although in certain cases there does seem to have been deliberate dumping, particularly of bone. Two possible functions for the 'pond' spring to mind. It may have been used to water livestock kept in the surrounding yard. The presence of abundant dung beetles in one layer supports such an interpretation quite strongly, but the steepness of its sides suggest that beasts could not have been allowed direct access. Alternatively (or perhaps as well) it may have supplied water for some industrial or craft activity for which it was useful to have water supply immediately to hand rather than relying on the river, the level and quality of which may have been variable, or access to which may have been restricted for some reason. Another possibility is that this large cut was a sump for foul waste from some process, so polluted that discharge into the river was prohibited.

The evidence for butchery from the vertebrate remains from the later phases, and for metal-working from the earlier, show the kinds of activities which might have produced polluted effluent. Metalworking is outside the scope of this report, but the evidence from bone requires further discussion.

Interpretation of the vertebrate material from North Bridge as a whole is problematic because of the inherent bias caused by the obviously specialised nature of most of the bone groups. The bulk of the material under discussion may merely represent animals chosen for a particular craft/industrial purpose (i.e. wool, hides, horns) rather than giving a true picture of the economic significance of each species.

However, the vertebrate remains recovered from these excavations appear to be refuse from a range of activities inconsistent with exclusively domestic occupation. The presence of primary butchery waste in 16th century deposits from the Pit 1519 represents either small-scale carcass conversion or hide preparation (or quite possibly both).

The large accumulation of cattle horncores recovered from Pit 1028 (whose fills were dated to the 16th-18th centuries) almost certainly represents waste associated with one of several craft activities. Although concentrations of horncores have often simply been thought to be characteristic of hornworking, it is possible that both butchers and tanners could also be responsible for such accumulations of waste.

Butchery waste (i.e. mainly heads and feet of cattle and sheep) was certainly present in the slightly earlier 16th century deposits of Pit 1519. Both butchers and tanners would accumulate numbers of horncores if they sold just the horn sheaths on to the hornworkers. However, if this was the case, one might expect to find the cores mixed with the other butchery or tanning refuse, which at North Bridge they quite clearly were not.

Similar dumps of horncores, associated with shallow water-tight pits and layers of ash and lime, were recovered from sites adjacent to St Peter's Church and at St Peter's Street, Northampton (Shaw 1984; Harman 1979). These features were interpreted as evidence for tanning, the horncores, in this instance, being delivered to the tanner attached to the hides, seemingly a common practice during the medieval and post-medieval periods (Cherry 1991). Prummel (1978) cites 18th century Dutch documentary evidence for hides and skins arriving at the tannery with horns and hooves still attached. The horns would constitute a useful by-product which could be sold on to the horners either 'hornes in the bone' or horns 'oute of the bones' (Armitage 1990). Again, if only sheaths were sold, large quantities of horncores would be accumulated.

Before the horn can be utilised, it has to be detached from the bony core. Separation was achieved either by prolonged soaking in pits or by leaving the horns lying in the open air so that the connective tissue between the sheath and the core desiccates and decomposes, making removal from the core easier (MacGregor 1989; 1991; Prummel 1978).

Archaeological evidence and 19th century sources (Fisher 1936; Wenham 1964) imply that, in general, the horns were soaked in large water-filled pits. At Stamford, Lincolnshire, a series of shallow pits were found (Cram 1982), some of which had been lined with clay. These features were interpreted as 'soaking pits' in which the horns were placed for some weeks to separate the keratinous sheath from the core. The horncores were found apparently *in situ* at the bottom of eight of these clay-lined pits. At Hornpot Lane, York, in addition to a large shallow clay- and wood-lined pit containing approximately 200 horncores, there were hearths and furnaces (Wenham 1964; Ryder 1970). The latter were thought to be integral to the next stage of hornworking, heating and softening horn prior to cutting, shaping and moulding. The horncores at Doncaster were not recovered from features which were clearly related to hornworking (such as those discussed above).

Several of the more complete horncores recovered from North Bridge had obviously had their tips sawn off, and a few tips were also recorded. Prummel (1978, 409) suggests that removal of the horn tip, which facilitates separation of the sheath from the core, is almost certainly indicative of hornworking. MacGregor (1989; 1991) also notes that the solid tip of the horns were sometimes removed prior to soaking or decomposition, possibly to facilitate separation but also because the tip could be used without any further preparation as raw material for the production of handles, buttons and thimbles.

A small number of horncores with their tips removed were recovered from excavations at the Royal Mint site, Tower Hill, London (formerly the Royal Navy Victualling Yard, West 1995). According to McGrath (1948), regulations implemented at Smithfield cattle market during the 17th century, and intended to guard against buying to sell again in same market, required cows to have two or more inches cut from a single horn. In the light of this historical evidence, West interprets the assemblage from the Royal Mint site as the remains of cattle possibly bought at Smithfield. Whilst it is highly unlikely that any of cattle from the North Bridge site came from as far south as London, it is possible that a similar regulation may have applied to other livestock markets. However, in contrast to the situation at Doncaster, separate horncore tips were not reported by West, which might support the conclusion that the Doncaster assemblage is most likely to represent hornworking. It is highly unlikely that either butchers or tanners would go to the trouble of removing the tips.

The horse remains from the horncore pit are more difficult to interpret. Deposits with both horncores and horse bones have also been recovered from excavations at Northampton (Harman 1979), the Castle Ditch, Newcastle-upon-Tyne (Rackham 1981) and St Johns Street, Bedford (Grant 1979). In these cases, they have been variously interpreted as representing tanning waste, the dismembering and disposal of sick or old animals, or the processing of meat for hounds. The apparently low frequencies of head and feet elements at these sites suggest that the equine remains do not represent tawers' waste—tawers (formerly 'tawyers', amongst several other spellings) were craftsmen who 'tawed' the skins of deer, sheep and horses by treating them with alum and oil (Salzman 1923, 245; Cherry 1991, 299). In this case, these elements would have been removed and transported with the hide to the tawer.

Although major meat-bearing bones formed the bulk of the horse remains, there is little evidence of butchery on any the horse bones from these sites. This suggests that the remains of the horse carcasses were either dumped wholesale or roughly stripped of meat, for feeding to the hounds or to the lower echelons of society (Graves 1957), before the bones were eventually discarded. By contrast, the large assemblage of horse bones from Witney Palace, Oxfordshire (Wilson and Edwards 1993) exhibited much evidence of butchery (although it was not quantified) and included a wide range of skeletal elements (although the presence of few distal limb elements was interpreted as representing hide removal). Witney Palace was interpreted as a high status establishment feeding horse flesh to hunting hounds, a very different set of circumstances to that at Doncaster.

The limited biometrical dataset (Tables 20-21) includes little evidence for the presence of improved livestock at North Bridge during the post-medieval period. The hypothesis that sheep, at least, in the north of England remained quite small and constant in size from the later medieval period to late post-medieval times has been put forward by O'Connor (1995) using data from a range of post-medieval assemblages from York. However, the values for bones of early post-medieval date from excavations in Lincoln indicate a very early breeding experiment which produced animals with a larger carcass than was generally found in the north of England at that time.

To summarise, the biological remains from the North Bridge excavations have provided fairly detailed information regarding the economic and industrial nature of this part of Doncaster during the late medieval and post-medieval periods. It is quite clear that butchers as well as possibly hornworkers and tanners had establishments in the vicinity of the site. Historically, these crafts and industries were usually situated together on the periphery of major urban settlements, a direct consequence of the noxious nature of their activities and their interdependence upon one another. The lack of plant foods

and the broad nature of the animal and plant remains indicate that there was little or no domestic use of the site at any period between the 13th and 18th centuries. At at least one stage, there were huge numbers of dung beetles—perhaps the beasts exploited by the industry on the site were being penned and their dung provided a habitat for the beetles.

One of the insect species recorded from the North Bridge site is believed to indicate temperatures higher than at the present day: the nettle bug *Heterogaster urticae* (of which a single individual was recorded from Context 1432 in Pit 1519, dated to the 15th/16th century). The presence of *H. urticae* during even the less intensely cold part of the 'Little Ice Age' is notable in view of its failure to return in strength to Yorkshire in the 20th century. An inability to colonise seems highly unlikely given its mobility and the ubiquity of its hosts (nettles), so that we must assume that present-day temperatures have not returned to those which existed in the Roman period and the 9th to 11th centuries, when it was common in York (Kenward and Hall 1995). Remains of two individuals of deathwatch beetles (*Xestobium rufovillosum*) were found in the same deposits as the nettle bug; according to Buckland (1975) this beetle is unable to exist in the open in Yorkshire at present-day temperatures, but of course the Doncaster specimens may have originated in long-lived buildings.

Concluding remarks

Although in some respects unpromising as a source of bioarchaeological information (Carrott *et al.* 1994), it is the authors' contention that the deposits at North Bridge have repaid handsomely the investment of resources in carrying out these analyses. The opportunity to survey a large number of samples has meant that patterns of change over time—or perhaps a surprising lack of them!—can more easily be discerned.

One methodological advance made through this work is the realisation that larger 'test' GBA subsamples than the 1 kg recommended by Kenward *et al.* (1986) should probably be used routinely for analysis where preservation appears to be poor; the small amounts of charred plant material present in low concentrations in most samples at this site were certainly more informative where, as here, subsamples of 3 kg were routinely employed. Similarly, extensive survey revealed the consistent presence of *Cristatella mucedo* statoblasts, good evidence that flood silts contributed to the deposits throughout most of the sequence. The advantages of using this technique rather than relying mainly on the (larger) BS samples lie in the lesser degree of damage to the more delicate charred herbaceous material in which processing of GBA subsamples usually seems to result, the greater ease of separating and handling residues and washovers, and the recovery of small remains (in the range 0.3-1.0 mm), usually incompletely extracted in BS samples.

Overall, then, this has been a productive exercise, providing notable results concerning the site as a whole and individual features, and yielding valuable information for wider synthesis of various aspects of the past, as well as contributing to our view of the best way to approach sites with low concentrations of biological remains and where preservation by anoxic waterlogging is highly localised.

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