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Appendix*

**Technical report: Studies on biological remains and sediments  
from medieval deposits at the Magistrates' Courts site,  
Kingston-upon-Hull (site codes HMC 94 and MCH99)**

**Part 1: Text**

by

Allan Hall, John Carrott, Deborah Jaques,  
Cluny Johnstone, Harry Kenward, Frances Large and Raimonda Usai

**Summary**

*Plant and animal remains were investigated from deposits of medieval date associated with a 14th-16th century Augustinian friary and a phase of occupation prior to the establishment of the friary.*

*Pre-friary deposits were often rich in organic remains suggestive of stable manure and these seem to have been extensively reworked into the deposits forming during the life of the friary, including many associated with burials. However, one burial gave evidence for plant remains likely to have been buried deliberately with the corpse. Other pre-friary deposits, notably the fills of a large feature, which may have been a creek, gave some evidence for saline conditions. Floors from the pre-Friary and early Friary phases gave some evidence for the strewing of litter such as rushes and for abundant fish remains discarded onto the floors. Although human parasites were present, these surfaces appear to have been fairly dry. Apart from the fish remains, bones generally represented debris from butchery or domestic waste. A material almost constantly present where organic material was preserved was peat, often from raised mires; this was presumably brought to the site for litter or as a fuel. Grain pests were also common, and there were surprisingly large numbers of clover weevils (*Sitona*) whose significance is discussed.*

**KEYWORDS:** MAGISTRATES' COURTS SITE; KINGSTON-UPON-HULL; MEDIEVAL; TENEMENTS; AUGUSTINIAN FRIARY; GRAVE FILLS; SEDIMENTS; PLANT REMAINS; INSECT REMAINS; MOLLUSCS; VERTEBRATE REMAINS.

Authors' address:

Palaeoecology Research Services  
Environmental Archaeology Unit  
Department of Biology  
University of York  
PO Box 373  
York YO10 5YW

Prepared for:

Humber Archaeology Partnership  
The Old School  
Northumberland Avenue  
Hull HU2 0LN

Telephone: (01904) 433846/434475/434487

Fax: (01904) 433850

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**Technical report: Studies on biological remains and sediments  
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Part 1: Text**

## **Introduction**

Excavations on the site of proposed new Magistrates' Courts for the town of Kingston-upon-Hull were undertaken by the Humber Archaeology Partnership in 1994 (with a further small excavation in 1999). The area excavated revealed a large part of the town's Augustinian Friary, as well as evidence for early 14<sup>th</sup> century domestic occupation in deposits pre-dating the establishment of the friary in the second decade of the 14<sup>th</sup> century, and for a variety of post-Dissolution buildings and other features.

Investigation of biological remains and sediments from these excavations was undertaken to shed light on the nature of occupation in the pre-Friary phases of the site, including aspects such as diet and housing conditions, as well as broader environmental issues such as flooding by the nearby river. For the ecclesiastical phase, assessment had indicated the possibility of studying funerary practice as well as aspects of diet and living conditions, though the first of these was limited by large-scale redeposition within grave cuts which was not apparent in assessment.

The deposits encountered were sampled for biological remains by means of GBA, BS and SR samples (*sensu* Dobney *et al.* 1992), a series of spot samples, mostly of organic material associated with human burials, and by hand-collection (for bone and shell). An assessment of biological remains was undertaken following excavation by Carrott *et al.* (1995), with a further assessment of material from the 1999 excavation by Hall *et al.* (2000). Funding restrictions meant that, for the main phase of analysis, only material in Periods 1 (pre-friary levels) and 2 (construction and use of the friary) from the 1994 excavations could be examined. Some vertebrate material originally included in these phases but later assigned to Period 3 is included here as an appendix. Vertebrate remains from later phases were of considerable interest and it is hoped that funding will be found to secure their detailed examination.

In all, for Periods 1 and 2, there were 58 BS samples, 220 GBA samples, 71 spot samples (plus a further 83 samples from burials taken for study of parasite remains, a group not considered here), and 8 SR samples. Two sediment monoliths representing a sequence thought to include a buried soil or old ground surface were also taken.

## **Practical methods**

*Sediments:* Thin sections were made for three blocks of sediment from supposed buried soils, taken during excavation in Kubiena tins. The sections were dried and impregnated with crystic resin prior to cutting.

*BS samples:* Samples taken for bulk-sieving were processed on site, using 1 mm meshes for both residue and washover. As the washovers were small, they were reunited with the residues and the combined fractions dried before being sorted for bones, shell and artefacts.

*GBA samples:* For the GBA samples selected for this study, the lithology was described using a *pro forma* and subsamples of 1-8 kg were processed according to the methods of Kenward *et al.* (1980; 1986), the residues mostly being stored wet prior to examination.

*Plants:* Plant remains and other components of the residues were recorded using direct input to a PC (via an input form and *Paradox* software). Abundance of all constituents (related to the original size of the

subsample) was recorded using a four-point scale from 1 (one or a few individuals or fragments or a very small component of the matrix) to 4 (abundant remains or a major/dominant component of the matrix).

*Insects:* 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 normally recorded fully quantitatively and a minimum number of individuals estimated on the basis of the fragments present. Other invertebrate macrofossils were recorded semi-quantitatively using the scale described by Kenward *et al.* (1986) and Kenward (1992), estimates being made for extremely abundant taxa. Recording of the state of preservation of invertebrates followed Kenward and Large (1998), making use of the sheet illustrated in their fig. 2.

Insect remains recovered from the residues during recording of plant remains were in most cases included in the record, although there were hardly ever any taxa additional to those from the flots and, indeed, rarely any additional individuals. Fossils from residues tended to be larger or denser than those in the flots.

*Molluscs:* Mollusc remains were recorded from a selection of the flots, washovers and residues from the processing of GBA and BS samples. No provision was made in the project design for the recording of marine shell, so the assessment by Carrott *et al.* (1995) should be consulted for further information about this material; however, some brief notes on the presence of marine shell have been made as part of the recording of the general nature of the deposits, but no detailed study of the remains recovered from the samples, or of the hand-collected material, has been undertaken.

Counts of molluscs are for minimum numbers of individuals (MNI). All complete fossils and distinctive fragments were identified to species where possible, using reference works by Ellis (1978), Kerney and Cameron (1979), and Janus (1965), and the reference collection of the Environmental Archaeology Unit, University of York, although in some cases there were very many unidentified fragments.

The manuscript lists of invertebrates were entered to a *Paradox* database using systems written by JC, for analysis and long-term storage. The data were interrogated using *Paradox* to produce species lists in rank order for each assemblage and a species list for the site in taxonomic order, following Kloet and Hincks (1964-77) for the beetles and bugs and Kerney (1976) for the molluscs.

*Vertebrate remains:* Bone was hand-collected during excavation. The bone from a series of 'site-riddled' samples was incorporated with the hand-collected material for the purposes of this investigation. For the assessment of the material from the 1994 excavations (Carrott *et al.* 1995), vertebrate material was examined from a total of 298 contexts initially dated to Periods 1 and 2. The entire assemblage was scanned and material from a total of 70 contexts (including 21 from Period 1 and 44 from Period 2) subsequently selected for further recording. A general paucity of detailed information pertaining to individual contexts throughout most of the post-excavation phase, combined with time constraints, resulted in the recording in detail of a number of assemblages which were then discovered to be either from grave fills or (in five cases) Period 3 in date. Thus, 18 Period 2 grave fills appeared to yield useful bodies of vertebrate material but almost certainly consisted largely of residual material, in most cases from earlier deposits disturbed during grave digging. The Period 3 material examined in error is discussed in an appendix to this report.

Data concerning vertebrate remains were recorded electronically directly into a series of tables using a purpose-built graphical input system and *Paradox* software. 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 concerning fragment size, dog gnawing, burning, butchery and fresh breakage for each context yielding more than 10 fragments.

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.* (unpublished). 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), medium-sized mammal 2 (assumed to be dog, cat, hare or equivalent sized mammal), unidentified bird, unidentified fish and totally unidentified. 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) and, in addition, recording of caprovid mandibles and isolated teeth were assigned to 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 Dobney *et al.* (1999).

Material recovered from the samples was recorded in a similar manner to that described for the hand-collected material. However, where material from duplicate samples existed for single contexts, only a proportion was recorded in detail, the rest being scanned for any additional species or to check consistency. The text in this report includes information about the vertebrate remains from the scanned assemblages, but numbers of fragments from these samples are not included in the tables.

## **Interpretative methods**

The interpretative methods employed in this study with regard to plant and invertebrate remains were essentially the same as those used in work on a variety of sites by Hall, Kenward and co-workers (though mollusc shell has been treated separately).

*Plants:* For the plant remains, interpretation is facilitated by the use of 'abundance-indicator values' (AIVs), calculated from the abundance scores and a score for the indicator value of each taxon within a series of ecological, use, and other groups (for details, see Hall and Kenward 1990).

*Insects:* For the insect remains, interpretation rests primarily on a number of 'main statistics' of whole assemblages of adult beetles and bugs, and on the recognition of ecologically-related groups of species (see Kenward 1978, with modifications outlined by, for example, Kenward 1982; 1988; Hall and Kenward 1990; and Kenward and Hall 1995). The main statistics used include: (a) a measure of species-richness (or diversity), of Fisher *et al.* (1943), for the whole assemblage and for components of it; and (b) proportions of 'outdoor' species (OB, calculated from taxa coded oa and ob), aquatics (W, w), waterside species (D, d), phytophages (plant-feeders) (P, p), species associated with dead wood (L, l), moorland/heathland taxa (M, m), and decomposers (species associated with decomposing matter of some kind). Decomposers are subdivided into (a) species primarily associated with somewhat dry habitats (RD, rd), (b) those found mostly in rather, to very, foul habitats (RF, rf), and (c) a residuum not easily assignable to one of these (rt). The category 'RT' includes all three of these groups of decomposers (rt + rd + rf). (In each case, the lower-case codes (e.g. 'rd') are those applied to species and the upper-case codes ('RD') are for the ecological group.)

A further ecological component quantified for the present site was the synanthropes, i.e. those species favoured by human activity (Kenward 1997). Taxa have been assigned codes for degree of synanthropy as follows: 'sf'—facultative synanthrope, common in natural as well as artificial habitats; 'st'—typically synanthropic, but able to live in nature; 'ss'—strong synanthrope, absent from or very rare in natural habitats in the relevant geographical area. These codes give rise to ecological groups SF, ST, and SS, which are summed to give SA (all synanthropes). A group of synanthropes regarded as particularly typical of buildings of various kinds has been termed 'house fauna' (Kenward and Hall 1995).

The abundance of these 'ecological' groups is discussed against the background of values for many other assemblages from a large number of sites. Thus, % N OB = 30 is a high value, but % N RT = 30 is low; while % N W and % N RF are both high at 10.

The index of diversity offers a guide to the presence or absence of remains of insects which bred in or on the developing deposit (autochthones), low values indicating breeding communities, high ones faunas of mixed origins. Note that 'significantly' low values differ for the various components of assemblages; the more inherently rich a component is, the higher the value of the index of diversity for a living community will be. Thus, 'outdoor' communities associated with natural vegetation tend to give a high value of , while very specialised communities, such as those of decaying matter deposited by humans, or stored grain, have low or very low ones.

Data for the present site have also been examined using the statistically-based groupings of species established for Anglo-Scandinavian Coppergate, York, by Carrott and Kenward (in press) and for a range of other sites (Kenward and Carrott in prep.). A separate study of species associations at the Magistrates' Courts site has also been made (see below).

In the context-by-context accounts the words 'several' and 'many' in relation to macro-invertebrate data are used in the semi-quantitative sense of Kenward *et al.* (1986), i.e. estimates of more than three and less than ten individuals were recorded as 'several' and translated to '6' for statistical purposes, and estimates of ten or more were recorded as 'many' and translated as '15', unless the numbers were very large, in which case a rough approximation was used. Numbers of individuals of adult beetles and bugs are, with a few exceptions flagged in Table 8, 'MNI's, calculated from the numbers of parts (heads, pronota, elytra, etc.) recorded.

*Molluscs:* The principal sources for the biology of the recorded mollusc species were Ellis (1978), Evans (1972), Kerney and Cameron (1979) and Janus (1979).

*Vertebrates:* With regard to the vertebrate remains, small assemblage size and problems of residuality have meant that only basic statistical analysis of the data could be undertaken. Thus, only fragment counts—where calculation of the total number of bone fragments involved the simple counting of all recorded identifiable fragments (number of individual skeletal parts or NISP)—were utilised. Minimum numbers of individuals (MNI) were determined using the zone system devised by Dobney and Rielly (1988), but there were too few identifiable fragments from Period 1 for meaningful information to be obtained. Unidentifiable fragments were recorded and quantified separately. An archive exists of the mandible wear stages and biometrical information.

## Results

(Note that, with regard to numbering, the sequences used at this site were such that some of the sample numbers are identical to some of the three-digit context numbers.)

The results of these investigations (including data relating to contexts and samples only examined during

the assessment stage) are presented in period, area and context order in the following account, with deposits from the same feature being grouped where appropriate. Note that the areas of the site defined for Period 2 (Nave, Choir, etc.) are used as a convenient way of grouping the Period 1 contexts for the purposes of the structural report, but can have no other significance, except perhaps in relation to deposits forming during the layout and construction of the first friary buildings (see those contexts indicated in Table 1 as being from the latest phase of Period 1). The tables are presented in a separately numbered report (Hall *et al.* 2000).

Table 1 gives a list of samples from Periods 1 and 2 for the site with an indication of those selected for this study. A full list of plant and animal taxa recorded from these deposits appears in Table 2, with lists of plant remains (and other components of samples) by context in Table 3. AIVs for plant remains are given in Table 4 (with an explanation of the groups used in Table 5), whilst Table 6 gives some statistics concerning plant remains and other materials which may represent 'litter'. Main statistics for the assemblages of adult beetles and bugs are presented in Table 7 and species lists by context and sample for macro-invertebrates other than molluscs in Table 8. Ecological codes used in the analysis of the insect assemblages are explained in Table 9. Tables 10-15 present data relevant to the further analysis of the data for the insect remains. Data concerning molluscs appear in Table 16, whilst Tables 17-20 give data relating to vertebrate remains.

### *Period 1: pre-friary deposits*

A major feature in the pre-friary deposits encountered at this site was a large natural depression or channel located beneath the subsequent position of the nave of the friary church. In the field it appeared that the bottom two-thirds of this feature had silted naturally, and the remainder infilled with waste dumped from the direction of the Market Place (which lay to the west); these dumps appear on artefactual evidence to date to the later 13<sup>th</sup> century. Subsequently, tenements were established along the Market Place, the rear of post-and-wattle buildings extending to within a few metres of the (?former) cut.

#### 'NAVE' AREA

### **Cut 2158 and associated deposits**

The fills of a large feature, Cut 2158, perhaps a marl pit or a ditch, were extensively sampled. In one case (1626) the single context number represents several separate contexts. The fills are presented here in stratigraphic order from lowest to highest, but the first material to be discussed came from the deposits into which the cut was inserted.

### *Buried soil and associated deposits*

A presumed buried soil was encountered in Section 88 at the interface of what appeared to be the natural drift, described in the field as clean, firm, bright orangey-brown clay, lacking inclusions. It was overlain by Context 2159, a firm pale brown clay, streaking black when trowelled. The 'soil' consisted of a lower firm yellow-brown clay and an upper, firm pale blue-grey clay, though field notes by ARH suggest the sharp transition implied by the division shown on the site section actually was more diffuse, the lower yellow-brown clay being rather mottled with blue-grey patches. The position of the sample can be located on Section 88/87 of the site archive

*Sample 690:* a block of sediment, recovered in a Kubiena tin, traversed the contact between the upper element of the soil and Context 2159. It was taken at 6.3 m from the W section pin and at a height of 2.26

m OD.

Laboratory description: Fine material: dominantly brown or light brown and, only in places, reddish-brown. B-fabric: speckled. Ped types: mostly apedal; the upper part of the section may have very weak subangular or angular block peds (very unclear).

The coarse fraction of the upper part of the section contains mainly quartz and feldspars (including microcline), shell fragments, unidentified microfossils, all equal to or smaller than 50  $\mu\text{m}$ . Black fragments with angular edges (possibly charcoal), and others with smooth edges, smaller than 30-40  $\mu\text{m}$ , are frequent. Porphyric related distribution pattern.

The coarse fraction of the lower part of the section is similar to the upper one, though quartz seems more dominant (this however, may be a local characteristic). Porphyric related distribution pattern.

Voids: cavities and elongated voids with dominant diameter of 150-250  $\mu\text{m}$ , and subordinately diameters of 500, 600, 1000, and up to 1300  $\mu\text{m}$ . Elongated voids include planes and non-accommodated voids. Some of the non-accommodated voids, especially in the upper part of the section, may have been caused by earthworms. Some planes are clearly artifacts resulted from sample preparation, whilst others are clearly voids in the material. In the upper part of the section, elongated voids display a dominantly random orientation and distribution patterns, whilst in the central part of the section the smaller elongated voids have a parallel basic orientation and distribution pattern, and referred distribution patterns dominantly parallel to the ground surface. Below this central part of the section, basic and referred orientation and distribution patterns of voids are both parallel and perpendicular to each other and to the ground surface.

Pedofeatures: elongated non-accommodated voids contain rare sandy, silty clay fillings. Voids in the central/lower part of the section contain discontinuous opaque infillings, some of which clearly ferruginous, others unidentifiable. Some of the infillings have a liquid-like appearance, and may be/have been dark opaque fluids. In the upper part of the section, opaque textural pedofeatures, some of which are clearly ferruginous, others unidentifiable, are thinner, rarer and in the form of coatings rather than infillings.

Mottle pattern: part of the mottling pattern displays features resulting from seasonal waterlogging, whilst other rare mottles on voids may have been related to more permanent waterlogging. This, however, could be only a local pattern, unrepresentative of the whole context.

*Sample 691:* This sample was taken at 6.21 m from the W section pin and at a height of 2.17 m OD.

Laboratory descriptions:

**Upper part of Sample 691:** Fine material: Speckled yellowish-brown with reddish-brown bands parallel or sub-parallel to the ground surface.

Coarse fraction: Dominantly quartz of <50  $\mu\text{m}$ . Presence of layers of different texture one above another, all parallel to the ground surface. Textures are characterized by higher or lower percentage of coarse grains, as opposed to clay particles.

Unidentified microfossils. Frequent <30-40  $\mu\text{m}$  charcoal flakes and other black fragments with smooth edges. Porphyric related distribution pattern.

Peds: Apedal



Context characterized by the absence of peds and by the presence of cracks and fissures (planar voids with accommodated walls) <300  $\mu$ m thick, mainly parallel to each other and to the ground surface. Some voids contain plant tissues and rare black opaque cells.

Pedofeatures: Black opaque nodules and interlacings unrelated to voids.

Though very similar to the lower/central part of Sample 690, this upper part of Sample 691 is characterized by bands of different texture and often reddish colour inherent to the material and unrelated to waterlogging.

### **Lower part of Sample 691**

Contains at least two different components of different origin mixed with each other.

Dominant component: Grey speckled birefringent fabric with masked/opaque brown areas; apedal; rare cavities, elongated non-accommodated voids, and planes, some of which are the result of sample preparation, all with random basic and related orientation and distribution patterns; very rare thin masked hypocoatings on elongated voids; coarse fraction dominantly made of <50  $\mu$ m quartz particles.

Less well-represented component: discrete brown opaque or masked areas with fewer skeleton particles rarer than in the dominant component.

*Sample 693:* This sample, from a section somewhat to the S of the location of Samples 690/691, traversed the transition from the supposed buried soil (Context 2287 in this area), to the underlying brown clay (2290). The exact position of the sample may be located on Section 88 of the site archive; it was at 2.63 m from the S section pin and at 2.575 m OD.

Groundmass: arranged in bands of masked reddish and greyish colours, with different textures characterized by higher or lower amounts of coarse grains.

Fine material: dominantly speckled limpid grey with masked brown areas, subordinately porostriated and parallel striated, with streaks parallel to horizontal planes.

Coarse fraction: Abundant <50  $\mu$ m particles, mainly quartz, arranged in bands; <40  $\mu$ m charcoal flakes and other rounded black inclusions.

Peds: apedal

Voids: randomly oriented interconnected cavities and elongated non-accommodated voids of 500 to 2000  $\mu$ m. Planes of up to 1.5 mm with parallel and subordinately perpendicular basic and related orientation patterns, parallel and subordinately perpendicular to the ground surface.

Rare thin opaque textural pedofeatures on plane walls, often ferruginous, or containing agglomerates of rounded dark cells of organic tissues probably representing humified organic material. Other similar voids contain non-humified organic tissues. Some non-accommodated voids contain infillings consisting of a mixture of grey rounded particles, black sharp-edged/rounded particles (charcoal?), few silt particles, all in a brown masked matrix. Rarely, non-accommodated voids contain reddish brown thin clay and sesquioxide coatings/hypocoatings.

### *Interpretation of thin sections*

Parallel void patterns in the lower part of the section from Sample 690 may suggest that this material underwent transportation or compaction before the deposition of the upper context, which shows no parallel patterns. There is no clear sign of soil formation in the material, though it is possible that some weakly defined and unclear voids of the upper part of the section indicate the presence of peds.

The porosity pattern of the upper part of the section from Sample 691 is similar to that of the lower part of the section from Sample 690. In the section from 691, however, it is clear that a porosity pattern parallel to the ground surface developed vertical cracks later. The horizontal pattern could, again, derive from transportation and/or compaction, as for the section from 690.

The section from Sample 693 is very similar to the lower part of that from Sample 691. In particular, the texture and colour-banded patterns and parallel crack patterns of 693 are almost identical to those of the lower part of 691.

Overall, then, evidence from macro- and micromorphological examination of these sections does not suggest that the horizon thought in the field to be a possible old ground surface is actually a former soil, though this is mainly through lack of positive evidence.

### *Fills of Cut 2158 and its recuts*

**Context 2163:** primary fill of large ?natural cut feature, **2158**

*Sample 666/T1* (5 kg): moist, mid orange-grey - brown, stiff (working crumbly to plastic and sticky when wet), clay silt (?alluvium).

This large sample of material forming the thick basal fill of the cut gave a very small residue (less than 100 cm<sup>3</sup> was retained), of which most of the clasts were of undisaggregated clay with some flint to 20 mm. There were a few twig fragments to 35 mm, and a little plant debris, including moderate numbers of *Sphagnum imbricatum* leaves and wheat/rye 'bran' fragments in the finest fraction, as well as some animal hairs. A single seed of the saltmarsh plant glasswort (*Salicornia*) perhaps indicates some tidal influence in the formation of this deposit but it was certainly not simply formed by water backing up from the Rivers Hull or Humber and most of the plant remains point to occupation material, perhaps including a litter (?stable manure) component, as in Sample 664 (peat fragments to 25 mm were present here).

A very limited assemblage of beetles and bugs (N = 29, S = 26) was accompanied by small numbers of other invertebrates. Predominantly consisting of outdoor forms (PNOB = 59), this may have been a mixture of transported remains and a few taxa which lived at low density *in situ*.

*Sample 664/T1* (5 kg): moist, light to mid brown (locally strong brown ?Fe salts), sandy clay ('alluvium') which tended to break on planes.

Again, there was a minute residue (of a few cm<sup>3</sup>) of flint, sand and plant detritus. The last of these, though small in volume, may have originated in stable manure or some other litter including cut grassland vegetation as there were traces of several taxa regularly recorded in other samples from this site where such plant material was clearly present in quantity. Also present were a few *Sphagnum imbricatum* leaves and traces of peat fragments (to 5 mm) and a few very well preserved fig (*Ficus carica*) seeds; the former may well have been used as litter, whilst the latter (which are small and durable) seem to have been dispersed widely through these deposits (they were recorded from 10 of the 15 Period 1 contexts examined and 11 of the 26 Period 2 contexts, but usually only in trace amounts, i.e. <5 seeds per kg of

raw sediment).

A small group of beetles and bugs was recovered (N = 44, S = 39), predominantly outdoor forms (PNOB = 64). There may have been some dumped material, but this assemblage gave the appearance of having originated in an area of weedy ground, perhaps in the cut itself, and of including a little scatter or background fauna from occupation.

This basal fill of Cut 2158 thus appears to have formed largely by natural silting, perhaps with some saline influence, and with the admixture of small amounts of debris from human occupation.

#### **Context 2175: fill of recut 2176 of large cut 2158**

*Sample 662/T1* (4.5 kg): moist, slightly olive brown silty clay and dark brown humic silt with some compressed detritus.

A small to moderate-sized residue about 500 cm<sup>3</sup> was obtained, of which about 200 cm<sup>3</sup> was mineral (including sand, cinders, coal, flint, chalk, brick/tile, mortar with some marine shell and bone). The remainder comprised woody detritus (with wood fragments to 35 mm) and peat (probably fen peat, to 10 mm, though the presence of moderate amounts of shoots and/or leaves of *Sphagnum imbricatum* suggest raised-bog peat may have been present, too). A mixed litter component is likely to have been present, with holly (*Ilex aquifolium*) leaf fragments, bracken (*Pteridium aquilinum*) and grass/cereal culm nodes all potentially used for, or arriving with, litter. The presence of moderate numbers of corncockle (*Agrostemma githago*) seed fragments and wild radish (*Raphanus raphanistrum*) pod segments would be consistent with a component of straw or threshing waste amongst this litter. There was a large range of plants present altogether (63 taxa, the equal fourth largest assemblage from the Magistrates' Courts samples examined in this investigation), the best represented being weeds of cultivated and waste places and foodplants (though mostly only in trace amounts).

A large assemblage of beetles and bugs was recorded (N = 241, S = 84). Much the two most abundant taxa were indicative of saline conditions (halobionts): *Carpelimus halophilus* (42) and *Cercyon depressus* (27). The former is typical of muddy saline habitats (Palm 1961, 24), the latter of stranded seaweed. Some of the other taxa have been recorded in wrack by Backlund (1945); this component is discussed in more detail below. There are indications from the insects that something resembling stable manure may have been among the materials which were dumped into the cut at this stage, notable taxa being *Oxytelus sculptus* (9), *Falagria* sp. (8), and *Cercyon atricapillus* (3), but also several of the rarer species. Five human fleas (*Pulex irritans*) may have originated in stable manure since this flea seems frequently to have bred in stables.

All five bone fragments (weighing 1.1 g) recovered from this sample were unidentified fish remains.

This deposit appears to have been stable manure dumped into the cut and saturated by sea water; the possibility that at this stage the cut functioned like a creek must be entertained.

*Sample 683/T1* (3 kg): moist, varicoloured from mid greyish-brown to orange to black, crumbly (working plastic and slightly sticky when wet), slightly sandy clay silt with inclusions of light grey-brown silty clay (?alluvium). Stones (20-60 mm), wood and marine molluscs were present. Modern contaminants included moss and algae.

The plant assemblage from the moderately large residue of about 600 cm<sup>3</sup> was, not surprisingly, rather similar to that from Sample 662. The overall composition of mineral matter—with a high proportion of plant material—was also quite similar. The value of a simple coefficient of similarity for the two lists of

plant taxa based purely on presence/absence of 0.43 is rather high for heterogeneous organic occupation material of this kind. However, the assemblage from 683 differed from that from 662 in being larger (with 73 taxa, the largest for this set of samples) and in having the highest score for many of the use and other groups into which taxa have been grouped for analysis (cf. Table 4), notably for perennial nitrophile weeds in ARTE, for bog mosses, and for fibre, oil and food plants, with several other groups also achieving relatively high values. (Closer inspection shows the high value for the BOGS mosses group to be artificially inflated by counting each of three 'parts-taxa'—*Sphagnum imbricatum* leaves/shoots, and *Sphagnum* sp(p). stem fragments and capsules/lids as if they were separate taxa. Likewise, the ARTE group is somewhat inflated by separate records for fullers' teasel, *Dipsacus sativus* and fullers'/wild teasel *D. sativus/fullonum*.)

Oil and fibre plants were represented by hemp (*Cannabis sativa* 'seed') and flax (*Linum usitatissimum* capsule fragments and seeds) and the former category also has walnut (*Juglans regia*) included for the analysis. Foodplants from Sample 683 included celery (*Apium graveolens* seed, ?barley (cf. *Hordeum*), ?pea (cf. *Pisum sativum*), hazel (*Corylus avellana*), fig, walnut, flax (linseed), cherry (*Prunus* Section *Cerasus*), field bean (*Vicia faba* ssp. *minor*) and wheat/rye (*Triticum/Secale*) 'bran', though only flax seed and capsule fragments were recorded above trace levels (both scored '2'). Overall, the deposit seems to have accumulated a mixed organic waste component with a high content of 'litter' of various kinds (especially peat, straw and woodland litter, cf. Table 6), perhaps something like stable manure (the food remains are not necessarily inconsistent with this, of course); perhaps the very large content of seeds of *Chenopodium* Section *Pseudoblitum* which distinguished this assemblage from that from 662 (where this plant was rare) points to waste—such as a midden or dung-heap—on which goosefoots were growing prior to dumping of the waste in this cut. *Chenopodium* Section *Pseudoblitum* includes plants found on drying mud at the edges of ponds and salt marsh taxa, however, and may well have grown in the cut at times when it was not flooded.

A large number of beetle and bug taxa (90) contributed 156 individuals; there were also large numbers of other invertebrates. Diversity was high ( $\alpha = 88$ , SE = 13), and the proportion of outdoor insects high (PNOB = 38). This suggests a mixture of habitats, and probably background fauna was abundant. It appears, however, that there was a contribution from in or around buildings: there was some house fauna (but no clear component), although the abundance of human fleas (16 *Pulex irritans*) and lice ('many' *Pediculus humanus*) strongly indicates either dumped floor sweepings, or perhaps outflow from a drain receiving washing water. There was a single dog flea, *Ctenocephalides canis*. Indications of decaying matter came from several taxa, among which only *Acritus nigricornis* (6) was particularly abundant, although fly puparia were numerous. There was clear evidence of aquatic deposition from 16 beetle and bug taxa: among the beetles six *Helophorus* sp., four *Ochthebius viridis*, three of a second *Helophorus*, and others; and among the bugs *Notonecta ?glaucia* and Corixidae sp. Even more strikingly, there were large numbers of *Daphnia ephippia* (around 300). The aquatic weevil *Tanysphyrus lemnae* indicates duckweeds, but of course may have been transported some distance. Waterside mud was indicated by one of the most abundant beetles, *Platystethus nitens*.

This sample, like several others from the site, contained rather more *Sitona lineatus* than might be expected by chance, and some importation mechanism must be sought. Possibilities are in hay and in pulses used for food for human or livestock. The presence of beans and tentatively identified peas suggests the food route: perhaps the single bruchid (quite possibly *Bruchus rufimanus*, often found in cess pits and clearly eaten with pulses) and the three grain weevils arrived with them in faeces, or in food preparation waste.

A total of 27 fragments (weighing 1 g) was recovered from this sample, of which seven were identifiable. Five gadid fragments were identified, together with single herring and pleuronectid vertebrae. The unidentified fraction contained 15 fish fragments and the rest were completely unidentifiable.

Though plant remains in this part of Context 2175 were substantially similar to those documented by Sample 662, they included a wider range of food taxa and there was a large component of seeds of one particular plant likely to have been a weed of disturbed nutrient-rich soils (though also found on mud at the edges of drying ponds and in coastal salt-marsh communities). However, the insects lacked the strong 'wrack' community seen in 662, and on the evidence of fleas and lice probably included a component from a house floor (or conceivably waste water from washing people or their clothes).

**Context 2181** (fill of Cut 2158, dumping/levelling?)

*Sample 661/T* (1 kg: assessment only): Plant remains from this sample, which was only examined during the assessment stage of this project, were evidently rather like those from Context 2175, peat, linseed and 'bran' all being noted as present.

There were very few insects, including traces of aquatics, a marine-littoral *Cercyon* species, and some taxa which conceivably originated in stable manure.

**Context 2184** (fill of Cut 2158, dumping/levelling?)

*Sample 660/T* (1 kg: assessment only): another context examined only during the assessment. The subsample was noted, again, as yielding peat, *Sphagnum*, and some hemp seeds; seeds of some annual nitrophile weeds were also abundant.

There were abundant and well-preserved insects, including aquatics, decomposers, a marine-littoral *Cercyon* sp., and some synanthropes (the last being mainly grain pests).

**Context 1626:** several contexts, which may have been successive cuts and their fills, were combined under this number; samples are considered in stratigraphic order from lowest upwards, within the context

*Sample 682/T1* (3 kg): moist, mid olive brown to dark brown, crumbly, slightly sandy silt with jumbled local patches of pure grey-brown silt (?natural). Medium-sized stones (20-60 mm), brick/tile, wood, twigs, bird and fish bone were all noted as present.

There was a very large residue of a little over 1000 cm<sup>3</sup>, of which all but about 250 cm<sup>3</sup> was a washover of woody and herbaceous detritus, the wood including some apparently worked pieces (to 60 mm) and chips (to 20 mm). There were considerable quantities of peat (to 25 mm), some of it charred. The records for moderate amounts of vegetative remains of cotton-grass (*Eriophorum vaginatum*) and abundant *Sphagnum imbricatum* leaves and/or shoots point to the peat probably having originally formed in a raised bog. Much the same range of taxa was present here as in Context 2175 (see above), suggesting the deposits were essentially recording the same input of materials. Some of the organic waste had evidently suffered some damage by fire, for some fragments of wood and straw-like material were charred at one end. Other debris from occupation included marine shell, charcoal, coal, cinders, brick/tile and bone, large mammal, bird and fish all being represented.

Clearly of mixed origins, the assemblage of adult beetles and bugs was large (N = 237, S = 111) and diverse (alpha = 81, SE = 9). It is difficult to tease apart the communities which contributed to it. One clear component was the aquatics, which included numerous ostracods, *Daphnia ephippia*, several caddis (Trichoptera) larvae, and 13 water beetle and bug taxa. One of these—*Ochthebius viridis*, with four individuals—indicates brackish water, and other indications of salinity come from the decomposer *Cercyon depressus* (4). Foul matter—either dumped or *in situ*—was indicated by a wide range of taxa

present in modest numbers. Material from within a building found its way into the cut: house fauna was represented by 23 *Pulex irritans* (human flea), ‘many’ *Pediculus humanus* (human lice), nine *Lathridius minutus* group, eight *Anobium punctatum*, five each of *Xylodromus concinnus* and *Tipnus unicolor*, and others. There were also five *Sitophilus granarius*. The clover weevil *Sitona lineatus* was represented by at least eight individuals: as for some other contexts at this site, the most likely mechanism for importation seems to be in pulses used for food. Much of the rest of the fauna was doubtless naturally transported—in water or in flight—or represented minor components of dumps.

Of the seven bone fragments recovered (weighing 1.9 g), four were identifiable. These included single bones of herring, pleuronectid, cyprinid and goose. The goose radius was of similar size to those of barnacle geese in the EAU reference collection. All three unidentified fragments were fish remains.

It is tempting to suggest that the cut received outflow from a drain used to dispose of domestic waste water, but direct dumping of various kinds of waste is just as likely in view of the presence of coarser plant and vertebrate material and artefactual debris.

*Sample 679/T1* (3 kg): moist, mid-dark slightly greyish brown, crumbly and slightly brittle (working slightly plastic), slightly sandy clay silt. Large stones (>60 mm), cinders, wood, large mammal bone and eggshell were all present.

The large residue of about 1260 cm<sup>3</sup> included one large lump of stone (to 120 mm), a fragment of pottery (to 100 mm), two large pieces of brick/tile (to 110 mm) and some large mammal bone (to 170 mm), altogether making up about 560 cm<sup>3</sup>. The remainder consisted of roughly equal volumes of wood, bark (both to 10 mm) and peat (to 40 mm), on the one hand, and grit and sand on the other. The wood included a fragment up to 40 mm which may have been turned.

Prominent amongst the modest list of identifiable taxa recorded for this subsample were weeds of cereal fields, notably corncockle and wild radish, but also some well preserved *Centaurea* achenes which may well have been cornflower (*C. cyanus*). There were also traces of charred and uncharred rachis (ear-stalk) of cereals: of the two charred fragments recorded, one was probably from a tough free-threshing wheat such as *Triticum ‘aestivo-compactum’* (of which traces of grains were also noted) or rivet wheat (*T. turgidum*). The remaining material was not identified further. All these remains might have arrived in straw, for example. Other plants recorded in this assemblage were mostly other kinds of weeds, grassland plants, and plants used for food and other purposes, such as hemp, flax, hazel, fig, and grape (*Vitis vinifera*).

This sample gave a beetle and bug assemblage (N = 131, S = 55) which was very different from that recovered from Sample 682: diversity was quite low (alpha = 36, SE = 5), and the fauna dominated by three members of the genus *Carpelimus*. There were 22 *C. ?halophilus* (almost certainly this species), and 19 each of *C. bilineatus* and *C. fuliginosus*. These probably lived *in situ* in rotting vegetation or richly organic mud. Core group B of Carrot and Kenward (in press), including taxa typical of foul but open-textured decaying matter, accounted for a large proportion of this assemblage (37%, cf. Table 10).

The remaining beetle fauna was mostly typical of urban occupation deposits, and gave little clue as to origins. Five human fleas and four human lice suggested that material from domestic occupation arrived somehow: other house fauna was rare (the most abundant species being *Tipnus unicolor* and *Mycetaea hirta*, three of each), so perhaps floor sweepings are an unlikely source unless from a structure whose floor was kept fairly clean.

Three bone fragments (weighing 227.9 g) were recovered from this sample, of which only a fragment of cattle pelvis was identifiable.

Perhaps drain outwash might be invoked here, as for some of the other deposits in this series of infills; however, dumping was certainly also contributory, the dumped debris becoming incorporated into the silt matrix in water (which may have been floodwater, if only on spring tides).

*Sample 677/T1* (3 kg): moist, mid brown, locally light grey-brown to orange, crumbly (working plastic), slightly humic, slightly sandy clay silt with inclusions of grey clay. Large mammal bone was present.

The large residue of about 1150 cm<sup>3</sup> had about 500 cm<sup>3</sup> of sand, gravel, brick/tile, bone, mortar and marine shell, the rest being peat (to 20 mm), wood and other plant detritus. The wood included small worked fragments (to 30 mm) and chips (to 10 mm). Once again, a mixture of litter, as from stable manure, is the most likely explanation for this assemblage. There was a notable though small component of food flavourings here, too: celery seed, ?dill (cf. *Anethum graveolens*) and fennel (*Foeniculum vulgare*); these were the only records for the latter two plants for the Period 1 and 2 samples examined from this excavation.

A huge insect assemblage was recovered: 482 individuals of 102 beetle and bug taxa, and abundant other remains, especially fly puparia. The three most abundant beetles were, as in Sample 679, *Carpelimus halophilus* (112 individuals), *C. bilineatus* (27) and *C. fuliginosus* (46). In the present case they were accompanied by a rich decomposer fauna likely to have co-existed with them in rather foul but open-textured material: *Cercyon depressus* (22); *Leptacinus intermedius* (17), a *Philonthus* species (16), *Acrilus nigricornis* (14), *Cercyon atricapillus* (13), *Neobisnius* sp. (11), *Oxytelus sculptus* and *Falagria* sp. (7), with many other species in the lower ranks. The core Group B of Carrott and Kenward (in press), regarded as representing open-textured foul matter, made up 28% of this assemblage (Table 10). There were also species preferring dung-like textures: *Aphodius granarius* (5) and *Platystethus arenarius* (4), for example.

House fauna was represented by several taxa present in significant numbers: *Anobium punctatum* (13), *Lathridius minutus* group (8), *Ptinus fur* and *Mycetaea hirta* (both 5), *Tipnus unicolor* and an *Atomaria* species (both 4). There were smaller numbers of several others belonging in this group. Carrott and Kenward's (in press) core Group A was represented by 62 individuals, although the abundance of fouler decomposers meant that this represented only 13% of the assemblage. There were grain pests in small numbers, and weevils regarded as frequently imported in hay (eight *Sitona lineatus* and single individuals of two *Apion* species).

Overall, then, this would normally be regarded as a stable manure group, and this may be the case. However, for some other assemblages from this site it has been suggested that the *Sitona* weevils, grain pests, lice and fleas may have arrived in domestic waste, and it would be unsafe to argue that the present assemblage was different in this respect. Perhaps they, and the food flavouring plants, arrived in a domestic component, as separate dumps or in a drain of some kind.

Two species indicate a saline influence at this stage: *C. halophilus* and *Cercyon depressus*, and the cut probably had the character of a creek, unless the entire area had been flooded by seawater.

Four bone fragments (weighing 43.4 g) were recovered, of which only a single caprovid mandible was identified.

Biological remains from this deposit represent a return to conditions seen in Context 2175, with strong evidence of seawater-soaked plant litter, probably including stable manure, but undoubtedly also other waste components.

*Sample 676/T1*: just moist, mid to dark grey, crumbly (working slightly plastic), sandy silt with ?ashy patches. Brick/tile, wood, twigs and marine mollusc shell were present.

A very large residue of not much less than 2000 cm<sup>3</sup> in volume was obtained for this subsample. More than 75% of it was undense material, mostly peat (up to 100 x 40 x 40 mm, though mostly rather smaller) and herbaceous detritus. A few fragments of the peat (up to 20 mm) had been burnt. The abundant cotton-grass and *Sphagnum imbricatum* attest the quantity of raised-bog peat present in the sample overall; another plant which may have arrived in it was heather (*Calluna vulgaris*), of which tentatively identified root-basal twig fragments were moderately common. Perhaps because of the quantity of peat present, other plant taxa were rather few. The inorganic fraction of the residue was of brick/tile and sand with traces of coal and cinder, bone and mortar. Leather and bark were also present in trace amounts.

The insect remains from this sample offered another variation on the theme seen in the previous two (Samples 679 and 677). Fewer beetle remains were present, although a substantial assemblage was still recovered (N = 186, S = 80). The same three *Carpelimus* were abundant, *C. ?halophilus* especially so (34 individuals), but *Platystethus arenarius* was also common (11), suggesting quite foul conditions. Fly puparia were numerous, probably taxa associated with putrid material. The house fauna component was present, but not strong (it included eight human fleas and three human lice, however).

Of the four bone fragments recovered from this sample, only a single herring vertebra was identified. The unidentified remains were also those of fish.

There is no reason to doubt that this deposit formed under essentially the same conditions as those represented by Samples 679 and 677, with both having a prominent component of peat, presumably from litter.

The last two samples examined from 'Context 1626' were from a part of the section some metres to the W of the ones just described. They were from the uppermost parts of the fill as exposed.

*Sample 658/T1* (2 kg): moist, mid to dark grey-brown, crumbly to soft (working slightly plastic), slightly clay silt with inclusions of dark brown compressed herbaceous detritus. Moss was also present in the sample.

The very large residue of about 950 cm<sup>3</sup> was rich in plant debris with the appearance of 'strawy' detritus (grass cereal culm fragments and culm-nodes were rather common), the mineral component of sand and brick/tile (to 80 mm) making up less than 100 cm<sup>3</sup>. The large assemblage of identifiable plant remains was dominated by weeds of various kinds, but especially those of waste places and cultivated ground. The excellent state of preservation of some of the material, e.g. the carrot (*Daucus carota*) fruits with intact spines, points to rapid deposit formation consistent with the dumping of organic waste—in this case perhaps stable manure. Certainly there appeared to be a mixture of various kinds of litter including hay, straw, and peat, and overall this proved to be the most 'litter-rich' samples from the site (Table 6), with a notably large component of leguminous flowers, perhaps from clover, *Trifolium* spp.. There were also a few small (<20 mm) fragments of concretions containing wheat/rye 'bran' but apparently without worm eggs (two pieces were tested); these are likely to have formed from the faecal component within material such as stable manure.

A number of the plant remains from this assemblage deserve particular mention, not least the abundant *Brassica* seeds which are thought to be from *B. rapa*, the plant which includes the modern turnip (grown for its tuberous tap-root) and turnip rape (an oil-seed and fodder crop, but not the same as oil-seed rape, which is a form of *B. napus* L., a species which has also been selected as swede). It seems most likely that the rather small seeds recorded here are simply from the wild form of the plant growing as a crop weed, though the material might well repay closer investigation. Two tentatively identified taxa may be evidence for plants grown as herbs or vegetables in the vicinity: ?leek (*Allium* cf. *porrum*, a single seed) and ?parsley (cf. *Petroselinum crispum*, traces of fruits).



Invertebrate remains were extremely abundant, a group of 317 adult beetles and bugs ( $S = 107$ ) being recorded together with immense numbers of chironomid midge larvae and mites, numerous water flea resting eggs (*Daphnia ephippia*) and fly puparia, and a range of other fossils. Conditions appear to have been rather different than during deposition of the lower parts of the series, for aquatic beetles and bugs were numerous ( $PNW = 20$ ): in addition to the *Daphnia* there were several ostracods, and, among the beetles, *Ochthebius viridis* (16), a *Helophorus* species (14), a second *Ochthebius* (7), *O. ? minimus* (5), and numerous rarer taxa. The *Carpelimus* species were still present, and indeed *C. bilineatus* was the most abundant beetle (21), but in addition *C. rivularis*, regarded as indicative of less strongly human-influenced conditions, was present (16). There were seven *C. halophilus*, but *C. fuliginosus* was absent. This might reasonably be interpreted as a trend towards more 'natural' conditions, with less dumping of organic waste—or possibly, in view of the increase in aquatics, and assuming that this feature was connected to a tidal river, a rising sea level which increased scouring. *Ochthebius viridis*, *Carpelimus halophilus* and *Cercyon depressus* certainly attested to a marine influence. The 'domestic' component remained in the form of fleas and lice (four *P. irritans* and three *P. humanus*), and small numbers of grain pests.

There were three *Sitona ?lineatus*, perhaps from the same source as the legume flowers which were abundant amongst the plant remains.

As for vertebrate remains, only two herring vertebrae were recovered from this sample.

The broad picture here is of a mixture of elements seen in various of the earlier deposits in this cut (though presumably not being mixed through reworking). The plant remains (and non-biological occupation debris) point to dumping, the insects to both a saline influence and freshwater conditions.

*Sample 657/T*: moist, mid to dark grey-brown (locally olive- to rust-coloured), crumbly (working slightly plastic), sandy clay silt with inclusions of compressed very dark brown herbaceous detritus. Very small (2-6 mm) stones and eggshell were present.

Though rather smaller, the list of plant taxa from this subsample was essentially very similar in composition to that from 658 (Jaccard coefficient of similarity = 0.42). Again, there was a very large residue (of about 1200 cm<sup>3</sup>) of which only about one-sixth was mineral material (sand, pottery and stone), the rest being a mixture of peat (sometimes in thin pieces, up to 25 mm), herbaceous detritus, including much 'strawy' material, with good preservation and some material still remaining undisaggregated. Tentatively identified parsley 'seeds' were again present, and the list of other 'useful' plants included remains of two which might also have served as flavourings, e.g. for beer: hops (*Humulus lupulus*, as fruits) and bog myrtle (*Myrica gale* leaf fragments), though the latter may have originated in peat.

An assemblage of 247 adult beetles and bugs (85 taxa) was recorded, and there were quite substantial numbers of a range of other invertebrates. The proportion of outdoor forms was large ( $PNOB = 41$ , 38 taxa), and it appears likely that some lived at or by the point of deposition, in particular *Carpelimus halophilus* (31), *Ochthebius viridis* and *Platystethus nitens* (10 of each). *C. halophilus* was, as in some of the samples from lower in this sequence, accompanied by *C. bilineatus* (22) and *C. fuliginosus* (13), and these, together with numerous other taxa, including *Cercyon depressus*, doubtless could have exploited accumulations of fairly moist decaying plant debris. Whether the entire fauna colonised *in situ*, or part was imported in material resembling stable manure is hard to determine. However, *C. bilineatus*, *C. fuliginosus*, *Acritis nigricornis* (10), *Falagria* sp. (also 10), *Aphodius granarius* (9), *Leptacinus intermedius*, and various rarer taxa might be argued to be more likely to have originated as a community elsewhere. There was not, however, a typical community of stable manure: some characteristic species were absent (e.g. *Anthicus formicarius*, *Cercyon atricapillus*, and *Monotoma* spp.). There was a house fauna component, of which the most numerous taxa were *Pulex irritans* (11), *Lathridius minutus* group (5) and *Anobium punctatum* (4), and also four grain weevils (*Sitophilus granarius*) and a single human louse.

The peat component seen in the plants was echoed by the bug *Ulopa reticulata*. A louse appeared to be *Haematopinus* sp., the genus including the pig lice among others, but it was too poorly preserved for confident identification.

Only a single snail was recovered from this sample. This was identified as *Hydrobia ?ventrosa* supporting the greater evidence from the other invertebrate remains for a saline influence.

Of the 14 vertebrate fragments recovered from this sample (weighing 16.1 g), only three were identifiable. Species present included eel, herring and thornback ray. The unidentified fraction comprised mostly fish remains.

In broad terms the biota was similar to that from Sample 658, although freshwater invertebrates were less prominent.

#### *Was Cut 2158 a creek?*

The insects from this sequence of ditch fills indicate a clear, though variable, saline influence (Table 12), and it appears that the cut was either a creek connected to the Humber, or was at least flooded by seawater fairly regularly (perhaps during spring tides).

#### *Hand-collected bone from '1626'*

Overall preservation was good. Colour ranged from fawn to dark brown (nearly black), although most fragments were brown. Angularity of most fragments was spiky with a few described as slightly battered. Over half the assemblage fell within the 50-200 mm size category, less than 20% was smaller. Dog gnawing and fresh breakage were noted on up to 10% of the fragments, whilst evidence of butchery was recorded on 10-20% of the assemblage.

Of the 43 fragments (weighing 925 g) recovered, 19 were identifiable. Two human bone fragments were identified as a metatarsal and metacarpal. Cattle bones were most numerous, and the other mammals present included caprovid and pig. Birds were represented by single chicken and goose (greylag size) bones. Fish included herring, eel, cod, ?saithe and unidentified gadid bones. Gadidae (cod family) were represented by individuals of around 100 cm in length.

Although the usual domestic animals were represented by a range of skeletal elements, primary butchery waste (mandibles and metapodials) predominated. Fish bones included elements associated with the head and with the body, which is more indicative of kitchen and household refuse. The unidentified fraction contained both large and medium-sized mammal vertebra, rib and shaft fragments, but not in large quantities. Although, the inclusion of human remains within the deposit indicates the possibility of a component of reworked material, the state of preservation of the assemblage suggests that some of the remains represented primary deposition. The feature filled by Context 1626 lay to the rear of tenements and would have been an ideal repository for the dumping of waste from a variety of activities. Material recovered from this deposit was not typical domestic or kitchen refuse, but equally was not present in sufficient quantities to suggest that it represented carcass processing on a large scale.

#### **Other deposits in the 'Nave' area**

**Context 1457:** organic-rich levelling or occupation deposit

*Sample 527/T1* (2 kg): moist, very dark brown to black, strongly compressed, fine and coarse herbaceous detritus with grey sand/ ashy material. Fly puparia were present. (/T1 not examined for plants.)

Large numbers of invertebrates were recorded, an assemblage of 204 adult individuals of 89 beetle and bug taxa being accompanied by immense numbers of fly puparia and a rather unusual mixture of other remains. The beetles included what appeared to be components from several main habitats: some house fauna (*Lathridius minutus* group, with 21 individuals, being much the most abundant taxon); foul mouldering matter such as stable manure (several taxa; core Group B of Carrott and Kenward, in press, contributing 21% of the assemblage (Table 10)—the fly puparia probably also belong in this ecological group); and much fouler matter (notably six *Aphodius ?prodromus* and four *A. granarius*). Several rarer taxa suggest that cut hay-like vegetation may have contributed too: an *Apion* species (three species, with 4, 1, and 1 individuals); *Sitona lineatus* (four); *S. lepidus*, *Hypera ?nigrirostris* and *?Gymnetron* sp. (one of each). These component suggest the presence of an indicator group for stable manure (cf. Kenward and Hall 1997), only the grain pests being missing (there was only a single *Oryzaephilus surinamensis* in this category).

*Sample 528/T* (3 kg): moist, mixture of gritty, light to mid grey-brown, clay silt and very dark brown, highly compressed herbaceous detritus (?straw). It was noted that the surface of the organic clasts were beginning to decay in storage.

The very large residue of about 2100 cm<sup>3</sup> consisted largely of organic material— herbaceous detritus and undisaggregated ‘peaty’ sediment making up all but about 10% by volume. The rest was a mixture of sand, stone and brick/tile. Apart from undisaggregated material, the organic fraction was mostly unidentified herbaceous detritus. There were moderate numbers of seeds or fruits or other parts of a diversity of plants likely to have been brought with cut (or perhaps more likely grazed in view of the numbers of low-growing plants represented) grassland vegetation: sedges (*Carex*), heath grass (*Danthonia decumbens*), grasses/cereals (as stem or culm fragments), self-heal (*Prunella vulgaris*), buttercups (*Ranunculus* Section *Ranunculus*) and yellow-rattle (*Rhinanthus*). Remains of several taxa present in trace amounts might also have arrived in this way, such as involucre fragments of knapweed (*Centaurea* cf. *nigra*) and propagules of hawkbits (*Leontodon*), cats-ears (*Hypochoeris*) and purging flax (*Linum catharticum*). These form a group repeatedly seen in archaeological occupation deposits with waterlogged preservation and are considered to have originated in hay (cf. Kenward and Hall 1997 in respect of material interpreted as stable manure). There were also traces of plants from peat—cotton-grass and *Sphagnum imbricatum*—as well as fragments of peat up to 15 mm; these, too, are perhaps most likely to have originated in material used as litter for animal housing.

A large group of invertebrates was recorded, fly puparia and mites being particularly numerous. There were 173 adult individuals of 78 beetle and bug taxa, of which the most abundant, an Aleocharinae species (24), is ecologically indeterminate. There was a house fauna component (sixteen *Lathridius minutus* group, eight *Cryptophagus* sp., five *Atomaria* sp., four each of *Xylodromus concinnus*, *Anobium punctatum* and a second *Cryptophagus* sp, and traces of several others). Core Group A of Carrott and Kenward (in press)—interpreted as house fauna—contributed 29% of the fauna (Table 10). Fouler conditions were indicated by a range of taxa, with *Cercyon analis* (9), *Gyrohypnus fracticornis* (5) and *Falagria* sp. (4) characteristic among the more abundant; the fly puparia probably reflect the same conditions. Several weevils, among them three *Sitona lineatus*, may indicate cut vegetation (although *S. lineatus* itself may have had other origins in some deposits at this site, see below). Imported water may be indicated by the presence of several *Daphnia* ehippia.

Only nine fragments of hand-collected bone (weighing 110 g) were recovered from this context, of which two were identifiable. These were single cattle and caprovid bones. Preservation was variable.

Taken as a whole, the evidence from plants and invertebrates suggests that this deposit may have included

stable manure. However, the absence of a typical stable manure decomposer community of insects requires explanation; one possibility is that such material was cleaned from a floor before a large fauna could develop, and became too wet once dumped. An alternative is that the plant material was largely hay used as litter on floors in buildings other than those of stables or other animal housing, acquiring a house fauna, and subsequently invaded by foul decomposers once deposited in the open.

**Context 2016:** build-up in bottom of hollow-way **2021** associated with tenements fronting onto the Market Place.

*Sample 629/T1* (3 kg): mid, slightly orangeish grey-brown (orange oxidation patches), crumbly (working plastic), slightly clay silt. The sample was noted as ‘seething’ with modern collembolans, which had clearly reproduced in the tub during storage.

The moderate-sized residue of barely 350 cm<sup>3</sup> was largely (225 cm<sup>3</sup>) mineral material—mainly sand—the remainder being very decayed wood in small fragments (to 15 mm, including chips to 5 mm and mineralised wood fragment to 35 mm) with traces of bark and peat fragments. A rather similar range of plant taxa was present to what was seen in the more organic deposits from Context 1626 (similarity coefficients with the assemblages from Samples 657 and 658 were, respectively, 0.41 and 0.35, at the level typical for subsample of the same deposit), with three abundant plants: *Chenopodium* Section *Pseudoblitum*, fig and knotgrass (*Polygonum aviculare* agg.) and a wide range of other weeds and plants originating in occupation waste. There were also some faecal concretions containing wheat/rye ‘bran’ and eggs of *Trichuris* (whipworm, a common intestinal parasite of humans and other mammals).

Invertebrate remains were abundant. There were around 100 fly puparia, an assemblage of 156 adult beetles and bugs representing 80 taxa, and numerous other forms. Outdoor insects were rather frequent, and included a quite large number of aquatics (13 taxa, 24 individuals, PNW = 15). *Daphnia* ephippia were abundant, too, and there were a few rat-tailed maggots (syrphid larvae), these elements being unlikely to have arrived accidentally (the beetles and bugs could be argued to have been ‘background fauna’). It thus appears either that there was open water at the point of deposition, or that these aquatics were deposited by flooding or in waste water. It is not obvious which was the case.

There were only rather small numbers of insects likely to have originated in the adjacent buildings (the most abundant being five *Lathridius minutus* group and three *Xylodromus concinnus*); Carrott and Kenward’s (in press) core group A contributed only 17% of the fauna (Table 10). Most of the terrestrial fauna may have been background fauna or scatter, but it is possible that there was some foul matter close by since there were four each of *Omalium rivulare*, *Anotylus tetracarinatus* and *Oxytelus sculptus*. The origin of four *Sitona lineatus* is as unclear here as for the site as a whole (see below).

Only nine fragments of bone (weighing 19 g), of which five were identifiable, were recovered from this context by hand collection. A single chicken tibiotarsus was present, the surface of the bone being covered in concretions. The other four identifiable fragments were from fish: two cod and two gadid bones. Preservation was described as good, colour as dark brown, and angularity as spiky.

Though there appeared to be an insect component originating in buildings there was little to suggest bulk domestic waste, and in particular there was no reason to suspect that large quantities of floor sweepings had become incorporated (there were, notably, no fleas and very little house fauna). The presence of *Daphnia* may indicate that this depression held water at times; perhaps it even served as a drain.

**Context 2177:** fill of hollow-way **2251**

Only hand-collected bone was investigated for this deposit. Overall preservation was described as good and colour as dark brown. Angularity was recorded as variable with both spiky and battered fragments present. Most of the fragments were between 50 and 200 mm in greatest dimension, although a few were smaller. Evidence of fresh breakage, butchery and dog gnawing was rare.

Of the 18 fragments (weighing 293 g) recovered, six were identifiable. Mammals were represented by cattle and caprovid fragments, whilst bird remains comprised a single goose carpometacarpus and two juvenile chicken bones.

The following contexts represent the latest stages of Period 1 and/or the earliest of Period 2 in the 'Nave' area:

**Context 798:** demolition/levelling of tenements for construction of nave, AD1316-1320 (latest stage of Period 1)

**Hand-collected bone:** Overall preservation was recorded as good. Colour ranged from beige to dark brown, although most fragments were brown and ginger. Angularity was very variable, with a mixture of spiky, battered and rounded fragments. More than half the fragments were between 50 and 200 mm in greatest dimension, with up to 10% in both smaller and larger categories. Dog gnawing and fresh breakage were evident on <10% of the fragments, whilst butchery was noted on over 20% of the material.

Of the 617 fragments (weighing 9101 g) recovered, 184 were identifiable to species or species group. Human bones were the most numerous with 83 fragments. At least three individuals were represented, including a juvenile. Mammals included cattle (43 fragments), caprovid (23 including 9 sheep), pig (7), and cat (10). Birds included chicken, geese and ducks. The single duck fragment was of a similar size to mallard specimens in the EAU collection. All four goose bones were the size of smallish greylag individuals. Two of the chicken bones were spurred tarsometatarsi. In addition seven cod bones were identified from at least two sizes of individual, one very large, about the same size as a 150 cm individual in the EAU reference collection.

The presence of human remains in large quantities suggests that this deposit is somewhat contaminated with material from the later graves cut through it. Overall, the vertebrate remains are similar with those from the earlier phase, with cattle remains being dominated by mandibles, metapodials and phalanges. This may represent primary butchery waste, although, a small component of meat-bearing elements (pelves and radii) was also recorded. The unidentified fraction comprised numerous large mammal-sized (assumed to be cattle) rib and shaft fragments, which may indicate the refuse from secondary butchery processes.

**Context 905:** demolition/levelling of tenements for construction of nave; associated with Contexts **798**, **1851** and **1981**

**Hand-collected bone:** Preservation, colour and angularity were all recorded as variable. Most of the bones were well preserved and they included some 'greasy'-looking fragments; their colour was mostly brown and dark brown. Spiky, battered and rounded broken edges were recorded, suggesting a mixed origin for the bones. Most fragments were between 50 and 200 mm with a few larger and smaller pieces noted. Burning and fresh breakage was seen on up to 10% of the fragments, whilst butchery was evident on 10-20%.

A total of 156 fragments (weighing 2965 g) was recovered from this context, of which 44 were identifiable. Cattle, caprovid and pig were well represented (fourteen, nine and six fragments respectively). Four cat bones were recovered, possibly all from the same individual. Bird bones comprised duck and chicken. In addition, six cod fragments, representing fish of a range of sizes from about 60 cm to approximately 150 cm in length, were identified.

**Context 1851:** make-up/levelling layer dated c.1350, related to Context 798 (see above)

*Sample 583/T1* (3 kg): just moist, reddish grey brown, crumbly (working plastic), sandy clay silt with patches of nearly black, compressed organic matter which had almost completely decayed in store (mostly consisting of arthropod frass). Brick/tile fragments were present.

The moderately large residue of about 700 cm<sup>3</sup> contained about 200 cm<sup>3</sup> of peat in clasts up to 40 mm and some other organic material, including lumps of undisaggregated strawy detritus which were clearly different from the more homogeneous peat when split open or when the surface revealed the nature of the constituent plant debris. The rest was mainly brick/tile (to 100 mm) and sand. It was noted during recording that some of the peat fragments were sometimes rather hard and apparently worn, rather dense and amorphous, whilst other clasts were less consolidated, softer, felted, with *Sphagnum* leaves and rootlets. This may represent peat of different lithological nature from the same cutting or peat from different sources; the denser, harder material may have become indurated through being dried before being incorporated into the deposit. Overall, preservation of plant remains was noted as rather variable. There were moderate numbers of remains likely to have arrived with litter, including remains originating in the peat. Probable food plants were limited to traces of fig and strawberry.

The invertebrate fauna resembled in broad character that of many Period 1 deposits, and was presumably redeposited.

**Hand-collected bone:** Only seven fragments (weighing 84 g) were recovered, of which two were identifiable (single cattle and sheep bones). Preservation was good, colour ginger, and angularity spiky.

**Context 1981:** make-up/levelling layer dated c.1350, related to Context 798 (see above)

**Hand-collected bone:** Only four fragments (weighing 49 g) were recovered from this context, of which two were identifiable. A single pig tooth and a chicken radius comprised the identified bones.

‘CHOIR’ AREA

**Context 1777:** remains of dumping/levelling prior to construction of E end of choir (latest stage of Period 1)

*Sample 620/T1* (3 kg): moist, mid brown (locally darker and sometimes greyish), brittle to crumbly (working plastic), slightly ?humic, clay silt. Brick/tile fragments (to 10 mm) were present but possibly a contaminant.

The small to moderate-sized residue of only about 150 cm<sup>3</sup> consisted of sand, grit and some very decayed wood. Seeds were rather sparse and generally somewhat battered; they were mainly weeds, especially *Chenopodium* Section *Pseudoblitum*. This is an indicator of drying mud by ponds and waste places with high nutrient levels and was scored at an abundance of 3 on the four-point scale used. There were also moderate numbers of some other annual weeds likely to have grown with it: oraches (*Atriplex*) and annual

nettle (*Urtica urens*). Remains of *Carex*, *Juncus* cf. *gerardi*, *Ranunculus* Section *Ranunculus*, *Rumex*, and *Sphagnum imbricatum* were all scored at '2', and—along with some taxa present in trace amounts—suggested that a grassland component, and perhaps also peat, were present. This occupation deposit—which presumably incorporated material from a variety of sources—also gave evidence for the following 'useful' plants: hemp achenes, fig seeds, wheat/rye 'bran', hazel nutshell, saw-sedge (*Cladium mariscus*) nutlets and weld (*Reseda luteola*) seeds. The fig and 'bran' perhaps suggest that some food waste (?faeces) reached the deposit.

A small assemblage of insects was recovered, with several *Daphnia* ephippia (water flea resting eggs), harvestmen (Opiliones) and mites (Acari). Adult beetles and bugs were represented by 45 individuals of 38 taxa, and this group was of very high diversity ( $\alpha = 113$ , although  $SE = 45$ ), and had a very large 'outdoor' component (PNOB = 47). Synanthropes were very rare. A mixed origin, probably with a large component of background fauna, seems certain.

Two vertebrate fragments (weighing 0.7 g) were recovered, both of which were identified: one was a chicken coracoid, the other a thornback ray tooth.

This context may have been redeposited from semi-natural aquatic deposits such as dumps along a saline creek or represent accumulation on an open surface immediately adjacent.

#### 'CLOISTER' AREA

**Context 289:** fill of ditch 411 running between tenements; accumulation of domestic debris?

*Sample 119/T1* (3 kg): moist, mid grey to brown, plastic, clay silt, with 10 mm mottles consisting of patches of 'gley-like' colouration. Mouldy wood was present within the sample.

The small residue of only about 100 cm<sup>3</sup> comprised woody and herbaceous detritus, the wood (which was up to 25 mm in maximum dimension) showing some mineral deposition and mostly looking like chips from working. There were hints of grassland vegetation, perhaps from hay, and of peatland in the form of traces of bog myrtle leaf fragments, but there was no indication of the accumulation of concentrations of any particular kinds of waste in this ditch and silting may have been largely natural.

Other than moderate numbers of chironomid midge larvae, macro-invertebrates were rare. There were only 34 adult individuals of 26 beetle taxa (no bugs), in an assemblage dominated by species from semi-natural habitats, including saline water, and giving little sign of human influence. Hints of a grassland element came from *Agriotes lineatus*, *Sitona* sp. and *Apion* sp., but these may have been of local origin rather than indicating hay-like cut vegetation (although the mixture of plant remains hints at litter from the keeping of animals).

**Hand-collected bone:** Preservation of the hand-collected bone from this context was generally good, although both the colour and angularity were variable. Colour ranged from fawn to dark brown and both spiky and battered fragments were present. A few fresh breaks were noted and up to half of the fragments displayed evidence of butchery. Of the twelve fragments (weighing 371 g), six were identifiable as domestic mammals (cattle, sheep and pig). The remaining six unidentified fragments included a large mammal vertebra which had been split longitudinally. Too few fragments were recovered from this deposit for much interpretation; however, it is clear that this assemblage does not represent large-scale dumping of refuse into the ditch. Variable preservation and the fragmented nature of the bones suggests the probable inclusion of reworked material.

While this ditch fill probably largely accumulated by natural processes, there was a component of waste—mainly bone, but with a trace of plant litter and associated insects—from nearby human occupation.

**Context 630:** floor in Room 2, Building 2

*Sample 511/T1* (5 kg): just moist, jumble of browns and grey-browns, crumbly, brittle and layered (sometimes working plastic and sticky), mixture of silts and clay silts with whitish ash layers. Stones (6-60 mm) and charcoal present.

The moderate-sized to large residue of about 900 cm<sup>3</sup> included some 400 cm<sup>3</sup> of grit and sand, with some chalk (to 50 mm). The washover comprised woody and herbaceous detritus of which the bulk was wood and bark, with some charcoal; there were also traces of rather rounded and worn-looking amorphous peat fragments. Some of the wood was rather 'flaky' (and pale) in appearance and was perhaps mostly from woodworking. Plants in this subsample likely to have been useful included grape (four large and well-preserved seeds), flax (capsule fragments), fig and saw-sedge. Traces of faecal concretion (to 40 mm) perhaps suggest reworking of material from a cess pit or garderobe pit. There was also a trace of holly leaf epidermis whose significance here is difficult to understand unless it arrived in litter or from trees growing near the site. The moderate numbers of bog-bean (*Menyanthes trifoliata*) seeds are probably part of a component arriving with fen peat or cut waterside vegetation, whilst the moderately common rush seeds (mostly unidentified but with some mud rush, *Juncus gerardi* and toad rush, *J. bufonius*) are consistent with material strewn on floors or brought into the room on muddy feet.

Insects were fairly abundant (for adult beetles and bugs, N = 112, S = 57) and included many ants (Formicidae). A distinct house fauna component (*sensu* Kenward and Hall 1995, 662-7) was present, occupying the first three ranks of abundance: *Cryptophagus* sp. (8), *Lathridius minutus* group (7) and *Xylodromus concinnus* (6). There were smaller numbers of some other taxa likely to have lived with these in a building. The statistically-defined 'house fauna' group of Carrott and Kenward (in press) contributed 27% of the fauna (Table 10). However, 'outdoor' taxa contributed a large proportion of the fauna (PNOB = 41), surprising in a group deposited on a floor. It appears very likely that much of the fauna (and thus perhaps much of the flora) was imported in the original floor make-up or with cut vegetation used as floor litter. The records of five each of *Aphodius granarius* and *Sitona lineatus* seem a little out of place, however, and might be seen as a hint that stable manure was present; there was little grain fauna, however (this part of the fauna being confined to two *Sitophilus granarius*), although these species are typical of stable manure groups of post-Conquest date (Kenward and Hall 1997).

*Sample 513/T1* (7 kg): dry, light brown to mid grey-brown (variable at mm and cm scales, perhaps originally coarsely layered), indurated to crumbly, very slightly sandy clay silt with very decayed or now gone herbaceous detritus. Flint, mortar/plaster, charcoal and marine mollusc shell were all present.

There was a moderate- to large-sized residue of about 1400 cm<sup>3</sup> of which about 500 cm<sup>3</sup> was sand and gravel, the rest very granular organics, of which the coarser material was mainly peat (to 15 mm) and wood chips (to 30 mm, and including material not identified further than conifer). The high concentrations of peat and wood probably account for the rather low concentrations of identifiable seeds and fruits: only nine taxa were recorded, all in trace amounts, though they included both fig and walnut, the former only as seed fragments, the latter as nutshell fragments no larger than 2 mm—material perhaps consistent with a trampled floor.

Beetles and bugs were rather numerous (N = 142, S = 72), and there were moderate numbers of a range of other remains including earthworm egg capsules. This assemblage showed characteristics also seen in Sample 511, but in a much clearer form. 'House fauna' was present in about the same proportion (26%),



with *Xylodromus concinnus* and *Atomaria* sp. (both 7), *Lathridius minutus* group (6), *Anobium punctatum* (5), and various others. Very striking in the present group, however, was the presence of several *Aphodius* species: *A. prodromus* (13), *A. granarius* (7), *A. ater* (1), and three un-named species (4, 1, 1 individuals). Together these strongly suggest dung (the first two are occasionally found in other foul decaying matter), and the presence of six grain weevils (*Sitophilus granarius*) points to the possibility that this was horse dung. Some aquatics (many *Daphnia*, a caddis larva, and a few beetles) may have been brought in water for livestock, or arrived in dung, having been ingested with water elsewhere. There were weak hints of a 'hay' component, from three *Sitona lineatus*. There was, however, no indication of a typical decomposer fauna of stable manure (Kenward and Hall 1997).

A single individual of the heath or moor bug *Macrodema micropterum* was identified, but none of the other species seem likely to have been imported with it. There were two human fleas (*Pulex irritans*), and a single sheep ked (*Melophagus ovinus*), both rather typical of domestic floor deposits.

Although described during excavation as a burnt layer, this deposit was not found to be especially rich in charred material. Indeed, if the archaeological interpretation of this deposit as a floor is correct, it must have formed where there was either a steady accumulation of organic waste, including woodworking debris, or where such waste was deliberately laid, as in a byre or stable, or in a workshop where an absorbent surface was required. Although a typical stable manure beetle fauna was absent, and there was rather limited evidence for hay or litter, perhaps the structure housed livestock.

#### **Context 1820: floor**

Since it was established during the assessment of bioarchaeological samples that samples from this context contained useful concentrations of remains, and given that archaeological floors are often poor in remains, yet likely to yield valuable information about human activities and living conditions in the buildings in which the floors accumulated, it was decided to examine several samples from different parts of floor 1820, although limitations of time meant that investigations of plant remains were less complete than those for insects.

*Sample 609/T1* (5 kg): just moist, light yellow-brown to almost black, indurated, layered (very thinly) and compressed (working crumbly, then sticky when wet), very humic, slightly clay sandy silt. Brick/tile (to 50 mm), coal and marine mollusc shell were present.

The large residue of 1700 cm<sup>3</sup> was mainly of mineral material, from which a small washover of about 300 cm<sup>3</sup> of organics, mostly in the <1 mm fraction, was taken. The mineral sediment consisted largely of cinders (to 30 mm) and sand, with coal and traces of oyster shell, mortar and brick/tile. Seeds were rather sparse and preservation, as perhaps might be expected in a floor, rather variable, but the taxa recorded included a range of plants likely to have arrived from grassland, e.g. in cut vegetation such as hay: spike-rush (*Eleocharis palustris*) and ?mud rush at an abundance of 2, with traces of carrot, hairy buttercup (*Ranunculus sardous*), and yellow-rattle. A salt-marsh—or at any rate coastal—source is perhaps implied by some of these. Another component of the deposit may have been peat, since leaves and/or shoots of the raised-bog-forming moss *Sphagnum imbricatum* were present in moderate numbers. The presence of fig and cherry (*Prunus* Section *Cerasus*) points to a component likely to have originated in food. There were also some weeds of cornfield habitats (from straw?) and waste ground taxa, though none was at all frequent.

There was a rather large group of beetles and bugs (N = 161, S = 75), and substantial numbers of some other invertebrates. 'Outdoor' forms were abundant, too (PNOB = 25), perhaps indicating fauna brought in the original floor make-up, or trampled in subsequently, though some of the fauna may have come in cut vegetation such as might be strewn to sweeten a floor. The most abundant beetle was the woodworm

(*Anobium punctatum*), of which there were 19; other ‘house fauna’ taxa included *Lathridius minutus* group (12), a *Cryptophagus* species (7), *Ptinus fur* (6), and a second *Cryptophagus*, *Atomaria* sp. and *Mycetaea hirta* (all four). Core Group A (house fauna) of Carrott and Kenward (in press) contributed 43% of the fauna. These were accompanied by enormous numbers of human fleas (at least 46 *Pulex irritans*) and several ?human lice (?*Pediculus humanus*, the uncertainty of identification being a product of poor preservation of these very delicate remains). It thus appears certain that people lived in the room.

Other components of the insect fauna included: seven grain weevils, *Sitophilus granarius*, and a single saw-toothed grain beetle, *Oryzaephilus surinamensis*; six clover weevils, *Sitona lineatus*; and a heath or moor component in the form of a single *Ulopa reticulata*. These may all reflect aspects of human importation of food and raw materials. Some of these components, and the aquatics, might suggest the presence of stable manure, but there was little trace of a characteristic decomposer group of such material (core Group B of Carrott and Kenward, in press, regarded as typical of material such as stable manure, was virtually absent, Table 10).

On the basis of the biota, this room appears to have been in domestic use at the stage at which this floor deposit formed.

*Sample 611/T1* (5 kg): description as for *Sample 609*, but with traces of wood.

Roughly half the volume of the small residue of about 500 cm<sup>3</sup> comprised woody debris, inc worked wood fragments (there was, for example, one small wooden peg). The mineral component was sand and grit. Sedges, grasses (Gramineae) and spike-rush were the more abundant of the identifiable plant remains, together with traces of quite a wide range of weed taxa, food and other useful plants—including fig, hemp, opium poppy (*Papaver somniferum*), apple (*Malus sylvestris* endocarp or ‘core’), wheat/rye ‘bran’ and flax (capsule fragments)—and taxa likely to have come from grassland or peatland habitats. The last group included the bog plant cotton-grass, of which traces of the sclerenchyma spindles found in the sheathing leaf bases were recorded, as well as moderate numbers of leaves and/or shoots of *Sphagnum imbricatum*.

A mixture of different kinds of litter is again perhaps suggested by this group. Something of the heterogeneity of the floor is indicated by the lack of cinders and coal here (cf. *Sample 609*).

The invertebrate fauna from this sample represented a variation on the theme laid down in *Sample 609*. Invertebrates were abundant; there were 116 individuals of 65 beetle and bug taxa, and quite large numbers of other remains. The outdoor component was even larger (PNOB = 38). The most abundant taxa in this category were *Sitona lineatus* (9), *Ceutorhynchus contractus* (4), with three taxa at two, and the remainder as single individuals. The weevils *S. lineatus* and *C. contractus* may conceivably have been introduced in peas or beans and cruciferous foods respectively, and *Bruchus ?rufimanus* (one) may also have arrived in pulses.

House fauna was represented by *Anobium punctatum* (15), *Lathridius minutus* group (8), *Tipnus unicolor*, *Ptinus fur*, *Cryptophagus* sp. and *Atomaria* sp. (all three) and a few others, Carrott and Kenward’s (in press) core Group A contributing 47% of the fauna (Table 10). These, and the rarity of ‘foul’ decomposers (PNRF = 2), suggest rather clean dry conditions. Human lice (*Pediculus humanus*) were abundant, however, as were human fleas (*Pulex irritans*), and three dog fleas (*Ctenocephalides canis*) were also noted. There were no grain pests from this sample.

Five vertebrate fragments were recovered from this sample, of which four were herring vertebrae, and one an eel vertebra.

*Sample 612/T1* (5 kg): just moist, very dark brown, indurated, very thinly layered and compressed (working crumbly, then sticky when wet), very humic, slightly clay sandy silt. Brick/tile (to 50 mm), coal and shell fragments were present.

The residue for this subsample was of large to very large size (about 1800 cm<sup>3</sup>) and roughly one third was mineral material, the rest forming a washover of undense organic detritus, of which a very large proportion was in the <1 mm fraction and rather a lot in 1-2 mm fraction. On inspection, coal was found to make up a fair proportion of this washover, however. Much of the remaining organic material was peat, in clasts to 15 mm, and apparently a mixture of different lithological types: some fragments were almost amorphous (highly humified) sediment, others detrital, yet others containing rootlets. It is likely that much of the finer organic fraction consisted of undisaggregated amorphous organic material from the decay of peat during the life of the floor or (less probably) since burial. Further fragmentation during processing is likely.

Identifiable plant remains comprised large numbers of sedge nutlets together with a variety of weeds, and peatland, wetland, and foodplants, the moderate amounts of bog-bean and *Sphagnum imbricatum* presumably originating in the peats (some of the *Menyanthes* seeds in were in a pristine condition, though most were rather pale and oxidised). Indeed, fen and waterside taxa, though few, were at their most prominent in this sample of all of those from the site. The foodplant component included hazel, walnut, cherry, elderberry (*Sambucus nigra*) and grape, though none was present in more than trace amounts. Wood of yew (*Taxus baccata*), up to 5 mm in maximum dimension, was identified amongst the small component of wood fragments, which also included some chips.

The assemblage of beetles (and a few bugs) from this sample was smaller than that from Sample 611 (N = 82, S = 52), but very reminiscent of it. House fauna was important: *Anobium punctatum* (9), *Lathridius minutus* group (5), and *Ptinus fur* (4) occupying the first three ranks of abundance. Core Group A of Carrott and Kenward (in press) amounted to 39% of the fauna (Table 10), and there were nine human fleas (*Pulex irritans*). Human lice may have been abundant too, but the louse remains were too decayed to venture an identification. Dog fleas (*Ctenocephalides canis*) were certainly quite common ('several' being noted). *Sitona lineatus*—which from species association analysis was linked to house fauna elements (Figs. 1-2)—was again present in larger numbers than likely by chance (three), and there were two grain weevils. The bark beetle *Leperisinus varius* may have come from structural timber not stripped of bark, but it may equally have emerged from firewood, suggesting another aspect of domestic life. There was nothing to suggest from the insect remains that there was any foul matter on the floor.

A total of 115 fragments of bone (weighing 7.1 g) was recovered from this sample, of which 47 were identifiable. Fish remains included 35 herring fragments, three eel, three gadid and a single ?plaice vertebra. The unidentified fraction consisted chiefly of fish remains.

*Sample 613/T1* (5 kg): description as Sample 609.

This subsample yielded a large residue of about 1500 cm<sup>3</sup> of which perhaps 25-33% was organic, though almost all of it was in the <2 mm fraction. The coarser 'organic' material was mainly peat, coal, and cinders with only traces of bark and wood, some of the fragments of wood showing burning at one end, as in a match.

Seeds and fruits were rather sparse and somewhat 'battered'. They included foodplants—hazel, walnut, 'bread/club' wheat (*Triticum aestivo-compactum*), fig, cherry, blackberry (*Rubus fruticosus* agg.) and grape—and a variety of weeds, as well as wetland and peatland plants, with *Sphagnum imbricatum* again being recorded in moderate amounts. There was also a single tentatively identified achene of milk thistle, *Silybum marianum*, a plant recorded from a nearby site in Blanket Row (Johnstone *et al.* 1999) as well

as from three sites in York: from ?medieval deposits at Skeldergate, (A. R. Hall, unpublished data) and from a single 12th century dump at 16-22 Coppergate, York (*ibid.*) and from a medieval deposit at Layerthorpe Bridge (Hall *et al.* 2000). It is likely to have been introduced to Britain from continental Europe, perhaps after the Norman Conquest, probably as a medicinal plant.

Invertebrate remains were abundant. There were 121 adult beetles and bugs (64 taxa). Outdoor taxa contributed a large proportion of the fauna (PNOB = 40), although a good part of this was 16 *Sitona ?lineatus*, which surely must have been imported, perhaps with pulses. The beetles offered a little evidence for cut herbaceous vegetation, an alternative but less probable source for this weevil in view of the range of taxa identified. There were two grain weevils (*Sitophilus granarius*). The presence of pulses was strongly supported by a record of three *Bruchus ?rufimanus*, a bean weevil. (Pulses were rare amongst the plant remains at this site, though they are certainly under-represented in the fossil record unless conditions for preservation by one or more means, notably charring or mineralisation, is especially favourable.)

House fauna predominated in the remainder of the fauna: *Anobium punctatum* (14), *Lathridius minutus* group (6), *Ptinus fur* (5), *Xylodromus concinnus* and a *Cryptophagus* species (both 4), and a few others (core Group A contributing 50% of the beetle and bug assemblage). Again, a restricted range of indoor habitats is indicated; fleas were able to breed (there were 'many' *P. irritans*), but there was nothing to suggest more than traces of foul matter *in situ* (PNRF = 7, mostly *Aphodius* spp, whose origin in domestic floor deposits is open to discussion, see below). Lice were recorded during initial sorting as present in extremely large numbers, but such was the quality of preservation of these remains that careful study could only give a record of 'many' *?Pediculus humanus*. There were also five dog fleas (*Ctenocephalides canis*).

Six fragments of bone were recovered from this sample, of which two were identified as herring vertebrae. Three of the unidentified fraction were fish bones, the other was completely unidentifiable.

*Sample 614/T1*: just moist, mottled dark brown and black with a range of other colours, crumbly and brittle to just plastic, sandy silty clay. The deposit may have had an organic content which had decayed prior to sampling. Very small (2-6 mm) stones, mortar/plaster, brick/tile, coal and cinders were present.

This subsample was not investigated for plant remains.

Beetles and bugs were rare (N = 37, S = 27, a group resembling a random extract from those from the other samples from this context), but other invertebrates quite abundant. Human lice were abundant, and so were human fleas. There were two grain weevils, and numerous *Daphnia* ephippia (water flea resting eggs), the latter perhaps brought in water supplies with two *Helophorus* sp. water beetles.

*Sample 616/T1*: moist, mid brown (locally darker), plastic, silty clay with reddish burnt soil. Fragments of mortar/plaster, brick/tile and pot were all present. Live algae provided evidence of modern contamination in store.

Not examined for plant remains.

Invertebrates were present in modest numbers (for adult beetles and bugs, S = 23, N = 33; there were a few tens of individuals of other groups), the beetles being dominated by house fauna. There were several ostracods and *Daphnia* ephippia, and single adult and larval caddis flies, pointing most probably to the importation of water.

*Sample 618/T1*: just moist, very dark brown (locally paler), crumbly brittle and indurated to slightly layered, very humic, slightly sandy silt.

Though very large, this residue of about 2000 cm<sup>3</sup> included a high proportion of undisaggregated, somewhat humic, silty, perhaps ashy sediment; clasts of undisaggregated sediment showed microlayering typical of ashy floors. The coarser organic material included peat fragments and coal (both to 10 mm) and wood (to 15 mm). There was quite a high organic content, although the concentration of identifiable remains was low; preservation was mostly rather good. As in other samples from this floor, there was a mixture of weeds, foodplants (the same taxa as in other samples), wetland and grassland taxa, and a component perhaps from peat, at least some of which formed in a fen rather than a bog. There were also modest numbers of snails (see below) and small marine molluscs.

The assemblage of beetles (no bugs) was of moderate size (N = 88, S = 50). House fauna predominated (there were ten *Anobium punctatum*, seven *Ptinus fur*, six *Xylodromus concinnus* and five *Lathridius minutus* group), core Group A of Carrott and Kenward (in press) contributing 47% of the assemblage. There were three *Aphodius granarius* and three individuals of a second member of this genus, but no other indications of foul matter.

Of the 37 fragments of bone (weighing 1 g) recovered from this sample, only five were identifiable. These included four herring and one pleuronectid vertebrae. Although consisting mostly of fish, the unidentified fraction also contained bird and mammal bone fragments.

Snails from samples in Context 1820: A small assemblage of snails (mostly of taxa of fresh water and waterside vegetation) was recovered. They seem most likely to have arrived in floodwater or through deliberate importation of water or sediment.

Floor **1820** was thus a rather heterogeneous deposit, but invariably contained at least a modest component of organic material including wood fragments (often as chips), peat and probably cut grassland vegetation. The frequent rush seeds (mostly mud rush) perhaps point to the use of cut rushes as another kind of floor litter, though this saltmarsh species seems less likely to be cut than many and the seeds may perhaps be from trample.

The entomological evidence does not support the suggestion that these structures may have held livestock (other than dogs), despite the presence of appreciable numbers of *Aphodius* dung beetles. The last may have arrived accidentally, or just conceivably have been attracted to dung deposited during the cleaning of sheep's wool, since some sheep keds (*Melophagus ovinus*) were recorded. The relative importance of the woodworm, *Anobium punctatum*, may suggest that there was only limited habitat for litter feeders, so that there may not have been much loose plant litter on the floor, what was strewn being compacted quickly, loose material then being swept away regularly. Alternatively, the floor may have been boarded, the woodworm beetles infesting the damp timber.

Identified bone fragments from this floor deposit were mainly herring vertebrae, whilst the unidentified fraction consisted almost entirely of small undetermined fish fragments. Mammal fragments were largely absent and those present were <50 mm in dimension. The small size of the fragments and the lack of large mammal remains could indicate that small bones went unnoticed amongst the 'litter' laid down on the floor, whilst larger debris was cleared away. It may equally be possible this is further evidence that the floor was boarded and that the fish remains were small enough to fall between the boards.

**Context 2118:** well fill

*Sample 671/T:* waterlogged, mid grey-brown (greyer internally), soft and slimy, clay silt. Medium-sized stones (20-60 mm) and brick/tile fragments (to 50 mm) were present. Modern contaminants included diesel oil and algae.

The moderate-sized to large residue of 850 cm<sup>3</sup> was mainly stone (to 90 mm), brick/tile (to 110 mm) and sand, yielding a washover of about 150 cm<sup>3</sup> of very decayed wood (to 110 mm), including chips up to 10 mm, and woody detritus with a trace of peat (to 10 mm). Some of the wood fragments exhibited holes but these are thought to represent ancient rather than recent decay (i.e. that the wood was already well rotted before being cast into the well).

Seeds and fruits were moderately frequent, making up a large proportion of a small 1-2 mm fraction, and preservation was mostly good. Most were weeds of various kinds, but there were traces of foodplants (hazel nut, fig and strawberry, *Fragaria* cf. *vesca*). The moderate numbers of *Sphagnum imbricatum* leaves and/or shoots were probably originally within the peat. A single tentatively identified seed of columbine, *Aquilegia*, perhaps represents a plant grown in the town for ornament or for its herbal properties (the seed itself is mentioned by Culpeper (quoted by Grieve 1976): 'taken in wine with a little saffron [it] removes obstructions of the liver and is good for the yellow jaundice').

Although other invertebrates were rare, this subsample produced large numbers of beetles (N = 347, S = 51). Most of these were grain pests (PNG = 74) and had presumably been dumped into the well in spoiled grain. (Perhaps the bran from this grain had decayed too far before disposal to have survived.) There were 194 saw-toothed grain beetles (*Oryzaephilus surinamensis*) and 64 grain weevils (*Sitophilus granarius*). Traces of house fauna (*Anobium punctatum*, with four individuals, being the most abundant) were probably dumped with these, as they would have typically lived in storage conditions with them. A hint of the presence of domestic floor material is offered by single human fleas and lice, however. The remaining beetles were probably a mixture of background fauna and remains from soil used for backfilling.

Two bone fragments (weighing 27.1 g) were recovered from this sample: a cattle phalanx and an unidentified fragment of medium-sized mammal.

**Hand-collected bone from Context 2118:** Preservation was recorded as fair to good and colour was noted as ginger. Angularity was described as variable, since spiky, rounded and battered fragments were all observed. Between 10 and 20% of the fragments were less than 50 mm in largest dimension, the rest being up to 200 mm in size. Fresh breakage and dog gnawing were both observed on up to 10% of the assemblage, whilst butchery was more frequent.

A total of 30 fragments (weighing 408 g) was recovered, of which ten were identifiable. The major domesticates (cattle, caprovid and pig) were all present. The pig metatarsal recorded was very large, although not as big as wild boar. The two goose bones had been cat-gnawed and both were similar in size to those of greylags. The cod vertebra was from an individual between 110 and 150 cm in length.

The biological remains suggest that the analysed deposit was essentially backfill (rather than a use phase accumulation), probably taken from the adjacent surface. Dumps probably included spoiled grain (perhaps as a component of stable manure) with hints of human food waste and possibly litter.

#### 'EAST RANGE' AREA

##### **Context 2294:** brick path

**Hand-collected bone:** Overall preservation was described as good and colour as dark brown with ginger tinges. Angularity was noted as spiky. Over half the bones were between 50 and 200 mm in largest dimension, with less than 20% being smaller. Fresh breakage and dog gnawing were noted on <10% of the material and evidence of butchery on 10-20%.

Of the 45 fragments present (weighing 229 g), sixteen were identifiable. Domestic mammals present included caprovid, pig and cat. Also present were chicken, goose and duck bones. The geese were of similar size to greylag specimens and the duck to mallard specimens in the EAU collection. In addition, single cod and gadid bones were recovered.

#### 'WEST RANGE' AREA

##### **Context 939:** clay levelling layer between floors of Building 1, overlain by **886, 673, 672** and then floor **1061**

**Hand-collected bone:** Preservation was variable although mostly good. Angularity was also variable, with most fragments recorded as spiky and a few as battered or rounded. The colour of the bones was best described as mottled, with patches of fawn, ginger, brown and dark brown/black. Most fragments fell within the 50-200 mm size category. Dog gnawing, butchery and fresh breakage were all noted on under 10% of the material.

Of the 53 fragments (weighing 395 g) from this context, 24 were identifiable. Taxa present included cattle, caprovid, pig, chicken, goose, ?kittiwake and gadid. The goose bones were all of a size similar to the greylag specimens in the EAU reference collection and consisted entirely of wing elements: humerus, carpometacarpus and first digits. Whilst these elements probably represent domestic refuse from dressing the bird carcass prior to cooking, there is a possibility that they may be waste from the use of the feathers for arrow fletching or for the manufacture of quill pens. The ?kittiwake bone has been identified as such on the basis of size and morphology. It is, however, also morphologically similar to the common gull (*Larus canus* Linnaeus), although a little smaller than the reference specimen. In addition to the identified bird bones, a further nine shaft fragments were present in the unidentified fraction, representing almost a third of the unidentified material. The mammal and bird fragments all suggest that this assemblage mainly represented domestic/kitchen refuse.

##### **Context 945:** floor or levelling

*Sample 358/T1* (5 kg): dry, dark grey brown (darker when wet), indurated to crumbly, (working plastic), clay sand. Hints of layering at mm scale, undoubtedly ashy. Chalk, brick/tile, ?charcoal, large mammal bone and marine molluscs present.

Though the residue was large (about 1300 cm<sup>3</sup>) it consisted mainly of sand with some mammal and fish bones, and a little marine shell, brick/tile and gravel; the washover, which was mostly coal in the <1 mm fraction, made up just 10-15% by volume. The few identifiable plant remains, all present in trace amounts, are likely to have been of diverse origins and offer little to the understanding of the nature of the floor and its history.

A small invertebrate assemblage was recorded (N = 21, S = 12); it certainly may have been deposited on a house floor. There were seven grain beetles (four *Sitophilus granarius* and three *Oryzaephilus surinamensis*), and much of the rest of the assemblage was house fauna. Four *Meligethes* sp. may have been modern and are best disregarded.

A total of 223 bone fragments (weighing 13.9 g) was recovered from this sample, of which 67 were identifiable. Single eel vertebra and gadid otolith fragments were recovered, together with 65 herring bones (mostly vertebrae). Of the unidentified fraction 126 fragments were fish and the rest completely unidentifiable.

*Sample 359/BS* (9.5 kg): Vertebrate material from this sample was scanned. Preservation was good, colour brown and angularity variable (fish and bird bones were mostly spiky, others were battered). Most fragments were less than 50 mm in greatest dimension. Numerous herring vertebrae were identified, together with a few pleuronectid and large gadid fragments. A few bird shaft and vertebra fragments were also recovered.

*Sample 360/BS* (9.5 kg): Of the 292 bone fragments recovered (weighing 38.1 g), 211 were identifiable. Most of these (191) were herring bones, of which 164 were vertebrae. Other fish present included eel, gadid, pleuronectid and ?dover sole. In addition a single small mammal incisor and pig metatarsal were identified.

*Sample 361/BS* (9 kg): A total of 520 bone fragments was recovered, of which 415 were identifiable. As with Sample 360, most of the identifiable remains were those of herring (384), including 365 vertebrae. Other fish present included eel, gadid, ?cod, ?ray, pleuronectid, ?lemon sole, ?plaice and ?long rough dab. In addition, two ?chicken carpometacarpal were identified.

*Sample 362/BS* (9 kg): Vertebrate material from this sample was scanned. Preservation was recorded as good, colour as brown and angularity as spiky. Most fragments were less than 50 mm in largest dimension. Less than 10% of the fragments were burnt. Fish included herring, eel, pleuronectid and gadid. A single fragment of crab claw was also recovered. Mammalian fragments consisted of a cow phalanx and a human tooth (with a caries cavity). The presence of a human tooth suggests reworking of the deposit.

*Sample 364/BS* (7 kg): Vertebrate material from this sample was scanned. Preservation was more variable than for other samples, as was angularity. The colour was still consistently brown. Almost all the fragments fell within the <50 mm size category. Fewer fish bones were present in this sample than in the others from this context, although herring, eel, pleuronectid and gadid were all present. Most of the unidentified fraction consisted of large- and medium-sized mammal fragments.

*Sample 365/BS* (8.5 kg): Vertebrate material from this sample was scanned. Preservation was similar to that observed in material from Sample 364. Almost all the fragments fell within the <50 mm size category. Fish remains included those of herring, eel, pleuronectid, and thornback ray. A single duck tibiotarsus (of similar size to mallard) was also recovered.

**Hand-collected bone:** Only six vertebrate fragments (weighing 34 g) were recovered from this context, all of which were unidentified.



Altogether, a bone assemblage, similar to that from Context 1820 (although somewhat larger), was recovered from this deposit. A predominance of well-preserved fish remains, herring vertebrae in particular, was again noted. Few large or medium-sized mammal fragments were recorded and, overall, most bones were <50 mm in dimension (even the rather meagre assemblage collected by hand). This material appears to represent table waste, although a small component of kitchen waste, i.e. the remains of fish heads chopped off prior to cooking, is also apparent. The abundance of small fragments and lack of larger mammal remains suggests that the floor was kept fairly clean, with the small fish and bird remains overlooked or ignored amongst the 'litter' covering the floor. As has already been suggested for Context 1820, another alternative is that the assemblage accumulated beneath a wooden floor, this theory also accounting for the survival and good state of preservation of these fragile remains.

### **Context 973: basal fill of pit 972**

*Sample 355/T1* (5 kg): moist, mid-dark slightly greyish-brown, crumbly, ?slightly humic, slightly sandy silt. Small (6-20 mm) stones were present together with brick/tile fragments (to 10 mm).

Most of the large residue of about 1050 cm<sup>3</sup> was sand and brick/tile fragments (to 60 mm) with about 200 cm<sup>3</sup> of fine to medium-sized herbaceous and woody detritus, including what may have been straw and hay components and some small (<5 mm) peat fragments. Seeds were moderately frequent and moderately well preserved and included a group which is thought to be typical of cut grassland vegetation, especially from damp meadows, with sedges and grasses, *Leontodon*, *Prunella*, *Ranunculus* Section *Ranunculus* and meadow-rue (*Thalictrum flavum*) all scoring 2 on the 4-point scale of abundance. A salt-marsh origin for some of this material is perhaps indicated by records for sea aster (*Aster tripolium*) and sea arrow-grass (*Triglochin maritima*). The 'straw' component is represented especially by corncockle, corn marigold (*Chrysanthemum segetum*), dwarf spurge (*Euphorbia exigua*), wild radish and narrow-fruited cornsalad (*Valerianella dentata*), although only the first of these was present in more than trace amounts. Stable manure is thus perhaps indicated as a component of this pit fill.

There were 195 individuals of 83 beetle and bug taxa, numerous mites, and rather small numbers of other invertebrate remains in an assemblage which presented considerable interpretative problems. The more abundant beetles included several ecological components. The first of these components, represented by 20 *Sitona lineatus*, the most numerous beetle, was species living on pea-flowered plants (Leguminosae/Fabaceae); additional taxa were (probably) *Apion* species (2, 1, 1 individuals), many of which are associated with this family, *Bruchus* sp. (1, quite possibly *B. rufimanus*), and *Sitona hispidulus* (1). These seem most likely to have arrived either in hay or other cut herbaceous vegetation used for sweetening floors or as horse feed, or with pulses used for food, either for humans or for livestock. Either of these explanations would be supported by the presence of grain pests (16 *Sitophilus granarius* and five *Oryzaephilus surinamensis*), which may have originated in grain for human consumption or animal feed. If stable manure were a source, as might be argued from the plants, there was remarkably little in the way of the decomposer fauna which typically seems to have developed in it, unless the stable was cleared out very frequently. Possibly four *Aphodius prodromus* and three each of *Anotylus sculpturatus* group and *Aphodius granarius* represented rapid colonisers of such material, and single individuals of two *Monotoma* species, very commonly found in stable manure associations, were present. All of these may have colonised waste in the pit, however.

A limited house fauna was present, and may indicate domestic sweepings or stable manure: there were eight each of *Cryptophagus* sp. and *Lathridius minutus* group, seven *Anobium punctatum* and *Tipnus unicolor*, and four *Xylodromus concinnus*. The larvae of human fleas (2) and dog fleas (1) may also have developed in either situation. Two human lice, *Pediculus humanus*, seem more likely to have a domestic origin. The presence of *Blaps* sp. and *Tenebrio obscurus* perhaps argues for a domestic origin, but both may have lived in a stable. *Tipnus unicolor* seems to be typical of longer-lived buildings.

A few species probably lived *in situ*, including *Platystethus nitens* (10 individuals, perhaps colonising muddy organic matter or the moist walls of the pit) and *Ochthebius viridis* (perhaps attracted to water in the pit). Open water may be indicated by several *Daphnia ephippia*, but an origin in imported water, perhaps drunk by livestock, is also possible.

A fragment of a head of a 'yellow jacket' wasp (*Vespula* sp.) was recovered from this sample. It has not been possible to determine whether this was a modern contaminant or (probably) the first fossil record of this group.

A single mollusc (Succineidae sp.) indicative of waterside vegetation was recovered. This may indicate vegetation at the edge of the pit but, as suggested for the *Daphnia ephippia*, may also have originated in imported water.

Only eleven bone fragments (weighing 69 g) were recovered from this context, including a single cattle tooth and two caprovid bones. The unidentified fraction consisted almost entirely of completely unidentifiable small fragments. Preservation of bone from this pit fill was variable, being recorded as good to fair. Colour ranged from fawn to dark brown and angularity was similarly mixed (mostly spiky with a few rounded fragments). More than half of the fragments were less than 50 mm in largest dimension, whilst 20-50% were between 50 and 200 mm. Fresh breakage and dog gnawing were present on a few of the fragments.

On balance, the greater part of the plant and invertebrate remains probably originated in stable manure which came from a floor which was cleared sufficiently frequently to prevent large insect faunas from developing; most of the decomposer beetles associated with fouler matter may have invaded after the material was dumped into the pit. The preservational condition of the rather scarce and fragmented vertebrate material (which was rather variable for all characteristics) suggests redeposition and is consistent with a taphonomic pathway via accumulation on a floor.

#### **Context 1007: floor**

*Sample 378/BS* (8 kg): Vertebrate material from this sample was scanned. Preservation was recorded as good, angularity as spiky, and colour as brown with ginger tinges. All the fragments were less than 50 mm in largest dimension. Numerous herring fragments were recovered, together with pleuronectid and thornback ray remains. The unidentified fraction consisted chiefly of further fish bones.

*Sample 379/BS* (7 kg): Vertebrate material from this sample was scanned. Preservation was similar to that for Sample 378 except that a much greater colour range was observed. All the fragments were less than 50 mm in largest dimension. Three herring vertebrae were found, articulated, within a concretion, together with many loose herring fragments. Pleuronectid vertebrae were also identified, together with a fish scale and a ?goat phalanx. The unidentified fraction contained fish, bird and mammal fragments.

*Sample 380/BS* (6.5 kg): Vertebrate material from this sample was scanned. Preservation and fragmentation were similar to those recorded for Sample 378. This assemblage consisted chiefly of herring vertebrae, gadid fragments and unidentified fish and mammal fragments.

*Sample 381/BS* (7 kg): A total of 204 fragments (weighing 42.2 g) was recovered, of which 169 were identifiable. Of the identifiable fraction, 160 fragments were herring bones (153 vertebrae). The remaining

nine fragments included those of marine fish (?plaice and cod), freshwater fish (pike), eels, and mammals (caprovid and cattle). The unidentified fraction contained bird bones as well as mammal fragments.

*Sample 382/T1* (5 kg): mainly mortar and ash with some coal. Just moist, mid grey brown (with pale ash and mortar and dark coal) and crumbly. Inclusions present were pot, charcoal and large mammal bone. There was some growth of algae.

The extremely large residue of about 2100 cm<sup>3</sup> consisted of sand and mortar with some coal, but plant remains were completely lacking. This contrasts with most of the other floor deposits at this site where at least some preservation of organic remains had occurred.

Beetles were rather rare (no bugs: N = 34, S = 17), as were other macro-invertebrates. There were nine *Meligethes* sp. (possibly, but by no means certainly, modern contaminants), but the remaining fauna was dominated by grain pests (five *O. surinamensis* and four *S. granarius*) and house fauna (three *Anobium punctatum*, the rest as single individuals). Even in this tiny group there was a *Sitona* weevil (discussed at length below). The outdoor insect taxa may have been strays or have arrived in trample.

Of the 17 bone fragments (weighing 3.6 g) recovered from this subsample, only three were identifiable. These were a single thornback ray dermal denticle and two herring fragments. The unidentified fraction consisted chiefly of fish fragments.

**Hand-collected bone:** Only five fragments (weighing 108 g) were recovered from this context, including a single cattle metapodial and goose coracoid.

Overall the evidence suggests that this was a relatively clean floor with a very restricted insect ‘house fauna’ and various food remains. Identified vertebrate remains recovered from this deposit were mostly small herring fragments; the whole assemblage (although smaller) resembling that from Context 945. All the bones were small (<50 mm in dimension) and well-preserved, with the exception of five hand-collected fragments. As for other floors from this site, most of the material represents table waste, with a little kitchen refuse included. Again, the possibility exists that this concentration of bones (mainly fish) built up beneath a wooden floor. This may be substantiated by the lack of plant remains from an organic floor covering. A boarded floor would not necessarily have needed further covering or may have been swept clean on a more regular basis. The insect remains from this deposit also suggest a clean floor, but species characteristic of damp wood or of voids beneath boarding did not form a conspicuous component.

**Context 1038:** layer in alleyway between buildings, perhaps containing material raked out from adjacent oven 970

*Sample 400/T1* (5.5 kg): mid to dark grey-brown, crumbly (working just plastic), clay sand. Flint, charcoal, large mammal and marine mollusc remains were all present, brick/tile common and coal abundant.

The extremely large residue of about 2200 cm<sup>3</sup> consisted mostly of non-organic occupation material: brick/tile (to 90 mm), coal (to 65 mm) and sand, with traces of chalk, charcoal, cinders, gravel and pottery. The biological remains were almost all ‘mineral’: bone (including fish), charcoal, eggshell and oyster shell. There were only traces of three identifiable plant taxa. Invertebrates were extremely rare—but the group was rather reminiscent of that from Context 1007.

*Sample 401/BS* (8 kg): Vertebrate material from this sample was scanned. Overall preservation was described as variable, fragments with both good and fair preservation being present. Angularity was also variable: some fragments had spiky edges, others battered or rounded edges. Colour was recorded as brown with ginger tinges. All the fragments were less than 50 mm in greatest dimension. A few very small, rounded, human bone fragments were recovered from this sample. A few herring and gadid vertebrae were identified. The unidentified fraction consisted chiefly of very small fragments of mammal bone, most of which were battered or rounded in appearance.

*Sample 402/BS* (7.5 kg): Vertebrate material from this sample was scanned. Preservation and fragmentation were very similar to that observed in Sample 401. Very few identifiable fragments were observed but included pleuronectid vertebrae. The unidentified fraction was mainly composed of mammal fragments, with a few fish and bird remains. A single planorbid snail was recovered.

*Sample 403/BS* (8.5 kg): Vertebrate material from this sample was scanned. Preservation and fragmentation were similar to those recorded for Samples 401 and 402, although a few larger fragments were observed. Fish present included, thornback ray, herring and large gadid. Several juvenile bird fragments (possibly chicken) were noted, including phalanges and a distal tarsometatarsus. The unidentified fraction consisted chiefly of medium-sized mammal shaft and rib fragments.

*Sample 404/BS* (6.5 kg): A total of 224 fragments was recovered from this sample, of which 59 were identifiable. Seven cattle fragments were recorded all of which were deciduous upper molars and fragments thereof. A single pigeon family (Columbidae) scapula was recorded; it was of similar size to collared dove (*Streptopelia decaocto* (Frivaldsky)) specimens in the EAU collection. The rest of the identified material consisted of fish bones from both marine and freshwater species. Marine taxa included cod, gadid, and herring. Freshwater fish were represented by pike and ?common bream.

*Sample 423/BS* (8.5 kg): Vertebrate material was scanned. Preservation was described as fair and colour as fawn. Angularity and fragmentation were the same as previous samples. Fish taxa included gadid, pleuronectid and herring. As with the assemblage from Sample 403, many juvenile bird phalanges and tarsometatarsi were present. The unidentified fraction consisted mostly of mammal fragments. A very small assemblage of poorly preserved fresh (and possibly brackish) water snail taxa was also recovered from this sample.

*Sample 424/BS* (8.5 kg): Vertebrate material from this sample was scanned. Preservation and fragmentation were the same as Sample 423. The fish present included gadid and herring. As with the assemblages from Samples 403 and 423, this sample contained juvenile bird (possibly chicken) phalanges tarsometatarsus and tibiotarsus. In addition a ?goose ulna was identified.

**Hand-collected bone:** Overall preservation was variable: some fragments were recorded as good (particularly bird bones), most were noted as fair, and some listed as poor to very poor (particularly small pig bones). Colour was highly variable, ranging from fawn to dark brown, some bones being mottled. Angularity was also variable, spiky, battered and rounded fragments all being recorded. The great variety in the preservation of fragments in this context is noteworthy, probably indicating a high degree of reworking. Consistent with this, the degree of fragmentation was relatively high with most of the fragments being less than 50 mm in greatest dimension. Dog gnawing, burning and fresh breakage were noted on up to 10% of the fragments, with butchery evident on 10-20%. The burnt fragments were not

obviously burnt (i.e. black or white in colour) but rather had a 'clinkery' feel when handled, as if having been subjected to only moderate heat.

Another indication of the degree of fragmentation is that, of the 192 bones (weighing 549 g) recovered, only 23 were identifiable. These included 17 pig bones, of which 12 were carpals or tarsals, all very poorly preserved and very rounded in appearance. The other pig bones (mostly metapodials) were also poorly preserved. Other taxa included cattle, caprovid, chicken and goose. The unidentified fraction contained fish and bird fragments as well as those of large and medium-sized mammals.

Preservation of the vertebrate remains was extremely variable (fair-poor to very poor) and the assemblage showed a high degree of fragmentation. If this context is associated with an alleyway, it would explain the extensive fragmentation and the variety of preservation observed. The material is likely to have been redeposited as well as trampled. Fish bones were dominated by herring, pike and ?common bream vertebrae, which probably represent table waste, or waste from direct food consumption, as do the bird remains. The identified mammal remains appeared to be mostly butchery waste, but the unidentified fraction included numerous rib and shaft fragments, along with many small and rather eroded fragments. Taphonomic factors may be responsible for the rather mixed material, but poor preservational conditions are unlikely to support the survival of fragile fish remains and juvenile bird bones. It seems likely, therefore, that a number of sources were responsible for the accumulation of material within this deposit

**Context 1061:** floor, first true floor of building; well worn

*Sample 478/BS (7.5 kg):* Of the 187 bone fragments (weighing 6.6 g) recorded, 108 were identifiable. The identified fraction was dominated by herring vertebrae (98). The remaining fragments were from eel, ?cod and ?saithe.

*Sample 479/BS (7.5 kg):* Vertebrate material from this sample was scanned. Preservation was recorded as good and colour as brown. Angularity was described as variable, fragments with spiky and battered edges being noted. All the fragments were less than 50 mm in greatest dimension. The only identified species was herring. The unidentified fraction consisted chiefly of fish remains, although mammal and bird bones were also present.

*Sample 483/BS (5.5 kg):* Vertebrate material was scanned and preservation found to be variable, with most fragments described as good and a few as fair. Colour was a mixture of brown and ginger. Angularity and fragmentation were similar to Sample 479. The assemblage from this sample consisted almost entirely of fish remains, including herring and gadid fragments. A single *Succinea putris* shell (and a fragment of another unidentified snail) was recovered from this sample.

*Sample 485/BS (10 kg):* Only nine bone fragments were recovered from this sample, a single pleuronectid vertebra and unidentified fish remains.

**Hand-collected bone:** Overall preservation was variable (recorded as good to fair), as was colour (ranging from fawn to brown) and angularity (spiky and battered). Although over half the fragments were between 50 and 200 mm, over 20% were <50 mm in greatest dimension. Butchery was evident on up to 10% of the fragments, whilst fresh breakage was more frequent, affecting over 20% of the fragments.

A total of 25 fragments (weighing 199 g) was recovered from this context, of which seven were identifiable. These included five cattle bones and single fragments of caprovid and pig.

Similarities of these bone groups to those from other floor deposits at this site included the predominance of fish remains, and herring in particular. Many small bones, most <50 mm, were present, the hand-collected material containing slightly larger fragments, as might be expected. The preservation of the bone was recorded as being more variable than for the material from Context 1007 (above), with a component of battered fragments. On the whole, the remains from the samples were well-preserved. The fish bones again seem to represent table refuse, whilst mammal remains, although few in number, are typical of butchery refuse—head and lower limb elements prevailing. The good preservation of the former suggests a primary deposit, whilst the battered nature of the latter indicates the presence of redeposited material.

#### **Context 1075:** floor S of oven

*Sample 451/BS (7.5 kg):* Material from this sample was scanned. Preservation was described as good, angularity as spiky, and colour as brown with ginger tinges. Whilst most fragments were less than 50 mm, a few fell within the 50-200 mm size category. Mammalian taxa included sheep and pig; fish included gadid, pleuronectid, herring and haddock.

*Sample 452/BS (7.5 kg):* Material from this sample was scanned. Preservation and fragmentation were similar to those recorded for Sample 451. Mammal fragments included those of sheep, and birds were presented by two rook/crow bones. Fish included cod, ?whiting, gadid, herring and pleuronectid. The unidentified fraction consisted chiefly of medium-sized mammal ribs, shafts and tarsals.

*Sample 456/BS (7.5 kg):* A total of 100 bone fragments (weighing 65.4 g) was recovered, of which 31 were identifiable. Fish present included cod, gadid, ?saithe, eel, herring, pleuronectid and ?lemon sole. In addition, two goose bones and a vole/mouse (microtine/murine) humerus were recovered. The unidentified fraction contained bird and mammal fragments. A very small assemblage of fresh water snail taxa was recovered from this sample, presumably from river flooding or water brought to the site for some purpose.

**Hand-collected bone:** Preservation was described as good, and the colour of the fragments was brown (with ginger tinges). Angularity was, however, variable with both spiky and battered fragments present. Almost all the fragments were within the 50-200 mm size category. Burning was noted on up to 10% of the bones and butchery was evident on 10-20%.

Of the 19 fragments (weighing 2248 g) recovered, six were identifiable. These included cattle, caprovid and cod bones. The unidentified fraction also contained fish remains.

Preservation of material from the samples was good and the nature of the broken surfaces was recorded as 'spiky'. There were a few fragments within the hand-collected material that were battered in appearance, but, overall, preservation was 'fair to good'. As with some of the other floor deposits, fish were represented mostly by the remains of herring (chiefly vertebrae), but a number of cod head and vertebrae fragments were also identified. Mammal fragments were quite scarce, another similarity to the material from other Period 1 floor deposits.

## Context 1277: pit fill

*Sample 481/T1* (5 kg): moist, mid grey-brown (lighter and darker locally), stiff to crumbly (working plastic), clay silt. Small (6-20 mm) and medium-sized (20-60 mm) stones were present, together with chalk, brick/tile (to 50 mm), charcoal and marine mollusc fragments.

About one-third of the large residue of about 1200 cm<sup>3</sup> was made up by a single large (to 120 mm) brick fragment; the remainder consisted of further mineral material (mainly coal, concreted sediment and sand) with a little bone and slag. There were traces of peat fragments (to 5 mm) but otherwise no organic component.

Although *Daphnia ephippia* were numerous (about 30, either colonists of the pit or from waste water), beetles were rather rare (N = 38, S = 28). There were grain pests (six *O. surinamensis* and one *S. granarius*) and a trace of house fauna (including two *Tipnus unicolor*), perhaps from domestic waste. There were also a few ground beetles which probably originated in the immediate surroundings, and four *Platystethus nitens*, likely colonists of mud in the pit.

Three fragments (weighing 1.1 g) were recovered from this sample, all of which were unidentified (two bird and one fish).

The biological remains offer little evidence for the nature of the pit fill, which seems mainly to have consisted of mineral debris, perhaps largely building material.

## SUMMARY OF PERIOD 1 MATERIAL

Many deposits dated to Period 1 contained few biological remains preserved by anoxic waterlogging, but some were very rich (and naturally these were targeted for this study in light of the assessment). Charred plant material other than burnt peat and charcoal was sparse, with charred cereals being recorded (always in very small numbers—in three cases as single specimens) from eight samples from five contexts.

Vertebrate remains recovered from Period 1 deposits totalled 3275 fragments (Table 17), of which 1508 were identified to species or to family group. This total is exaggerated by the large quantity (975 fragments) of herring bones recovered mainly from samples representing floor deposits within the ‘West Range’ area of the site.

Although bone preservation was moderately good, overall, it varied both within and between contexts, with a variable proportion of fragments appearing eroded or slightly battered. Concentrations of fish remains from floor and floor/levelling deposits showed exceptionally good preservation and probably represent the primary deposition of waste (see discussion of fish remains below). Table 17 shows the range of vertebrates represented in Period 1 deposits. Excluding fish remains, the main domesticates (i.e. cattle, caprovid, pig and chicken) make the largest contribution to the assemblage.

Biological evidence for the local environment in this part of Hull in the 13<sup>th</sup> century is limited. The supposed buried soil penetrated by the feature defined by Cut 2158 was not definitively identifiable as a former land surface. If it was, it had probably been truncated, though it seems more likely to represent no more than a stage of standstill in the build-up of the clays and silts on which the site was founded, or even a colour change representing the effect of lowering water table consequent on drainage resulting from the cutting of the feature.

What vegetation, if any, grew on the site at this period? Weed seeds were often rather abundant in the Period 1 deposits. They may have originated in plants growing in neglected places—this is particularly

likely in the case of trample-resistant plants such as knotgrass, *Polygonum aviculare*, for example (recorded at an abundance score of 2 or 3 from nine assemblages from four contexts, including five from the composite context '1626'). Alternatively, they may reflect the presence of cultivated soils in the vicinity. There were moderately frequent records of insects which may have lived on scattered weeds. Many of the weed seeds (and perhaps the insects) might equally have arrived as crop contaminants, or as components of straw or poor hay, however, and there is certainly no evidence for extensive stands of vegetation on surfaces—disturbance seems to have been intensive.

In some cases, areas of drying mud may have been colonised periodically (e.g. by the goosefoots in *Chenopodium* Section *Pseudoblitum*). There is a distinct possibility that such habitats were available at least in the earlier stages of Period 1, since the fills of Cuts 2158 and 2176 regularly contained suites of beetles indicating saline mud or litter which had been soaked in seawater. It seems quite likely that this feature was connected to a creek, although it is just possible that it was simply a hole which occasionally was filled with seawater by flooding. The botanical evidence for saltmarsh habitats is limited and mostly restricted to records for mud rush (*Juncus gerardi*) seeds from floors. The other halophyte taxa, especially sea aster (*Aster tripolium*) and sea arrow-grass (*Triglochin maritima*), were mainly recorded from fills of features other than the large cut (2158/2176) and are perhaps part of a 'cut vegetation' or herbivore dung component (considered further below).

Taken together, the biological evidence from Period 1 deposits all points towards domestic occupation of the tenements in this part of Hull in the 13<sup>th</sup> century. There is no evidence for craft and industry such as has repeatedly been found in earlier (Anglo-Scandinavian) tenements in York or, closer to this site, in 12<sup>th</sup> century Beverley. In particular, the concentrations of dyeplant material which characterised many deposits at 9<sup>th</sup>-11<sup>th</sup> century 16-22 Coppergate, York (Kenward and Hall 1995) and certain levels at 33-5 Eastgate, Beverley (McKenna 1992), were absent at the Magistrates' Courts site. There were traces of teasel fruits, some of which may have been from fullers' teasel (*Dipsacus sativus*), and traces of sheep keds (*Melophagus ovinus*), presumably derived from wool-cleaning, though the teasel fruits might have originated in plants growing as weeds, whilst they and the keds may represent scatter from textile working occurring elsewhere in the town. Work on Anglo-Scandinavian material in York suggests the possibility that dung beetles were attracted to dung deposited during wool-cleaning, perhaps accounting for the rather frequent records of *Aphodius* species (Table 11). At both Coppergate and the Magistrates' Courts site these dung beetles were at least as well represented in floors as in external layers, and at both the numbers of *Aphodius* per subsample for those assemblages containing any *Aphodius* were slightly higher than in assemblages from external deposits. However, it is not impossible that these beetles were attracted to lights, something which appears not to have been considered for archaeological deposits.

Here, as at numerous other post-Conquest sites, grain beetles and the spider beetle *Tipnus unicolor* appear as significant components of the fauna. The former are regarded as indicative of extensive trade in grain and probably the centralisation of storage, and the latter seems likely to be an indicator of long-lived buildings which were rather damp but of at least moderately good quality.

In general, the evidence suggests that floors were kept fairly clean, with rushes used as litter in some cases (rush seeds were frequent, and sometimes abundant in samples from floors, though the species usually present is not usually considered to have been used in this way, given its size). Other materials possibly used in this way are peat and wood chips, both of which were quite well represented in the assemblages (Table 3), though the presence of some burnt peat might equally indicate the use of peat as fuel. Litter on floors certainly provided habitat for the larvae of fleas, both those of humans (*Pulex irritans*) and of dogs (*Ctenocephalides canis*); the latter were present in larger numbers than have been observed in other archaeological deposits and perhaps suggest that dogs were a characteristic aspect of life at the site. The records of human lice (*Pediculus humanus*) suggest at least some of the buildings saw domestic occupation.



In a few cases there was ambiguous evidence that deposits included stable manure. The botanical evidence for this seems, on the face of it, quite strong, with grassland taxa (from hay) and cereal weeds (from straw or feed) usually rather frequent—and the peat and wood chips seem as likely to have been used on stable floors as domestic ones, to judge from the evidence from other sites. However, the insect assemblages lack clear evidence for rich, mature stable manure decomposer communities such as have repeatedly been observed at other sites (Kenward and Hall 1997), although grain pests and weevils which may have been imported in hay were common enough. Such a combination of insect remains (with species representing food present, but foul decomposers rare) would occur where stables were cleaned out sufficiently frequently to prevent the build-up of numbers of decomposers. This might imply a monthly clear-out. The presence of something resembling stable manure is certainly suggested by the results of the species association analysis for the insects (see below).

The records of the clover weevil *Sitona lineatus* have a bearing on this argument. It was recorded from a large number of Period 1 contexts and was occasionally unusually abundant (Table 8). These weevils develop in nodules on the roots of a range of leguminous plants, but the adults spend most of their time above ground. They are regarded as a very typical component of hay in archaeological deposits (Kenward and Hall 1997), and so may have been imported with the cut vegetation indicated by the plant remains. However, the range of other insects likely to have been brought with hay was rather limited: there were few records of abundant *Apion* spp. (a genus including numerous ‘clover weevils’). Newly-emerged specimens of these clover weevils and other plant feeders are regarded as evidence of the presence of cut vegetation, but there were no records for fresh *Sitona* and only one for *Apion* from the present site. This being so, other sources for the *Sitona lineatus* require consideration.

One such source may have been with legumes used for food—either for humans or horses. Other leguminous plants growing on the site (regarded as unlikely), bird droppings or pellets (in which they tend to be common at the present day, but for which there is no evidence from these deposits). Lastly, they could conceivably be grain contaminants, originating on leguminous cereal field weeds, since they are large enough to make their removal from grain by sieving difficult.

Unlike grain weevils and bean weevils, *Sitona* do not live inside seeds and so will not have emerged from stored peas or beans. They do, however, frequently enter houses with peas and beans brought green in the pod or freshly shelled into a container. A test for association (Spearman’s rank correlation) between *Sitona* in samples with more than 49 adult beetles and bugs and records for leguminous plants for samples where 20 or more plant taxa occurred gave no evidence of correlation ( $p = 0.461$ ). This is rather inconclusive since there were very few records of leguminous seeds (legumes are usually poorly represented except where charring has occurred), though legume petals were rather frequently recorded (and were, as at other sites, associated with grassland plants).

Some of the *Sitona* did not appear to have come from stable manure, for they occurred in assemblages lacking decomposers typical of such material. However, these assemblages may represent stable manure which had been removed from the stable and buried before decomposer communities could develop. Those samples from floors in which *Sitona* was most abundant (Contexts 630 and 1820) were notable for the marked abundance of plants representing grassland vegetation or other material which may have served as litter. Species association analysis (see below) showed that *Sitona* occurred especially with some taxa placed in ‘house fauna’, but also likely to occur in stored hay.

The records of grain pests deserve closer examination. Two species were recorded: *Sitophilus granarius* and *Oryzaephilus surinamensis*. The third grain pest which is frequently found in archaeological associations, *Cryptolestes ferrugineus* (Stephens), was conspicuously absent, as was the generally less common *Palorus ratzeburgi* (Wissmann). In most of the assemblages, *S. granarius* was proportionally more abundant than normal in Roman or early post-Conquest associations, which probably indicates well-cleaned grain intended for human consumption, but in one case (well fill Context 2118) *O. surinamensis*

was much the more abundant of the two. This context may have included very spoiled grain, perhaps from horse feed or from spillage on stable floors.

Evidence that the site saw domestic occupation (rather than use for craft, industry, or animal house) is provided by records of human fleas and lice. The former may have bred in buildings of any kind, but lice are more likely to have been shed in a domestic setting. Lice may, however, have been transported in waste from elsewhere.

The range of plant foods from Period 1 deposits was quite broad, with some nuts, fruits and even vegetables represented, but amounts of remains were generally very low (Table 3). With perhaps one or two exceptions it seems unlikely that any of the assemblages represented food waste or human faeces as such, the remains having become dispersed or redeposited from a primary deposit elsewhere or representing waste falling onto floors and becoming trampled into deposits firm enough not to be swept away. Given the nature of the deposits, it is unclear whether plant foods were relatively of low importance or whether their remains were systematically removed from the site for disposal. However, it might be imagined that the large feature containing Contexts 1626, etc., would be an obvious repository for such waste were it being produced in the vicinity. Yet food waste was no more abundant in those fills than elsewhere at the site in deposits with good preservation at this period. Human fleas and lice were common, however, the former being recorded from eight samples, and the latter from eight, both sometimes in large numbers, these clearly indicating a domestic origin, though perhaps in waste water.

The vertebrate remains recorded from the Period 1 deposits could be interpreted as a mixture of refuse, including both butchery and household waste. Although the assemblage was rather small, an examination of the range of skeletal elements represented (Table 18) suggested that primary butchery waste predominated for both cattle and pigs, these being represented mainly by mandibles, isolated teeth, and lower limb elements such as metapodials and phalanges. Caprovid remains showed a slightly different picture, with a greater proportion of meat-bearing than non-meat-bearing elements being recorded. Medium-sized mammal (assumed to be mainly sheep) rib and shaft fragments, recorded in the 'unidentified' fraction, were also particularly numerous, reflecting the presence of a greater proportion of kitchen refuse and table waste.

Kitchen and table refuse is also indicated by the remains of chicken and geese. Carcass preparation of birds would have been minimal, and most skeletal elements would be expected in household rubbish. This was most certainly found to be the case for chicken bones in these deposits. Goose remains recovered from floor deposits in the 'West Range' area were represented mainly by carpometacarpals and phalanges (digits), i.e. wing tips. These are probably waste from preparing the birds for cooking, but could just possibly hint at craft activity associated with the use of feathers, e.g. the construction of arrow flights or the making of quill pens. Examples of similar concentrations of wing elements (but on a far larger scale) have been identified from medieval tenement deposits at Eastgate, Beverley (Scott 1992) and from a post-medieval pitfill from The Shires, Leicester (Gidney 2000). However, numbers of goose fragments from the Magistrates' Court site are rather too meagre to support such an interpretation.

Despite the presence of goose wing bones and other butchery waste, there was no evidence for systematic commercial or large-scale craft activities being undertaken during this period. Evidence from the vertebrate remains at other excavated tenements of a similar period led to the suggestion that the mixture of refuse may represent individual households slaughtering and butchering their own animals (Johnstone *et al.* 1997; Scott 1992). This interpretation is particularly appropriate where the remains of chickens, geese and pigs are prevalent, as these can easily be kept in a small backyard plot. It was also the case that, at certain times of the year, particularly in the higher temperatures of summer, there would be benefits to sharing the carcasses of larger animals between a number of households because of the problems of long-term meat preservation (Landon 1997). The inhabitants of the tenements may, therefore, have acquired whole or half-carcasses of cattle or sheep and undertaken the butchering and jointing themselves. An

amalgam of refuse representing different stages of carcass preparation and consumption would then be expected.

Apart from the fish remains, no great concentrations of vertebrate remains were recovered from Period 1 deposits. Herring vertebrae were numerous, but could, using a strict MNI estimate, represent fewer than 20 individuals. Other fish present included various members of the gadid family: cod, saithe, whiting and haddock. Fish formed an important part of the medieval diet regardless of class or status. Until the 15<sup>th</sup> century, lay and religious people alike were required to consume fish on specific days, including religious festivals, particularly Lent (Hammond 1993). Documentary evidence suggests that a large household might consume between 400 and 1000 herrings a day during Lent (Hammond 1993), begging the question of the size of the fish. Clearly the remains recorded at the present site give no indication of consumption on such a scale, but this is not surprising, partly because the Period 1 tenements were evidently humble dwellings (and may have had few occupants) and partly because most bones would have been digested, decayed, or disposed of away from the site.

Freshwater fish were not present in large numbers in the Period 1 deposits and this may reflect the lowly status of the inhabitants of the tenements. Woolgar (1999) has suggested that the supply and consumption of freshwater fish was controlled by high status individuals and/or religious institutions.

A feature of the floor deposits of Period 1 was the regularly high concentration of well-preserved fish bones. Most of the identified fragments were herring vertebrae, although some head and pectoral girdle elements were identified. This range of elements is likely to represent table refuse as opposed to waste from the preparation of the fish prior to consumption, although a small component of such refuse is obviously also present.

Although the composition of these floor and floor levelling deposits varied, there was a general lack of larger mammal remains, and those fragments that were recovered tended to be less well preserved than the fish. It would appear, then, that these floors were kept fairly clean, and that small fragments were tolerated or lost amongst the rush or other plant 'litter' laid down on the floor. This is very much in accord with other biological evidence. Alternatively, there may have been some type of wooden flooring, fish bones and other small elements of refuse falling between the boards.

At the abbey of Ennemy in Belgium, kitchen floor deposits were found to contain high concentrations of fish remains, many of which were very small. The very sandy nature of the sediment at Ennemy, and the presence of other finds, suggested that this deposit (composed of table refuse) formed beneath a wooden floor (Ervynck and van Neer 1992; 1996). This hypothesis may perhaps be substantiated at the Magistrates' Court site by the scarcity of plant remains from Context 1007, as wooden floor boards may not have necessitated further floor covering and may have been swept clean. The presence of a wooden floor may also account for the good preservation of the fish remains, which may not have survived quite so well had they been subjected to continual trampling. Similar accumulations of fish bones were also identified from deposits at Mount Grace Priory (Irving and Jones 1994) and at the Dominican Priory, Beverley (Gilchrist 1996). In these examples however, the fish remains were recovered from monastic deposits, rather than from those formed during secular occupation. Fish remains were similarly prevalent at Eastgate, Beverley (Scott 1992). By contrast, the extensively sieved deposits of late 12<sup>th</sup> to 14<sup>th</sup> century date from tenements at Kingsgate, Berkhamsted, Hertfordshire did not produce a single fish bone (Johnstone *et al.* 1997), though the site is far from the sea.

### *Period 2: the friary*

Although it was not apparent from the assessment, detailed analysis has made it clear that a very large proportion of the biological remains from deposits dated to Period 2 originated during Period 1, having

been redeposited, particularly during grave digging. Assessment had suggested that the grave fills included plant and insect assemblages of an unusual kind which perhaps indicated the use of cut vegetation, including hay, in burial practices. It appears that the scale of assessment was inadequate, and that a much larger proportion of samples should have been examined, in which case the presence of large numbers of assemblages identical to those from many of the Period 1 samples in deposits formed as a result of high status occupation would have signalled the likelihood of redeposition. There is an important lesson here for future site-based studies.

In the following sample-by-sample account, the presence of redeposited material has not always been signalled. However, those assemblages believed to be genuinely of Period 2 date are flagged. Many of the redeposited groups are plainly very pure and can, with appropriate caution, be regarded as additional evidence concerning Period 1, indicating that deposits in the Nave area, in particular, were in Period 1 broadly very consistent.

## NAVE

**Context 614:** grave fill, coffin dated AD1343-55

*Sample 299/T1* (5 kg): moist, mid-dark grey brown (locally orange-brown), plastic, slightly sandy silty clay. Brick/tile and marine mollusc shell fragments were present.

The moderate-sized to large residue of about 1200 cm<sup>3</sup> was about 40% by volume organic, this fraction consisting of wood and fine organic debris. There appeared to be a mixture of occupation debris, including charcoal, cinders, coal, eggshell and worked pine and oak wood fragments, with some mineralisation of organic material evident. There was a very large assemblage of identifiable plant remains, the 70 taxa recorded making this the second largest group from the site (though admittedly from a large subsample). Most abundant were seeds of *Chenopodium* Section *Pseudoblitum* (scoring 3 on the four-point scale used) but many taxa were present at a score of 2, including cotton-grass (charred sclerenchyma spindles, presumably from burnt peat), fig, wheat/rye 'bran' and *Sphagnum imbricatum* leaves and/or shoots. As elsewhere at this site, the mixture of plants, many of which may well have come from litter of various kinds (cf. Table 6), is highly suggestive of stable manure and in this context it seems most likely that it was material reworked from earlier deposits than material contemporaneous with the digging and filling of the grave.

Although a large assemblage of invertebrates, including abundant beetles, was recorded, it unfortunately appears likely to have been excavated from earlier deposits and to reflect neither conditions at the time the grave was cut, nor materials deliberately placed into it. The assemblage was ecologically rather jumbled, supporting the hypothesis that it had mixed origins.

Of the 42 fragments of bone recovered (weighing 18.8 g), 21 were identifiable. A burnt cattle phalanx, goose coracoid (greylag size) and a mouse femur were identified. Fish included herring, cod, ?plaice and ?lemon sole.

*Sample 300/BS* (11.5 kg): Vertebrate material from this sample was scanned. Preservation was good, colour brown. Angularity was variable (see hand-collected material). Most fragments were <50 mm in greatest dimension. Between 10 and 20% of the fragments were burnt. Fish present included herring, eel, cod, ?whiting, gadid and a pleuronectid. In addition, a vertebra from a member of the family Rajidae was identified; it was most similar to the material of common skate (*Raja batis* Linnaeus) in the reference collection but not quite identical.

*Sample 301/BS* (11 kg): Vertebrate material from this sample was scanned. Preservation was recorded as good, colour as dark brown. Angularity was variable (see hand-collected material). Most fragments were <5 mm in greatest dimension. Less than 10% of the fragments were burnt. Fish taxa present included herring, ?whiting, gadid and pleuronectid. Other taxa included pig and ?goose. The unidentified fraction contained many fish and mammal fragments.

*Sample 302/BS* (10.5 kg): Vertebrate material from this sample was scanned. Preservation was recorded as good, angularity as spiky and colour ranged from brown to dark brown. All fragments fell within the less than 50 mm size category. Less than 10% of the fragments were burnt. Fish taxa included herring, ?whiting and larger gadid. A small mammal (rat-sized) metapodial was also noted.

*Sample 303/BS* (11.5 kg): All 47 of the fragments (weighing 18.5 g) recovered from this sample were identifiable and all were fish remains. Taxa included herring, eel, cod, gadid, ?plaice, ?long rough dab and mackerel.

*Sample 306/BS* (9 kg): Vertebrate material from this sample was scanned. Preservation was recorded as good, angularity as spiky and colour ranged from brown to dark brown. All fragments fell within the <50 mm size category. Taxa included eel, herring, pleuronectid and gadid. One of the large gadid vertebrae had been squashed as if eaten, possibly by a dog rather than human in view of the size of the fragment.

*Sample 307/BS* (8.5 kg): Vertebrate material was scanned and preservation recorded as good, angularity as spiky and colour as dark brown. Most fragments were <50 mm in largest dimension. A few burnt fragments were noted. A cow tooth was identified, together with cod, gadid, herring and pleuronectid remains. A single valve of the freshwater bivalve *Sphaerium ?corneum* was recovered from this sample.

**Hand-collected bone:** Preservation was recorded as variable (fair and good), as were colour (fawn and light brown), and angularity (with spiky, battered and rounded fragments all noted). More than 50% of fragments were between 50 and 200 mm in largest dimension, whilst 10-20% were smaller. Dog gnawing and butchery were noted on up to 10% of the fragments, whilst fresh breakage was slightly more frequently observed.

Twenty fragments were identifiable from the total of 43 fragments (weighing 733 g) recovered. As this context is described as a grave fill, it is hardly surprising that six pieces of human bone were identified, including three metacarpals, and single cranium, rib and scapula fragments. Other taxa identified include cattle, pig, sheep, chicken and goose.

Overall, few mammal fragments were recovered from this context, the assemblages being dominated by fish (herring, in particular). It is unlikely that, with the exception of the human bones, these remains have any connection to the grave *per se*. In all probability this represents material reworked from earlier deposits when the grave was being dug. The presence of numerous fish fragments shows some similarities to Period 1 deposits.

**Context 657:** grave fill

**Hand-collected bone:** Overall preservation was variable, with a mixture of fair and good preservation. Colour was also variable and ranged from fawn to brown. Angularity was very variable with a mixture

of spiky, battered and rounded fragments. Most fragments were between 50 and 200 mm in largest dimension. Dog gnawing and fresh breakage were evident on up to 10% of the fragments, with butchery noted on 10-20%.

A total of 38 fragments (weighing 331 g) was recovered, of which ten were identifiable. Cattle and caprovid remains were most numerous, with a single cat humerus also identified. Domestic fowl was represented by three bones, two of which were juvenile.

**Context 696:** lower fill of coffin

*Sample 281/T1* (5 kg): waterlogged, mid-dark grey, slightly humic, sandy slightly clay silt. The structure may have been destroyed by water in the sample, which also smelt of diesel. Brick/tile fragments were present.

The moderately large residue of about 1000 cm<sup>3</sup> (of which about 700 cm<sup>3</sup> was sand with some brick/tile, cinders, grit, and mortar), gave a washover of woody and herbaceous detritus. As in the other more organic deposits from this site, there was a mixture of plants most of which might have arrived in litter of one sort or another, with probable hay-meadow plants especially well represented (the highest scores for dry and wet 'hay meadow' plants were achieved by this assemblage, cf. Table 6). Fruits of knotgrass (*Polygonum aviculare*), a plant typical of trampled places, were present in large numbers, however, and some other weeds were well represented, so the material was certainly not all stable manure, for example, unless it had lain at the surface for some time and become weed-infested before being incorporated into the archaeological record.

The invertebrate assemblage was substantial, but of mixed character. It appears very likely that it originated in Period 1 deposits re-excavated when the grave was cut. The single mollusc (*Vallonia* sp.) recovered was of no interpretative value.

Seven fragments of bone (weighing 2.7 g) were present, two of which were identified. A single human fragment was recorded, together with a single herring vertebra.

**Context 697:** grave fill

Several 'spot finds' of organic material were recovered from the vicinity of the skeleton in this grave. Only the fragments of box leaves and/or twigs in three of the samples and the remains of hyssop in one are regarded as definitely of Period 2 date.

*Sample 232/SPT* (0.006 kg): The sample was found to contain rather large amounts of amorphous organic matter, one unidentified twig (to 30 x 5 mm) and two lumps of sediment showing signs of some arthropod damage to surfaces and white efflorescence (no doubt a phenomenon occurring during storage). There were traces of seeds of four taxa of no interpretative value. This was perhaps material which had already decayed considerably at the time of burial.

*Sample 233/SPT* (220 g; assessment only): Glossy greenish or yellow leaves were observed on some surfaces of the lump of sediment and on disaggregation many more whole leaves and fragments were recovered, together with fragments of green twig and some other plant macrofossils. The leaves and twigs were undoubtedly box (*Buxus sempervirens*) and the archaeological context suggests a ritual use of the plant within the coffin of the deceased. There were also at least four nutlets and a single calyx of the herb hyssop, *Hyssopus officinalis*, a plant likely to have been used in a burial ritual (see further discussion below). A few insect remains with no clear implications were noted.

*Sample 235/SPT* (0.11 kg): This sample consisted of a small lump of dark grey, slightly stony sandy clay with a few papery box leaves visible (and a trace of twig fragments of this plant emerged on disaggregation); there was also a rounded clast of dark brown, well-humified peaty material to 30 x 10 mm and some 'strawy' and woody detritus including grass/cereal culm and a half-achene of hemp which appeared to have become partly mineralised. The few other identifiable remains offer little useful additional information, though the presence of both daisy (*Bellis perennis*) and purging flax (*Linum catharticum*) is perhaps consistent with the incorporation of material from close-cropped turf. The significance of the box leaves and twigs is discussed further below.

*Sample 238/SPT* (0.074 kg): This sample comprised rather dry, granular, grey-brown (oxidising orange-brown) silty clay to clay silt with white superficial mould (probably forming during storage). There may have been a slight humic content. Box leaves were again present (scoring 2 on a four-point scale), with traces of box twig fragments and seeds of several plants likely to have been growing as weeds.

*Sample 250/T* (0.017 kg): This small sample of rather desiccated grey-brown (locally oxidizing orange) silt yielded only a single *Chenopodium* Section *Pseudoblitum* seed and traces of beetles and fly puparia, together with traces of concretion to 25 mm.

*Sample 251/SPT* (0.205 kg): This was a grey-brown, slightly clay silt with lumps of mid to dark brown slightly felted peat to 60 mm which required soaking in sodium pyrophosphate to assist in disaggregation. The organic fraction consisted of compressed 'strawy' detritus with various plant remains suggestive of the presence of grassland either as hay or turf (in either case the material might well have arrived via herbivore dung). Notable were the moderate numbers of all the following: mouse-ear chickweed (*Cerastium*), heath grass, mud rush, purging flax, self-heal and yellow-rattle, most if not all of which might be eaten by animals grazing on the upper parts of a salt-marsh or on alluvial meadows.

**Context 799:** last occupational use of tenements, floor levelling

**Hand-collected bone:** Preservation was variable with fragments in both 'good' and 'fair' condition. Angularity was also variable, although most fragments were described as spiky. Colour ranged from fawn (almost beige) to dark brown. Nearly all the fragments were between 50 and 200 mm. Less than 10% of the fragments displayed dog gnawing, fresh breakage and evidence of butchery.

Forty bone fragments (weighing 573 g) were recovered from this context. Of these, 17 were identifiable and were mostly domesticates: cattle, caprovid, pig and fowl. A single cat femur and cod were also recovered. In addition, two human bone fragments were present, a tarsal and a radius. The human bone again suggests some degree of later intrusion into this deposit.

**Context 805:** organic patch from right ribcage of skeleton

*Sample 270/SPT* (0.965 kg): This sample came from the rib-cage of the skeleton and consisted of about 1200 cm<sup>3</sup> of rather dry, crumbly, mid-dark greyish-brown granular, perhaps largely concreted, material, the concretion perhaps partly forming in the period since sampling. It was left to soak with in a sodium pyrophosphate solution to assist disaggregation. On washing, it was found to produce a very large residue (only a little silt being lost on sieving), primarily composed of granular amorphous calcareous concreted material and some (?human) bone apparently sometimes fused with the calcareous concretion. The

calcareous material had a more or less beaded appearance with some areas in the form of thin, somewhat undulating sheets. The small washover of a few cm<sup>3</sup> comprised a little charcoal and a trace of elder seeds.

**Hand-collected bone:** A total of 51 fragments (weighing 23.9 g) were recovered all of which were very small, poorly preserved fragments of human bone.

**Context 815:** coffin fill adjacent to right leg

*Sample 262/T1* (1.4 kg): moist, mid-dark grey, crumbly (working slightly plastic), strongly layered internally, very sandy clay silt with coarse herbaceous detritus. Flecks of brick/tile were also present.

This sample of sediment from the vicinity of a skeleton produced a moderate- to large-sized residue of about 250 cm<sup>3</sup> of which about one-fifth formed a washover of herbaceous detritus, with nutshell and peat, and several plants consistent with the presence of litter of various kinds, all of the organic component perhaps deriving from reworked stable manure. The mineral component included much sand with some brick/tile.

A small group of insect remains, and a few other invertebrates, had no characteristics likely to be peculiar to a grave cut, and seems likely to be derived from earlier deposits.

**Context 864:** grave fill, coffin dated AD 1347

*Sample 289/T1* (3.4 kg): waterlogged, dark grey-brown, soft (working slightly plastic and somewhat sticky), slightly sandy silt. Very small (2-6 mm) stones were common and small (6-20 mm) stones and brick/tile flecks were present. Marine molluscs were also present. Modern contamination consisted of moss and algae.

The large residue of about 1000 cm<sup>3</sup> was about 75% by volume organic, the remainder being sand and grit with occupation debris including marine shell, fish and mammal bone (some of it burnt), and leather (including a fragment which may have come from the sole of a shoe or boot). The organic fraction included much fine material as well as wood fragments (to 40 mm, some of them perhaps worked) and it was evidently very heterogeneous since there were many taxa, none of which were present in more than very small amounts (with 60 taxa this was one of the larger assemblages from the site).

Particularly noticeable was the large component of cornfield taxa, perhaps largely representing straw, as there were traces of waterlogged rachis fragments and other cereal chaff, as well as a variety of corn field weeds present as seeds, especially corncockle, wild radish and shepherd's needle (*Scandix pecten-veneris*). Indeed, this assemblage gave the highest score for the AIV for the 'cornfield' group 'SECA' for the samples from this site as a whole. The component of food remains was much as for other deposits with good organic preservation from both Periods 1 and 2: hazelnut, fig, walnut and linseed. Reworked stable manure with some domestic refuse seems a very likely source for most of these remains.

The invertebrate assemblage, too, had characteristics suggesting that it represented a deposit including stable manure or similar organic waste, dumped into a place where it was liable to inundation by saline water, and was doubtless reworked from layers formed during Period 1.

A total of 27 fragments of bone (weighing 32.2 g) were recovered from this sample, of which eight were identifiable. Taxa included cattle, cat, cod, herring and ?plaice.



**Context 873:** fill of coffin of skeleton **873** (grave fill **872**) ('matted straw from between left leg & coffin side')

*Sample 310/T1* (2 kg) and *Sample 310/T2* (5 kg): just moist, patchily dark grey to black with yellow flecks, soft (?ashy) to plastic, slightly sandy silty clay. Marine mollusc shell was present. Plant remains were recorded from the /T2 subsample and insects from the /T1.

Of the moderately large residue of 900 cm<sup>3</sup> (from the /T2 subsample), about 400 cm<sup>3</sup> was mineral material (mainly sand, brick/tile, chalk, cinders, and grit), the rest wood fragments to 60 mm (including chips to 10 mm), peat (both charred and uncharred, to 10 mm) and herbaceous detritus. Once again a mixture of plants probably representing a variety of kinds of litter was present, with peatland taxa rather prominent (cotton-grass, *Sphagnum imbricatum*, and ?heather were all recorded). Amongst this material there were several well preserved half-achenes of hemp and other 'useful' plants included hazelnut, walnut, fig and oats (*Avena*, in the form of 'bran' fragments).

The invertebrate assemblage (from the /T1 subsample) was fairly substantial, but had no characteristics marking it out as related to the burial, and again appeared almost certainly to have been redeposited from material of Period 1 date.

*Sample 314/SPT* (assessment only): About 50% by volume of this small (190 g) sample consisted of short lengths (to about 10 mm) of plant detritus, probably grass or cereal straw. There was some chaff, including a wheat rachis fragment and a small range of other plant macrofossils, amongst them leaves of *Sphagnum imbricatum*.

*Sample 316/SPT* (0.322 kg): This spot sample was grey-brown silt and grey clay with lumps of compressed plant detritus which again gave an impression of mixed materials originating as litter, especially the abundant uncharred grass caryopses (probably from hay) and moderate numbers of uncharred cereal rachis fragments (probably from straw).

*Sample 317/T1* (5 kg): moist, mid to dark grey-brown, soft (working plastic, locally crumbly), slightly sandy clay silt. Brick/tile fragments were present. Evidence of modern contamination (moss and algae) was also present.

The large residue of about 1100 cm<sup>3</sup> was a little over half organic material by volume, the bulk being herbaceous detritus and waterlogged cereal rachis fragments, probably mostly wheat and presumably from straw, with some peat (to 35 mm) and plant fibres. The last were probably from cotton-grass stems or leaves, since this plant was represented by charred and uncharred sclerenchyma spindles and uncharred rhizome/stem fragments. There may also have been stem material of plants such as hemp or flax, both of which were recorded as seeds and, in the case of flax, also as capsule fragments, though all were present in very low concentrations. Overall, plants likely to have arrived in litter of various kinds were very well represented in this assemblage—it had the fourth highest tally of such plants in the Magistrates' Courts samples (Table 6), with strong components of taxa likely to have come from hay or grazing land plants or turves (e.g. in herbivore dung or gut contents). Foodplants, on the other hand, were limited to hazel nut, fig, linseed, bread/club wheat and wheat/rye 'bran'; perhaps the most likely source of all these remains is in stable manure, here reworked from Period 1 into the grave fill.

Invertebrate remains were again abundant, the group ecologically being of some interest, but with no characteristic special to a grave. The likelihood is that the fauna was redeposited from Period 1.

Samples from 873 showed a good degree of similarity in their content of plant remains: 19 of the total of 79 plant taxa recorded from any one of the three subsamples were common to all, and 18 more were present in two.

The two bone fragments from this context were both herring vertebrae.

**Context 877:** grave fill (coffin dated AD 1347)

**Hand-collected bone:** Preservation of material from this context was recorded as good and angularity as spiky. Colour was variable but most fragments were yellowish-brown and had a 'greasy' appearance. In spite of the varied colour, the material from this context presented a very uniform appearance. Over half the fragments were between 50 and 200 mm whilst 10-20% were smaller. Burning and fresh breakage both affected up to 10% of the fragments, whilst butchery was evident on 10-20%.

Six of the 15 fragments recovered (weighing 190 g) were identifiable. Single human and pig bone fragments were the only identified mammals. Cod, ling and gadid fragments were identified, all from large individuals. The cod elements were from individuals around 110 cm in length and the ling from one about 150 cm in length.

**Context 1357** (burial and associated deposits)

*Sample 504/SPT* (0.29 kg): This small sample consisted of jumbled dark brown compressed organic detritus and dark grey-brown sandy silt matrix with clasts of greasy light grey clay silt. The largest clast of organic material was in a flattened oval fragment about 100 x 50 x 20 mm.

On disaggregation the organic material was found to consist largely of herbaceous detritus (including 'straw' and tree leaf fragments) and a few small woody twigs and ?dicotyledonous stem fragments. Probably this material was largely hay or perhaps grazing land material from herbivore dung or gut contents to judge from the fruits and seeds recorded, which were mainly from rather short-growing grassland plants. The assemblage is perhaps not really large enough for a confident interpretation to be made, though it is similar to many of these organic accumulations associated with the burials in the church.

**Context 1368:** coffin fill ('fibrous plant material from above right side rib-cage')

*Sample 505/SPT* (assessment only): The very small sample of approximately 25 g contained a pad of compressed plant detritus in a matrix of silt and clay. This pad was up to about 40 mm across and 5-10 mm thick and appeared to consist almost exclusively of *Sphagnum* sp. moss stems and leaves, perhaps fresh or dried plant material when deposited rather than originating in peat. This being so, it may represent material deliberately buried with the corpse rather than being redeposited.

**Context 1013:** grave fill

**Hand-collected bone:** Overall preservation of the fragments was good and the colour dark brown. Angularity was recorded as spiky and battered. Over half the fragments fell into the 50-200 mm size category with a few smaller pieces. Burning, dog gnawing and fresh breakage were noted on up to 10% of the material, whilst butchery was evident on 10-20%.

A total of 63 fragments (weighing 484 g) came from this context. Of these, 15 were identifiable, including two human bone fragments: a carpal and pedal terminal phalanx. Other mammals included cattle, caprovid

and pig. Two chicken bones were recovered together with two goose fragments (both greylag size). Two cod vertebrae were also identified, one from a very large individual (approximately 150 cm).

#### **Context 1015:** fill of coffin 1014

*Sample 412/T1* (4 kg): just moist, mid grey to brown (locally oxidising orange), crumbly to slightly brittle (working plastic), slightly clay silt. Large (>60 mm) stones were present, together with some charcoal. The presence of modern moss indicated some contamination.

This large sample produced only a small residue of about 400 cm<sup>3</sup>, of which about 40% by volume formed a washover of very decayed wood fragments (to 35 mm) and other organic debris, including burnt peat (to 20 mm) and unburnt peat (to 15 mm). The heavy fraction was mostly brick/tile, cinders and sand. Many of the plant taxa recorded might have arrived with litter of some kind though the overall content of such plants was about average for these samples.

Again most of the invertebrate fauna showed no special association with the burial or any material deliberately placed with it. Redeposition from layers of Period 1 date must be assumed. Two *Rhizophagus parallelcollis*, a species well known to be attracted to buried corpses but common in archaeological deposits, seem likely to be post-depositional invaders.

Only five fragments of bone (weighing 0.2 g) were recovered from this sample, all of which were unidentifiable fish fragments.

*Sample 419/T1* (3 kg): moist, light to mid grey to brown (locally oxidising orange-brown), soft to plastic, clay silt. Small (2-20 mm) and medium-sized (20-60 mm) stones were present, together with traces of wood. Moss growth on the sample was noted.

The moderate-sized residue of about 500 cm<sup>3</sup> was about half by volume less dense material (though the washover included quite a lot of cinder and charcoal, so the waterlogged organic fraction was rather less than this). The wood fragments (which were up to 20 mm) in this latter component were very decayed; there was also some peat, burnt and unburnt. The seeds in this subsample were somewhat sparse and rather poorly preserved, though those of fig (which are extremely resistant to decay) were, predictably, in good condition. Overall, the assemblage was much like that from 412/T1.

Again most of the insect fauna can be attributed to Period 1, through redeposition, but 21 *Coprophilus striatulus*, 11 *Rhizophagus parallelcollis* and seven *Trechus micros* were undoubtedly attracted to the buried corpse. This group of insects is of special note as perhaps the first occurrence of an assemblage of 'corpse beetles' in an archaeological inhumation deposit other than in a sealed coffin.

*Sample 414/SPT* ('wood fragments from above left hand [of skeleton]'): These were fragments of pine (*Pinus*), the largest 130 x 60 x 25mm.

#### **Context 1204:** grave fill

**Hand-collected bone:** Overall preservation was variable although mostly 'good'. Angularity was also variable, with spiky, battered and a few rounded fragments present. Colour ranged from fawn to dark brown although most bones were brown. More than 50% of the fragments were between 50 and 200 mm

in largest dimension. Less than 10% of the fragments were affected by dog gnawing, fresh breakage and burning. Evidence of butchery was noted on 10-20% of the material.

Sixty fragments (weighing 754 g) were recovered from this context, of which 12 were identifiable. Cattle and caprovid were the only mammals present. Birds present included single juvenile ?chicken bone and two goose carpometacarpi (both greylag size). The single fish vertebra was broken and so could not be identified further than to a member of the gadid family. The unidentified fraction contained a few more bird and fish fragments amongst the mammals. It also contained three small human bone fragments.

**Context 1311:** make-up layer

**Hand-collected bone:** Overall preservation was recorded as variable, with fragments showing both fair and good preservation. Colour was described as fawn. Angularity was variable, with mostly spiky, but a few rounded, fragments present. Most of the fragments fell within the 50-200 mm category, although 10-20% were smaller. Dog gnawing, burning and butchery were present on up to 10% of the fragments, whilst fresh breakage was more frequent, affecting up to 20% of the assemblage.

A total of 23 fragments (weighing 274 g) was recorded, of which five were identifiable. All identifiable fragments were from the major domesticates: cattle, caprovid and pig. The unidentified fraction consisted chiefly of large mammal bone fragments.

**Context 1368:** grave fill, coffin dated winter AD 1347/8

*Sample 506/T1* (2.2 kg): moist, light grey-brown with 1 mm-scale orange mottles and streaks, plastic, silty clay. Small (6-20 mm) and medium-sized (20-60 mm) stones and cinders were present.

There was a moderate-sized to large residue of about 550 cm<sup>3</sup> of which about 400 cm<sup>3</sup> consisted of brick/tile, sand, and gravel; the washover included quite a lot of cinders (though some may have been burnt peat), with uncharred peat and wood fragments (including chips of oak and perhaps also softwood). Again there was a modest-sized assemblage of identifiable remains of which a large proportion seem likely to have originated in litter, not least the peat, perhaps via redeposited stable manure. There were traces of food plants—walnut and fig—with several flavourings—celery seed, parsley and coriander (the only record for this last taxon for this group of samples). It seems unlikely that these food remains originated in the corpse within this grave; the foodplant taxa, with the exception of coriander, were recorded from many Period 1 deposits with a high content of litter taxa. There were also traces of teasel fruits which might have come from fullers' teasel used in textile working.

Invertebrate remains were moderately abundant. However, they mostly appear likely to have been redeposited. The exception, as for Sample 419 from Context 1015, was a group of species likely to have invaded a buried corpse: six *Coprophilus striatulus*, two *Trechus micros*, and two *Rhizophagus parallellocollis*. Unfortunately the seven human fleas may be reworked (they were common at the site), rather than reflecting infestation of the person buried.

**Context 1425:** series of N-S aligned timbers forming pathway, sealed by Context t 1427

**Hand-collected bone:** Preservation was described as good to excellent. Colour ranged from ginger to dark brown although most fragments were recorded as brown. Angularity was noted as spiky. Almost all the fragments were between 50 and 200 mm in greatest dimension. Dog gnawing and fresh breakage were evident on less than 10% of the assemblage, whilst 10-20% of the fragments were affected by butchery.

A total of 23 fragments (weighing 1017 g) was recovered, of which 11 were identifiable. Mammals present included cattle, caprovid and horse. A single ling vertebra was also recovered, from an individual around 1.5 m in length, a sizable fish

**Context 1589:** dump

**Hand-collected bone:** Preservation was variable: most fragments were described as 'fair' and a few as 'good'. Colour ranged from fawn to brown. Angularity was also variable, with both spiky and battered fragments present. Almost all the fragments fell within the 50-200 mm size category; <10% of them were affected by dog gnawing, whilst up to 20% showed evidence of butchery and fresh breakage.

Of the total of sixteen fragments (weighing 615 g) recovered, eight were identifiable. Only the major domesticates were represented: cattle (4 fragments), caprovid (3) and pig (1).

**Context 1682:** grave fill, coffin dated AD 1339-1345

**Hand-collected bone:** Overall preservation was recorded as 'good', and colour as brown. Angularity was noted as variable, with a mixture of spiky, battered and rounded fragments. Between 10 and 20% of the fragments were less than 50 mm in largest dimension, the rest being up to 200 mm. Dog gnawing, burning and fresh breakage was evident on up to 10% of the fragments. Butchery was noted on 10-20% of the assemblage.

Of the 104 fragments (weighing 1624 g) recovered, only 19 were identifiable. Cattle (6 fragments), pig (4) and sheep (3) were all present. Four chicken and a single goose (greylag size) bone were also recovered. In addition two cod bones were identified, one from an individual between 0.6 and 1 m, the other from a somewhat larger animal.

**Context 1771:** organic fill of cut 1757

*Sample 572/BS* (6.5 kg): Material from this sample was scanned. Overall preservation was variable, with both good and fair fragments recorded. Colour was described as brown. Angularity was also variable, fragments being noted as spiky or battered. Almost all the fragments were <50 mm in greatest dimension. Fish present included herring and eel. The unidentified fraction contained the remains of mammals.

*Sample 573/BS* (7 kg): Vertebrate material from this sample was scanned. Preservation and fragmentation were similar to Sample 572. Identified taxa included herring and pleuronectid. The unidentified fraction consisted chiefly of medium-sized mammal fragments.

*Sample 574/BS* (5.5 kg): A total of 48 bone fragments (weighing 2.2 g) was recovered from this sample, of which 14 were identifiable. Fish remains included herring and ?dover sole. Four juvenile cat bones were present. A bird radius and ulna were identified as a species of wader, of a similar size to lapwing (*Vanellus vanellus* Linnaeus) in the EAU reference collection. The unidentified fraction contained mostly fish bones.

**Context 2030:** burial, dated winter AD 1346-7

*Sample 630/T1* (5 kg): moist, light to mid grey (locally brownish), plastic, slightly sandy silty clay. Stone (20-60 mm) and brick/tile fragments were present. Modern contamination by both moss and algae was noted.

The moderate-sized residue of about 700 cm<sup>3</sup> was largely composed of brick/tile, mortar and sand, and there was a washover of only perhaps 15-20% by volume of woody and herbaceous detritus. There were rather few seeds, preservation being variable. Like so many other deposits at this site, there was evidence for peat and probably also other kinds of litter, but the list of plants is probably too small to be of much interpretative significance.

While much of the fauna was undoubtedly reworked from Period 1 deposits, this assemblage included 57 *Trechus micros*, 24 *Coprophilus striatulus* (at Ranks 1 and 2), and a single *Rhizophagus* sp. (probably non-diagnostic remains of *R. parallelocollis*), all certainly part of a thriving invertebrate population in the buried corpse.

**Context 2038:** burial, dated winter AD 1345/6

**Hand-collected bone:** Only eight fragments (weighing 111 g) were recovered from this context, of which four were identifiable. For the mammals a single cow mandible was recorded. For the birds three goose bones were recovered, all of which were of a similar size to greylag specimens in the EAU collection. Preservation was described as good, colour as dark brown and angularity as spiky.

CHOIR

**Context 501:** floor

**Hand-collected bone:** Preservation was described as fair and the fragments were fawn in colour. Angularity was variable, with both spiky and battered fragments present. More than 50% of fragments were between 50 and 200 mm in largest dimension. Between 10 and 20% of fragments were affected by butchery and fresh breakage.

Fifty-six fragments (weighing 612 g) were recovered from this context, of which only 11 were identifiable to species or species group. Cattle, caprovid, pig and cat fragments were present. A cattle first phalanx showed evidence of rodent gnawing. Two chicken bones were present together with three goose bones. One of the goose bones was of similar size to greylag specimens in the EAU reference collection, one was slightly larger (possibly domestic), and the third bone was much smaller, being of similar size to barnacle geese in the EAU collection.

**Context 509:** dump

**Hand-collected bone:** Preservation was recorded as fair, colour as fawn and angularity as spiky. More than half of the fragments were less than 50 mm in largest dimension, but this reflects the presence of a number of small bones rather than a high degree of fragmentation. Butchery and fresh breakage were noted on less than 10% of fragments.

A total of 31 fragments (weighing 55 g) was recovered from this context, of which 11 were identifiable. These included single sheep and gadid fragments together with eight (?black) rat bones, possibly from the same individual. The unidentified fraction consisted chiefly of medium-sized mammal bone fragments.

**Context 1109:** demolition deposit ?choir stall

**Hand-collected bone:** Overall preservation was variable, recorded as good to fair. Colour was described as fawn, with some bones (mostly bird and fish) showing green copper alloy staining. Angularity was noted as battered. Most fragments were between 50 and 200 mm in largest dimension. Evidence of dog gnawing and butchery was noted on up to 10% of the fragments, with 10-20% affected by fresh breakage.

In total, 146 fragments (weighing 754 g) were recovered, of which 29 were identifiable. Caprovid fragments were most numerous, amounting to 14 fragments and including five identified as sheep. Many of the caprovid fragments were subadult. Pig was represented by three teeth, including a deciduous premolar. Additionally, a single rat mandible was recovered, the morphology of which seemed closer to brown rat (*Rattus norvegicus* Berkenhout) than the black rat (*R. rattus*). If this is the case it is an early example of the species in this country but of course it may have entered at a later period by burrowing. Fish were represented by two medium-sized cod vertebrae and a gadid articular. Birds were represented by goose (two first digits) and chicken (six bones including a spurred tarsometatarsus) and 19 fragments in the unidentified section. The unidentified fraction also contained a single human shaft fragment.

**Context 1868:** grave fill

**Hand-collected bone:** Only six fragments (weighing 17 g) were recovered, of which two were identifiable. A goose carpometacarpus was identified which was of a similar size to greylag specimens in the EAU reference collection. The other bone was identified as an ulna from a member of the Laridae (gull) family, and was similar in size to the lesser black-backed gull (*Larus fuscus* Linnaeus) in the EAU collection. Specific identification could not be achieved because of the very similar morphology and size overlap of members of this family. Preservation of the assemblage was variable.

NORTH CHAPEL

**Context 1266:** grave fill dated 1400s onwards

**Hand-collected bone:** Overall preservation was described as good, colour as fawn, and angularity as spiky. Between 10 and 20% of the fragments were less than 50 mm in largest dimension, while the rest were up to 200 mm. Evidence of butchery, fresh breakage and dog gnawing were all noted, but on up to 10% of the assemblage in each case.

Of the 61 fragments (weighing 410 g) recovered, 12 were identifiable. Three human rib fragments were identified, whilst domestic mammals were represented by pig, caprovid and dog. Birds included domestic chicken and a member of the family Laridae. The larid ulna was of similar size to herring gull but the fragment was too small for certain identification.

**Context 1358:** make-up layer underlying 19th C cellar

**Hand-collected bone:** Only seven fragments (weighing 150 g) were recovered from this context, of which five were identifiable. Single fragments of cattle and caprovid were present, together with two dog bones

(both from a medium-sized individual). In addition, there was a single fallow deer tibia. Overall preservation was good, colour ranged from fawn to dark brown, and angularity was recorded as spiky.

**Context 1372:** ?turf line; ?make-up/raising of ground levels

**Hand-collected bone:** Only seven fragments (weighing 44 g) were recovered, of which four were identifiable: a single human metatarsal shaft, a caprovid pelvis, and two dog scapulae. Preservation was recorded as reasonable, colour as fawn, and angularity as spiky.

**Context 1415:** make-up layer

Preservation of the vertebrate remains from this deposit was 'fair', although some fragments were rather battered in appearance. Colour was recorded as 'variable'.

Of the 48 fragments (weighing 1032 g) recovered, only 16 were identifiable. A single human rib fragment was noted. Cattle bones were most numerous, and pig and caprovid present. A single dog bone was recovered, together with a humerus that was identified as canid of similar size to fox.

**Context 1429:** grave fill, dated c. AD 1340-50

**Hand-collected bone:** Only eight fragments (weighing 127 g) were recovered from this context, of which two were cattle bones, one a goose bone, and the rest in the unidentified fraction. The goose coracoid was of a similar size to the smaller greylag specimens in the EAU collection. Overall preservation was variable.

**Context 1435:** levelling layer (=1452)

*Sample 702/T1* (3 kg): moist, mid brown to dark grey-brown, brittle to crumbly (working plastic), ?slightly humic, clay silt. Very small (2-6 mm) and small (6-20 mm) stones were present together with brick/tile, wood and marine molluscs.

The moderate-sized residue of about 400 cm<sup>3</sup> comprised about 150 cm<sup>3</sup> of organic material (very decayed wood and coarse and fine detritus including peat). Seeds and fruits were rather frequent and moderately well preserved. They were also diverse—including a variety of waste ground and cornfield weeds, foodplants and taxa from grassland, wetland and peatland habitats. Most abundant were achenes of celery-leaved crowfoot, *Ranunculus sceleratus*, one of rather few records of this plant of muddy pond edges and ditches from this site (the others were all for trace amounts). There were moderate numbers of seeds or other remains of several other plants, including leaves of *Sphagnum imbricatum* and seeds of *Juncus* cf. *gerardi*. The foodplants included fig, hazelnut and walnut. Stable manure seems very likely to be the source of much of this organic material, with imported waterside mud or water perhaps introducing the crowfoot achenes (as well as the aquatic invertebrates mentioned below).

Although invertebrate remains were rather abundant, including 100 adult individuals of 66 beetle and bug taxa and numerous beetle larvae, this assemblage appeared ecologically mixed, including water beetles (and abundant water flea resting eggs), what may have been colonists of some material like stable manure, traces of house fauna, and species which may have colonised mud and bare ground. It seems entirely possible that this is redeposited sediment of an earlier date, and more detailed interpretation cannot be justified.



*Sample 516/BS* (7 kg): Vertebrate material recovered from this sample was scanned. Preservation was recorded as fair and colour as brown. Angularity was described as variable, both spiky and battered fragments being present. All the fragments fell into the less than 50 mm size category, together with a few herring vertebrae. The unidentified fraction consisted chiefly of mammal bone fragments with a few fish remains and a single small mammal vertebra. A crab claw fragment was also recorded amongst the vertebrate material.

*Sample 517/BS* (8 kg): A total of 84 fragments (weighing 8.5 g) was recovered from this sample, of which only nine were identifiable. Seven herring fragments were identified, together with single gadid and ?plaice bones. The gadid articular was heavily chopped.

Remains of three individuals of a *Hydrobia* sp. snail (possibly *H. ventrosa*, a species favouring brackish lagoons not directly connected to the sea) were recovered from the two BS samples from Context 1435.

**Context 1452:** levelling layer (=1435)

**Hand-collected bone:** Overall preservation was good, colour was recorded as dark brown, and angularity as spiky. Most of the fragments were between 50 and 200 mm in largest dimension. Evidence of dog gnawing was present on up to 10% and butchery on 10-20% of the fragments.

Eleven fragments (weighing 345 g) were recovered, of which three were identifiable. These were two cattle and a single cat bone.

**Context 1456:** fill of post-hole; original packing around timber

*Sample 519/T1* (5 kg): moist, mid grey-brown to mid-dark grey brown, soft (working plastic), clay silt (locally more clayey). Small (6-20 mm) stones, burnt coal, charcoal and oyster shell were present.

There was a moderate-sized residue of about 800 cm<sup>3</sup> of which about 300 cm<sup>3</sup> consisted of very decayed organic material, including wood (amongst which there may also have been some very decayed chips) and peat. The remainder was mostly concreted silt sediment and sand. The modest range of plant taxa present might well have originated in stable manure; they were a subset of the assemblages seen in many of the more organic sediments from this site. Given the context type, it might be expected that this was, in any case, a reworked deposit.

The invertebrate assemblage had characteristics in common with that from Context 1435, including the abundant *Daphnia*, and more detailed interpretation would be unjustified, for the reason argued in that case. The single *Theodoxus fluviatilis* shell recovered from the sample again indicates incorporation of aquatic material into this deposit—in this case, perhaps by flooding from the river or via water or sediment brought deliberately to the site. Such a mechanism would also explain the nature of the plant assemblage and the standing water (perhaps only temporary) indicated by the presence of *Daphnia*.

**Context 2364:** fill of drain **2027**

*Sample 700/T1* (2.5 kg): just moist, light yellow-brown, crumbly, silty clay with abundant low grade mortar. Very small (2-6 mm) and small (6-20 mm) stones were common, whilst brick/tile and charcoal were present.

This subsample gave an extremely large residue of about 1300 cm<sup>3</sup> of brick/tile (to 80 mm) and mortar (to 30 mm) with sand and traces of charcoal, fish bone and gravel but no identifiable plant remains.

There were only traces of invertebrate remains other than many earthworm egg capsules.

## CLOISTER

**Context 794:** fill of cut in Room 1, Building 2

*Samples 243/BS (10 kg) and 244/BS (11 kg):* Large assemblages of mostly highly fragmented molluscs were recovered from these samples. They comprised an extremely diverse suite of remains including fresh and brackish water taxa, taxa indicative of waterside vegetation, land snails indicative of both damp and relatively dry areas, and a small amount of marine shell (cockle, *Cerastoderma edule*). It seems highly unlikely that assemblages of such mixed character could have formed naturally, especially not in a cut feature within a building, so this was presumably material imported as fill, unless redeposited from unexamined deposits beneath.

**Context 1210:** make-up layer

**Hand-collected bone:** Only seven fragments (weighing 191 g) were recorded from this context, including two cattle and two caprovid bones.

**Context 1232:** levelling dump

**Hand-collected bone:** Preservation was recorded as fair to good, although quite homogeneous in overall appearance. Colour ranged from beige to brown, with most fragments described as fawn. Angularity was variable, most edges being battered, whilst a few were noted as spiky or rounded. Almost all the fragments were between 50 and 200 mm in greatest dimension. Less than 10% of the bones were affected by dog gnawing, whilst butchery and fresh breakage was evident on 10-20% of the fragments.

A total of 67 bone fragments (weighing 1330 g) was recovered from this context, of which 17 were identifiable to species or species group. Three human bone fragments—two femoral and one fibular shaft—were recovered. Cattle and caprovid bones were the most numerous. Other mammalian taxa present included cat (an ulna) and roe deer (a tibia). Birds were represented by chicken and goose. One of the goose metacarpals was of similar size to greylag specimens in the EAU reference collection, the other, although morphologically closest to the various species of grey geese, was smaller, about the same size as the pink-footed goose (*Anser brachyrhynchus* Baillon) material in the EAU collection.

**Context 1257:** grave fill dated c. AD 1340-50

**Hand-collected bone:** Preservation was recorded as variable, with a mixture of good and fair specimens. Colour ranged from fawn to dark brown although most fragments were noted as brown. Angularity was also recorded as variable, but it was less so than the other two parameters, most fragments having spiky edges. Nearly all the fragments were between 50 and 200 mm in greatest dimension. Dog gnawing, butchery and fresh breakage were noted on up to 10% of the bones.

Of the 34 fragments (weighing 314 g) recovered, seven were identifiable. Caprovid remains were most numerous (four fragments), with single cattle, pig and chicken bones also present.

**Context 1356:** make-up layer

**Hand-collected bone:** Preservation of the bone from this context was quite variable, with fragments described as 'fair' and 'good'. A few fragments appeared to be battered, but all were brown.

Of the 41 fragments (weighing 742 g) recovered from this context, 14 were identifiable. Cattle, caprovid and pig were all present. Other mammals included cat and hare (*Lepus* sp.). Birds were represented by a single goose carpometacarpus, which was of similar size to a small greylag.

**Context 1458:** make-up layer

**Hand-collected bone:** Preservation was variable, with fragments recorded as fair and good. Angularity was described as mostly battered with some slightly battered fragments also present. Colour was mostly brown with ginger tinges, although the cat bone present was beige. All the fragments fell within the 50-200 mm size category. Evidence of dog gnawing, butchery and fresh breakage was noted on less than 10% of the assemblage.

Sixteen fragments (weighing 462 g) were recovered, of which nine were identifiable. Cattle, pig and caprovid bones were present, together with a single cat ulna which may have been intrusive as its preservation was much better than for the rest of the assemblage. Three chicken bones were also present.

**Context 1465:** grave fill dated *c.* AD 1340-50

**Hand-collected bone:** Overall preservation was described as mostly good, colour was a mixture of fawn and brown. Angularity was variable: a few spiky fragments were recorded but most were battered or rounded. Most of the fragments were between 50 and 200 mm in greatest dimension, only a few smaller bones being recorded. Less than 10% of the fragments showed dog gnawing, butchery and fresh breakage.

A total of 36 fragments (weighing 255 g) was recovered, of which thirteen were identifiable. Two human rib fragments were identified. The other mammals present included caprovid, cattle and pig. Birds were represented by two goose bones, both of which were of similar size to greylag specimens in the EAU reference collection. Fish included cod, herring, and an unidentified member of the gadid family. The unidentified fraction contained further bird and fish bones as well as some mammalian fragments.

**Context 1591:** layer associated with hearth **1619** and with layer **1684**; cut by later graves and badly disturbed

*Sample 539/BS* (10.5 kg): Vertebrate material from this sample was scanned. Preservation was described as fair and colour as brown. Angularity was variable, both spiky and battered fragments being present. Almost all the fragments were <50 mm in largest dimension. The remains included cod, gadid, pleuronectid and herring. The unidentified fraction consisted chiefly of fish remains with a few bird and mammal bones.

*Sample 540/BS* (10.5 kg): Vertebrate material from this sample was scanned. Overall preservation was described as fair to good. Colour was recorded as brown with ginger tinges. Angularity and fragmentation were similar to those recorded for material from Sample 539. Goose and chicken bones were recorded and there were a few other unidentified bird fragments. Three pig bones were the only identifiable mammal

remains. Fish included eel, gadid and herring. Most of the herring bones were vertebrae, although other elements were present, and totalled several hundred fragments.

*Sample 541/BS* (11 kg): Vertebrate material from this sample was scanned. Preservation and fragmentation were similar to those for Sample 539. Whilst a few unidentified mammal and bird fragments were present, fish remains were predominant, including eel, pleuronectid, gadid, ?whiting, cod, ?cyprinid and herring, the last of these accounting for most of the identifiable remains.

*Sample 542/BS* (10.5 kg): Vertebrate material from this sample was scanned. Preservation and fragmentation were similar to those for Sample 539, except that the colour of fragments ranged from ginger to dark brown. At least 80% of the vertebrate remains recovered from this sample were fish, including ?whiting, cod, ?saithe, gadid, pleuronectid, eel, thornback ray and herring. The unidentified fish fraction consisted chiefly of spine fragments. Bird and pig phalanges were present amongst the unidentified bird and mammal fragments.

*Sample 543/BS* (11 kg)

Preservation was described as good, with colour ranging from fawn to dark brown. Angularity was recorded as variable, spiky, battered and rounded fragments all being observed. Most of the fragments were less than 50 mm in greatest dimension. A total of 886 fragments was recovered from this sample (weight not recorded), of which 549 were identifiable. Four mammal fragments were identified: two cattle and two caprovid. Birds were represented by two chicken, eight ?chicken, one duck and two goose bones. Most of the remains were fish, from the gadid, pleuronectid, eel, ray and clupeid families. Gadids included cod, ?poor cod, haddock and ling. The pleuronectids identified (tentatively) to species were ?lemon sole, ?plaice and ?dover sole. Both common eel and conger eel were present. Seven thornback ray teeth were identified. A single pike vertebra was the only evidence of freshwater fish. As with the other samples from Context 1591, most of the fish bones (438) were those of herring, including 351 vertebrae. The fish bone elements present included those from the head as well as the vertebrae, suggesting preparation as well as consumption.

*Sample 544/BS* (11.5 kg): A total of 839 fragments (weighing 374.9 g) was recovered from this sample, of which 582 were identifiable. Mammals included cattle (three fragments), pig (two), caprovid (five, including one sheep), mouse (a mandible), and vole/mouse (a humerus). Birds were represented by chicken (4+?4) and goose (3+?6). In addition to the fish mentioned for Sample 543, the following were tentatively identified: flounder, long rough dab, saithe and whiting. Herring bones were, again, the most numerous (480, including 358 vertebrae). As with Sample 543 the fish bone elements included heads as well as vertebrae.

A small number of freshwater and land snails (the former group including *Theodoxus fluviatilis*) were recovered from Samples 539, 541 and 542. Such an assemblage is only likely to have formed through mixing of material from several origins.

**Hand-collected bone:** Only two unidentifiable mammalian bone fragments were recovered from this context.

**Context 1676:** grave fill c. AD 1340-50

**Hand-collected bone:** Overall preservation was noted as fair although a few poorly preserved fragments were also present. Colour was described as brown, whilst angularity was variable, with a mixture of spiky, battered and rounded fragments present. Most of the fragments were between 50 and 200 mm in largest dimension, although a few smaller pieces were also noted. Dog gnawing, butchery and fresh breakage were all noted on less than 10% of the assemblage.

A total of 33 fragments (weighing 297 g) was recovered from this context, of which eight were identifiable. Mammals comprised cattle and caprovid remains. Two chicken bones (one juvenile) were recovered, together with a single goose (greylag-size) fragment.

**Context 2355:** grave fill

**Hand-collected bone:** Only six fragments (weighing 28 g) were recovered from this context, of which all were identifiable. Mammals included cattle and cat. Birds present were chicken and goose. Preservation was good, colour brown and angularity spiky.

EAST RANGE

**Context 144:** spread of ashy/charcoal material

*Sample 649/T1* (7 kg): moist, jumble of black, light brown, grey and yellowish material at the mm scale with some horizontal layering, mostly charcoal-rich ash. Brick/tile and coal were also present.

The extremely large residue of about 3350 cm<sup>3</sup> consisted of brick/tile (to 80 mm), coal (to 40 mm) and sand with some cinders and traces of bone, chalk, charcoal (to 5 mm) and stone. There were no plant remains.

Only traces of invertebrate remains were present.

**Hand-collected bone:** Overall preservation was variable, most fragments being described as fair or good. Fragment colour ranged from fawn to dark brown. Angularity was also variable, a mixture of battered and spiky fragments being recorded. Fragmentation was moderate to high with 20-50% of the material less than 50 mm in largest dimension. Less than 10% of the fragments were affected by dog gnawing, butchery, burning and fresh breakage.

Of the 247 fragments (weighing 1773 g) recovered from this context only 29 were identifiable. Mammals present included cattle, caprovid (including two fragments identified as sheep), pig and cat. Birds were represented by domestic fowl, goose (greylag-size individuals) and a single teal bone. In addition two, cod fragments were noted. The unidentified fraction contained numerous small fragments of cattle-sized shafts and ribs, as well as medium-sized mammal, bird and fish fragments.

**Context 220:** occupation accumulation on last floor of Room 1

*Sample 585/T1* (5 kg): just moist, crumbly ash and mortar with grey brown silt. The medium sized (20-60 mm) stones present were mostly chalk, including burnt fragments. Brick/tile, cinders and marine mollusc shells were present, mortar was abundant.

The very large residue of about 2100 cm<sup>3</sup> was of mortar and grit, with brick/tile and sand and some coal and cinders, but with no visible organic content. The only invertebrates were a few earthworm egg capsules, quite possibly late intrusions.

*Sample 588/T1* (5 kg): just moist, mid-dark grey brown, crumbly, brittle, layered and compressed (working slightly sticky when wet), sandy, slightly clay silt. Very small (2-6 mm) and medium-sized (20-60 mm) stones were present together with mortar/plaster, brick/tile flecks and charcoal flecks.

There was a large residue of about 900 cm<sup>3</sup> of which only a few cm<sup>3</sup> formed a washover of fine charcoal (to 2 mm) with a few charred and uncharred plant remains. Most of the residue was sand, with brick/tile (to 10 mm) and mortar (to 80 mm). Identifiable plant remains, all present in trace amounts, included one taxon likely to have originated in peat (traces of charred sclerenchyma spindles of cotton-grass) and, indeed, tentatively identified burnt peat fragments (to 5 mm) were also recorded. Some of the other remains may have arrived with water or cut vegetation but they hardly make a convincing group for interpretation. Four beetles were noted.

*Sample 593/T1* (5 kg): just moist, light to mid to dark grey-brown, brittle, layered and compressed (working crumbly and slightly sticky when wet), sandy silt, locally sandy/ashy.

The large residue of about 800 cm<sup>3</sup> consisted almost wholly of sand with a few cm<sup>3</sup> forming a washover of charcoal (to 10 mm) with some coal and cinders, fish scale and fish bone, and mussel and oyster shell fragments. There were moderate numbers of rush seeds (identified as *Juncus* cf. *gerardi*), which (if actually this species) must have originated in salt-marsh. The seeds may have arrived at this site in estuarine floodwater or cut vegetation (the latter in the form of herbivore dung, for example) though their presence in some quantity the near absence of other remains perhaps points to deliberate use, for example as floor covering (see Context 2221, below).

There were a few insect remains (two beetles and a fly), and several earthworm egg capsules.

**Hand-collected bone:** A single cattle mandible fragment (weighing 13.4 g) was recovered from this context. Its preservation was recorded as fair, with colour noted as fawn and angularity as battered.

**Context 2010:** organic dumps/levelling pre-dating construction of Room 4 wall

**Hand-collected bone:** Overall preservation was described as good. Colour was variable with ginger, brown and dark brown fragments recorded. Angularity was also variable although most fragments were slightly battered. Over half the bones were between 50 and 200 mm in largest dimension, less than 20% being smaller. Dog gnawing and fresh breakage were noted on up to 10% of the fragments and evidence of butchery was recorded on 20-50% of the assemblage.

Caprovid bones (including some identified as sheep) were most numerous, followed by cattle and pig fragments. A sheep cranium proved to have come from a polled individual. The birds were represented by a goose carpometacarpus (greylag-size) and two chicken bones. In addition, a crab claw fragment was noted.

**Context 2144:** 2nd floor in Room 1

*Sample 651/T1* (7 kg): moist, light to mid grey-brown and slightly olive, crumbly (working plastic), slightly sandy clay silt. Very small stones (2-6 mm) were common, while larger stones (6-60 mm) were present together with brick/tile fragments (to 20 mm).

The moderately large residue of about 1000 cm<sup>3</sup> yielded a washover of only a few cm<sup>3</sup> of organic material, though there was also some coal which increased this volume when more vigorous decanting was applied. Much of the residue consisted of sand with some brick/tile (to 50 mm) and grit, whilst in the washover, seeds of ?mud rush were abundant. Other plant remains were sparse and of little interpretative value, so the predominance of rush seeds leads to the conclusion that they originated in material used for flooring.

The only beetle was a *Sitona* weevil.

#### **Context 2208:** 1st floor of Room 1

*Sample 653/T1* (6.7 kg): moist, mid olive to grey-brown, crumbly (working plastic), slightly sandy clay silt with patches of pure mid brown silt. Medium-sized (20-60 mm) stones were present together with mortar/plaster, brick/tile (to 15 mm) and traces of charcoal.

The large residue of 1300 cm<sup>3</sup> was mostly sand with some brick/tile and traces of various other indicators of occupation such as bone, charcoal, cinders, coal, marine and shell. The very small washover consisted a few cm<sup>3</sup> of fine charcoal and coal with moderate numbers of seeds of just two plants: henbane (*Hyoscyamus niger*) and *Juncus* cf. *gerardi*. The latter can be explained in terms of material used for flooring (as for other floors in this group) but the henbane is more problematic. It is unlikely to have grown and been collected with the rush, although it certainly can grow in coastal locations (usually on disturbed sandy soils); it is perhaps more likely to have grown in the vicinity of the Friary as a weed though it was noted that the seeds were very decayed, which argues for reworking or a more distant source. It is just conceivable that the sticky and foetid foliage of henbane was regarded as of some value in controlling insect pests and was used on floors for this purpose—though such as use is not documented in the usual literature. In the absence of other evidence it is perhaps unwise to look to a possible use for the henbane as a medicinal herb, though this is well documented for the medieval period (e.g. Henslow 1899; 1905).

As far as animal remains are concerned, only a single beetle (*Anobium punctatum*) and a single herring vertebra were recovered from this sample.

#### **Context 2212:** floor surface with brick bench built on it (=488)

*Sample 650/T1* (5 kg): moist, mid slightly olive grey-brown, stiff to crumbly (working plastic), sandy, clay silt with cm-scale lumps of brown clay locally. Chalk (some ?burnt), mortar/plaster (to 100 mm), brick/tile, coal and charcoal were present.

The extremely large residue of about 2000 cm<sup>3</sup> was mostly brick/tile (to 90 mm) and sand, with some cinders, coal and oolitic limestone. There were traces of pottery (to 60 mm), mortar, and bone and marine shell, but no identifiable plant remains (even charcoal was lacking).

As for invertebrates, there were several earthworm egg capsules, and single individuals of six beetle taxa were noted.

A total of thirteen bone fragments (weighing 74.7 g) was recovered from this sample, of which a single caprovid metapodial fragment was the only one identified. The unidentified fraction contained fragments of both large and medium-sized mammal bones.

**Hand-collected bone:** Preservation was variable, fragments described as fair or good being present. Colour ranged from fawn to brown. Angularity was also variable: most fragments were noted as battered and a few as spiky. Almost all the fragments were between 50 and 200 mm in greatest dimension. Fresh breakage was noted on less than 10%, butchery on 10-20% and dog gnawing on 20-50% of the fragments.

A total of 75 fragments (weighing 1490 g) was recovered, and 26 of these were identifiable. Most (17) were cattle bones, followed by caprovid (8). The remaining fragment was a chicken coracoid. The unidentified fraction contained fish, bird and mammal.

**Context 2221:** floor on which brick bench was built

*Sample 670/T1* (5 kg): moist, light to mid grey brown (locally more grey or brown), crumbly to plastic, slightly sandy, clay silt (locally more sand or clay). Medium-sized stones (20-60 mm), ?mortar, brick/tile (to 25 mm) and charcoal flecks were present.

A moderate to large residue of about 800 cm<sup>3</sup> was produced by this subsample, of which the bulk was sand with some brick/tile and mortar. The minute washover of about 1-2 cm<sup>3</sup> included moderate number of *Juncus* cf. *gerardi* and earthworm egg capsules, with traces of a few other remains. Again, rush flooring is perhaps implied.

There were traces of beetles—but significantly a coherent group likely to have occurred in a clean house (*Anobium punctatum*, *Ptinus fur*, *Sitophilus granarius*, and once again, *Sitona* sp.).

**Context 2332:** organic dumps/levelling pre-dating Room 4 wall (machine-excavated and poorly recorded)

**Hand-collected bone:** Preservation was described as very good and angularity as spiky, colour being mostly yellowish-brown, though with a few dark brown and fawn fragments. Almost all the fragments were between 50 and 200 mm in greatest dimension. A few larger and smaller fragments were noted. Dog gnawing and fresh breakage were noted on up to 10% of the fragments, whilst evidence of butchery was observed on 10-20%.

A total of 24 fragments (weighing 1353 g) was recovered, 14 of which were identifiable. All were from domestic mammals: cattle (7 fragments), caprovid (3), pig (3) and horse (1).

**Context 2385:** ?levelling for Room 3

*Sample 707/T1* (5 kg): Dark grey brown, crumbly, sandy silt (very gritty texture) with patches of light grey-brown silt, clay silt, sand and ash and inclusions of dark brown compressed herbaceous detritus. Lumps of wood were present.

The very large residue of about 1600 cm<sup>3</sup> (of which only a quarter was of mineral material) consisted largely of wood fragments (to 50 mm), including one large (to 70 mm) worked chunk, and finer woody and 'strawy' herbaceous detritus, in all fractions. There were quite a few wood chips (to 10 mm), including some identified as pine. Overall, the assemblage was very like many from the Period 1 deposits and suggests either that this really was part of the pre-Friary sequence or that it was material reworked from



it. The abundant plant taxa (56 in all, excluding separate plant parts) were a mixture of cornfield and waste ground weeds with foodplants (hazelnut, sloe, bread/club wheat and wheat/rye 'bran') with peatland taxa (cotton-grass, ?heather and *Sphagnum imbricatum*, with peat fragments) and a grassland component (especially the abundant achenes of cat's ears, *Hypochaeris*) consistent with the presence of hay or other cut or grazed vegetation. There may also have been other kinds of litter such as bracken and material from a woodland floor. It is very likely that stable manure formed a good part of this material.

Invertebrate remains were very abundant in this sample. There were large numbers of fly puparia and mites, the former including many *Thoracochaeta zosterae*, now typical of stranded seaweed but on archaeological evidence formerly a typical denizen of cesspits. The assemblage of beetles (and a few bugs) amounted to 360 adult individuals of 93 taxa. Grain pests were overwhelmingly the most abundant species, 121 *Oryzaephilus surinamensis* and 54 *Sitophilus granarius* being recorded. This balance between the species suggests that grain may have undergone considerable decay. They were accompanied by a limited house fauna: *Anobium punctatum* (15 individuals), *Lathridius minutus* group (11), *Tipnus unicolor* (9), *Ptinus fur* and a *Cryptophagus* (both 6), and *Xylodromus concinnus* (4), but only traces of other species. This may be the restricted fauna of a grain store, or from a stable. Various species which are typical of archaeological 'stable manure' associations were present, but mostly in small numbers, and there is no reason to suppose that they had an opportunity to breed over a long period. If this is stable manure, the stable was probably being cleaned frequently, but at intervals long enough for flies to pass the larval stage and pupate—perhaps a few weeks.

It appears extremely likely that this is material originally deposited during Period 1 which was used for levelling in Period 2 (or at least at the point at which this building was constructed). The remains from Context 2118, Sample 671/T1 (well fill) may represent a candidate for the kind of assemblage forming the source, although this should not, of course, be taken as evidence of reworking of the well fill! The predominance of *Oryzaephilus surinamensis* is consistent with an earlier date and presumed lower status, since *Sitophilus granarius* seems to be the principal species in higher status sites which presumably received better quality grain.

A total of 46 bone fragments (weighing 10.5 g) was recovered from this sample, of which eleven were identifiable. All the identifiable remains were fish, which included cod, herring, thornback ray, ?dover sole and ?lemon sole. The unidentified fraction consisted chiefly of further fish remains.

#### **Context 2396:** floor

**Hand-collected bone:** Overall preservation was recorded as fair and colour as fawn. Angularity was variable, most fragments being slightly battered or rounded. Most fragments fell within the 50-200 mm size category although 10-20% were smaller. Evidence of fresh breakage was noted on up to 10% of the fragments and butchery on 20-50%.

Of the 45 fragments (weighing 596 g) recovered, 17 were identifiable. It was mainly domestic mammals which were represented (cattle, caprovid and pig). Fish included cod and unidentified gadid. The cod bone was from an individual around 100 cm in length.

#### WEST RANGE

#### **Context 332:** dump/levelling

**Hand-collected bone:** Preservation was recorded as variable, with both 'fair' and 'poor' fragments present. Most fragments were battered and fawn in colour. More than 50% were between 50 and 200 mm in largest dimension. Dog gnawing, butchery and fresh breakage were noted on 10-20% of the fragments.

A total of 19 fragments (weighing 489 g) was recovered from this context, of which 13 were identifiable. A single pig tooth was recovered together with 12 cattle fragments, mostly teeth and mandibles. The unidentifiable fraction consisted of large mammal fragments.

**Context 577:** dump/levelling associated with Context 332 (see above)

*Samples 216/BS (9.5 kg) and 218/BS (10 kg):* A few mollusc remains indicative of freshwater/waterside plants were recovered. These remains seem likely to have been either imported with material used in the levelling of Context 332 or, perhaps, given the presence in Sample 218 of *Theodoxus fluviatilis*—a species of swift flowing rivers and streams and the wave-wash zones of lakes—washed into the deposit by river flooding.

**Hand-collected bone:** Overall preservation was described as fair. Colour was recorded as a mixture of fawn and light brown. Angularity was also recorded as variable with most fragments noted as spiky and some as battered. All fragments were between 50 and 200 mm in largest dimension. Dog gnawing, butchery and fresh breakage were all noted at levels of 10-20%.

Of the 14 fragments (weighing 341 g) recovered from this context, eight were identifiable. The taxa present included cattle, pig, caprovid and chicken.

**Context 817:** build-up in shallow natural depression

*Sample 394/T1 (8 kg):* moist, mid brown (locally somewhat greyish or somewhat orange), plastic clay silt.

The minute residue of <100 cm<sup>3</sup> appeared to consist of undisaggregated (perhaps somewhat concreted) clasts of natural silt with some organic matter. The small numbers of seeds present were mostly very worn. Only silverweed (*Potentilla anserina*) and ?mud rush reached abundance scores of 2; the few other taxa present included pearlwort (*Sagina*), and these and the abundant foraminiferan tests suggests a deposit formed in a haline environment, perhaps a salt-marsh. If this deposit formed naturally in a hollow depression, one can only conclude that salt-water was reaching this part of the site at this time. Only traces of insect remains and other invertebrate remains (apart from foraminiferans) were recorded.

**Context 1009:** floor deposit

*Sample 384/T1 (7 kg):* just moist, light greyish-brown, crumbly mortar. Stones (in the range 2-60 mm) were present, consisting mainly of chalk. Brick/tile fragments were also present.

The extremely large residue of about 3200 cm<sup>3</sup> was mostly fragments of chalk (to 80 mm) and other stone (including oolitic limestone to 130 mm), with gravel and sand but no plant remains. It seems most likely that it was all construction or demolition debris.

There were only a few invertebrate remains, of no interpretative value.

**Context 1062:** floor

*Sample 425/T1* (6 kg): just moist, mid grey-brown (patchily varicoloured, lighter and darker, from white to black), indurated to just crumbly (working plastic and sticky), slightly silty clay. Chalk, mortar/plaster, brick/tile, pot, coal, charcoal, large mammal bone and marine molluscs were all present.

The large residue of about 2000 cm<sup>3</sup> gave a washover of about 150 cm<sup>3</sup> of charcoal (to 10 mm) with some wood, coal and plant remains; the rest was sand and brick/tile (to 140 mm) with mortar. There were traces of plant remains of no particular value for interpretation, though all might have arrived in litter of some kind.

A small group of beetles (N = 36, S = 28) accompanied numerous *Daphnia* ephippia and various other remains. The assemblage was ecologically mixed, with a trace of house fauna. Presumably (if this was not redeposited material) the *Daphnia* and two *Helophorus* water beetles were brought in water. The record of two capsid bugs *Deraeocoris lutescens* is believed to be the first from an archaeological deposit. It is discussed further below.

*Sample 426/T1* (5kg) : just moist, mixture of mid grey/red-brown, mottled, indurated clay and crumbly mid grey-brown to mid brown silt with charcoal flecks. Brick/tile fragments were present.

This moderate-sized residue of about 900 cm<sup>3</sup> was, by contrast with that from Sample 425, mostly sand, grit and concreted sediment, but with only a trace of brick/tile. There was a washover of less than 100 cm<sup>3</sup> of woody detritus, with charcoal, in which there were a few moderately well preserved seeds (including moderate numbers of rush seeds, probably largely *Juncus gerardi*) and other remains, some at least of which might well have arrived in peat (of which there were traces of fragments to 5 mm) or cut wetland vegetation.

There were few invertebrate remains, though a good proportion of the 22 beetles were house fauna.

#### **Context 1116:** dump/levelling deposit

*Sample 446/T1* (6 kg): just moist, mid dark grey- brown (locally more brown and with darker-paler layering), brittle to crumbly (working slightly plastic), sandy clay silt. Brick/tile and charcoal fragments were present.

The moderately large residue of about 1000 cm<sup>3</sup> consisted of sand with a few clasts of brick/tile, coal, gravel and mortar, none greater than 25 mm.

A fairly substantial group of beetles was present (N = 90, S = 46). Grain pests were dominant (13 *Oryzaephilus surinamensis* and ten *Sitophilus granarius*), and were accompanied by a small house fauna group: *Anobium punctatum* (9), *Cryptophagus* sp. (4), and *Tipnus unicolor* and *Lathridius minutus* group (3 each). The only other species represented by more than two individuals was *Sitona ?lineatus*, repeatedly rather abundant at the present site and discussed below.

#### SUMMARY OF PERIOD 2 MATERIAL

As remarked in the introduction to this section, there is little doubt that most of the biological remains from deposits dated to this period were, in fact, redeposited from Period 1. The assemblages were often indistinguishable from those recovered from certain of the earlier deposits. For this reason, and with obvious caution, the redeposited assemblages can be used as additional evidence that conditions during Period 1 in the 'Nave area' (in particular) were varied but within a consistent range.

There is perhaps a tendency to assume that the disturbance associated with the redeposition of delicate biological remains will lead to their destruction, and indeed this may often be the case. However, it has been argued elsewhere (Dobney *et al.* (1997) that bulk redeposition of richly organic archaeological sediment may result in gross contamination of later deposits. At the present site, it seems likely that organic deposits were redistributed during the construction of the friary buildings and also disturbed during the digging and refilling of graves.

That said, certain of the Period 2 deposits yielded biological remains which were clearly contemporaneous with the friary, even though they were sometimes mixed with earlier material. Of these, the leaves and twig fragments of box in three spot samples from a burial (Context 697), and the nutlets of hyssop in one of these, are of particular note and they are discussed further below. Also clearly linked to the burials were records from several contexts of beetles regarded as typical of post-depositional invader communities in buried organic matter and, in particular, in inhumations: *Coprophilus striatulus*, *Rhizophagus parallellocollis* and *Trechus micros*. These, too, are considered in more detail in the following section.

Biological remains in at least some of the floors dated to Period 2 appear to belong to that period, notably the rush seeds (many of which appeared to be mud rush, *Juncus gerardi*, a species of saltmarsh and coastal meadows) and small numbers of insects, often house fauna. One floor yielded water fleas and water beetles which, if they were not imported in make-up, probably arrived in water.

Vertebrate remains recovered from Period 2 deposits amounted to 3656 fragments (Table 19), of which 1704 were identified to species or to family group. Fish remains formed more than half of this assemblage. A wide range of context types produced bone, but the bulk of the identified assemblage (1135 fragments, mainly fish), was recovered from a single context (1591). We should not allow the data from this exceptional context to colour our view of the site at this period as a whole.

Preservation of material from Period 2 deposits appeared to be similar to that from the earlier phase. Variability of angularity (i.e. nature of the broken surfaces) and colour was recorded throughout the assemblages regardless of context type and material recovered from grave fills contained high frequencies of 'battered' and 'rounded' fragments. Fish remains from Context 1591 were less well preserved than those from the Period 1 floor deposits, but represent a similar accumulation of bones. In most cases, the assemblages recovered from Period 2 deposits appear to be material reworked from earlier deposits associated with the tenements. Large quantities of human remains were identified from contexts in the Nave, again highlighting the mixed nature of the deposits.

The range of species present in Period 2 deposits was similar to that for Period 1 (Table 19). Fish remains (chiefly those of herring) again were dominant but were mainly recovered from Context 1591. This deposit, situated within the cloister, is not easily interpretable. The excavator's description suggested that it was badly disturbed by the digging of graves. However, the fish assemblage, including both head and body elements, showed distinct similarities to material from the Period 1 floor deposits. Mammal remains were recovered in larger numbers from this deposit than from those of Period 1, but are represented by small fragments, all <50 mm in dimension. Despite the good preservation of the fish remains, it does seem likely that material in this deposit had been reworked from earlier ones.

A brief examination of skeletal element representation for the major domesticates again shows a similar pattern to Period 1 assemblages (Table 20). Seventy-five percent of identified cattle fragments represent non-meat-bearing elements such as mandibles, isolated teeth and metapodials. However, 'large mammal' fragments placed in the 'unidentified' category were mostly shaft and rib fragments which almost certainly represent secondary butchery waste or household refuse. Meat-bearing elements were again proportionally more abundant among the caprovids. As has already been suggested by the preservation criteria, it seems likely that most of the Period 2 assemblage represents earlier refuse associated with the use of the tenements or people living in the immediate vicinity.

## **Material from a further phase of excavation at the site (MCH99)**

Three samples of sediment and three boxes of hand-collected bone from further excavation of deposits at this site were submitted in 1999 for an evaluation of their bioarchaeological potential. The samples were all from 'Phase 2, 14th century primary ground raising dumps and early occupation', presumably equivalent to Period 1 of the 1994 excavation, whilst the bones came from deposits dated pre-14<sup>th</sup> century to 17<sup>th</sup>-20<sup>th</sup> century.

The plant and invertebrate assemblages from the sediment samples were very similar to many from Period 1 of the 1994 excavation.

Most of the bone represented domestic refuse, with a smaller component of primary butchery waste, which was more apparent in the earlier phases. The bone assemblage was also very similar to that recovered from the post-medieval deposits excavated in 1994.

Further details of this assessment are presented by Hall *et al.* (2000).

## **Comments on the remains of 'ritual' plants and 'corpse' beetles from the burials**

It is difficult to believe that the remains of box and hyssop were not deliberately deposited with the corpse in Context 697. Leaves and twigs of box from burials are moderately well known, though most of the records are for the Roman period. Thus there is material reported from at least three Roman burials in England—Bartlow Hills, Cambridgeshire (Gage 1840), Cann, Shaftesbury, Wiltshire (Anon 1918) and Roden Down, Berkshire (Allison 1947)—and from a Roman sarcophagus in Germany (Wortmann 1970, esp. fig. 10). From later burials there are records of box from 15th century Naples, Italy (Fornaciari 1984; here with remains of laurel, *Laurus nobilis* L. and rosemary, *Rosmarinus officinalis* L.) and from post-medieval (17<sup>th</sup>-19<sup>th</sup> century) Wales (Hood 1980).

For recent historical evidence of a continuing tradition, there is Vickery's (1984) reference to the use of box at funerals as late as the mid 19th century, though it is perhaps a custom that has survived today in the Roman Catholic rather than Anglican tradition, to judge from references to its use given in entries for 'box' in French and German encyclopaedias and dictionaries, e.g. Guilbert *et al.* (1971); Imbs (1975) and Götze (1939). Vickery writes (p. 187): 'At funerals in the north of England a tray of box twigs was provided outside the door of the house. Each mourner would take a piece as he went out, and later would drop it into the grave. In 1868 a *Daily Telegraph* reporter sent to cover the aftermath of a colliery disaster at Hindley Green near Wigan wrote: 'I find an old Lancashire custom observed in the case of this funeral. By the bedside of the dead man, the relatives, as they took their last look at the corpse, have formed a tray or plate, upon which lay a heap of sprigs of box. Each relative has taken one of these sprigs, and will carry it to the grave, many of them dropping it on the coffin. Ordinarily the tray contains sprigs of rosemary or thyme; but these poor Hindley people not being able to obtain those more poetical plants, have, rather than give up an old custom, contented themselves with stripping several trees of boxwood: hence it is that the mourners carry the bright green sprigs which I have seen.' (*Daily Telegraph* 1.12.1868, quoted in *Notes and Queries* 4, ser. 6, 496, 1870). Late in the nineteenth century, mourners in Shropshire were each given a sprig of rosemary as the funeral procession set out. It was customary for these to be dropped into the grave after the coffin had been lowered. Writing in 1940, Christina Hole observed that 'sprigs of rosemary wrapped in white paper are still thrown into the grave in many districts'.

The symbolism in the use of an evergreen like box in such ritual is obvious. From a reference cited by Vickery (*op. cit.*, 184) it appears that hyssop, too, has a recognised place in funerary ritual: 'In north Shropshire wallflowers, roses and other blooms were arranged in the coffins of the poor, whilst in

Monmouthshire rue, hyssop or wormwood, all considered to be symbolic of repentance, were sometimes placed in coffins (Wherry 1905).’

Turning to the ‘corpse’ beetles recorded at this site, *Trechus micros*, *Coprophilus striatulus*, *Quedius mesomelinus*, *Trichonyx sulcicollis*, perhaps some small euplectines, and *Rhizophagus parallellocollis* seem to be the typical components of a ‘subterranean’ beetle community. In most cases these species probably entered post-depositionally and are thus not informative about the *original* conditions. (They may perhaps of interest as indicators of changing water content, however, as it is suspected that they invade buried organic matter which is sufficiently well aerated to decay.) Some excellent examples of this community have been recorded from pit fills dated to the 4th century AD or later, and from some earlier deposits, at the 24-30 Tanner Row site in York (Hall and Kenward 1990, 345, 367-8.) The community is recurrent and widespread; an excellent example from outside the area considered here is an 18th century pitfill from Berrington Street, Hereford (Kenward 1985).

Anglo-Scandinavian deposits at 16-22 Coppergate, York, provided a number of assemblages of this kind in what appeared to be temporarily dewatered pitfills and open-textured brushwood layers. In most cases the species under consideration here appeared to be genuinely intrusive (e.g. Kenward and Hall 1995, 516, 521, 598), but in one case some of them may have lived a cavernicolous life in a covered gully in a house floor (*op. cit.*, 607). It is believed that a considerable number of grave fills have been investigated in some way for invertebrate remains, but with negative results which have not usually been put on record. Thus the examples of suites of species belonging to the subterranean community recovered from grave cuts at the Magistrates’ Courts site appear to represent an archaeological ‘first’, although Paul Buckland (*pers. comm.*) has recorded *R. parallellocollis*, *Q. mesomelinus* and *C. striatulus* from graves.

Invertebrates from inhumations should have potential as indicators of funerary practices, but the results of investigations of burials have so far been of limited value. Certain insects, especially flies, rapidly invade corpses when they are exposed, and so can provide a measure of how long they were left before burial. This has long been recognised in the forensic context (e.g. Mégnin 1895), and there is a considerable literature (see for example the review of Smith 1986). A further (and very distinctive) suite of species, including flies and beetles, is able to reach buried corpses, and it is in this category that the beetles from the present site must be placed.

## **The significance of species associations among insects at the HMC site**

### *Methods*

Analysis has been made of associations between selected taxa of beetles, with the addition of a few other invertebrates of particular archaeological interest. Assemblages including more than 34 adult beetles and bugs (excluding Aphidoidea and Coccoidea) have been used. The analyses were based on percentages (which, it is argued, are essentially independent as so many taxa are present in most assemblages). The taxa investigated were those selected by Carrott and Kenward (*in press*) for work on Anglo-Scandinavian 16-22 Coppergate, York. Four grain pests and *Tipnus unicolor* have been added for routine analyses of this kind as they are of importance in the post-Conquest period (as well as for Roman sites). A substantial number of the resulting 103 taxa were subsequently excluded as having too few records at the Magistrates’ Courts site: a minimum of 10 records was adopted (Table 13).

Following Carrott and Kenward (*in press*), Spearman’s rank-order correlation was employed (using the SPSS 9 package), and initially a ‘constellation diagram’ was constructed showing positive linkages between pairs of species with a probability (*p*) of arising at random less than 0.01 (one in a hundred). Particular significance is placed on three-way linkages (i.e. three taxa all occur more often *together* than is likely by chance). Subsequently a further diagram using  $p < 0.05$  (relationships likely to occur by chance

only in one in twenty cases) was built up to clarify the relationships between groups of taxa shown in the first diagram.

Two of the groups observed at Coppergate are relevant here: a group associated with buildings ('house fauna', Coppergate Group A); and one associated with foul but open-textured, often mouldy, rotting matter (Coppergate Group B). The special nature of the Coppergate site and the scale of analysis made other groups from the site less generally relevant. However, unpublished results for Roman deposits at 24-30 Tanner Row, York, may be mentioned: at that site there were three very clearly defined groups: (1) one including house fauna, largely coinciding with the Coppergate Group A, but with the addition of the grain pests and *Tipnus unicolor* (TA); (2) species indicative of foul to damp mouldy matter and hay, subsuming many taxa placed in Group B at Coppergate (TB); and (3) a group including (a) species associated with very foul matter, including dung, and (b) others requiring outdoor habitats, including water (TC). These Tanner Row groups are summarised in Table 14 for comparative purposes.

## Results

The relationships between pairs of taxa at  $P < 0.01$  are shown in Figure 1. The largest grouping, with 12 taxa in three-way linkages, consists of taxa likely to have occurred together in rather foul, but not saturated, decaying organic matter (Group HB). Many of these taxa are regarded as typical of stable manure (Hall and Kenward 1990; Kenward and Hall 1997). This association, with variations, is seen at several other sites, including Anglo-Scandinavian Coppergate (Group B, Carrott and Kenward in press), Roman Tanner Row (Group TB, Table 14) and Roman Carlisle (Kenward 1999). Single linkages connect Group HB to (a) a cluster of taxa probably indicating very foul matter (PAREN, ORIV and ATETRA) and a flea beetle found on cruciferous weeds (PNEMGP); (b) two taxa seen as components of a post-depositional burrowing fauna (TIMICROS and CSTRIAT) and thence to two grain pests (TB: OSUR and SGRAN). The association of grain pests with what is probably the fauna of stable manure seems logical (grain being used as horse feed), but why the link should be via subterranean fauna is not clear. Perhaps they lived in the dark corners of stables or in the voids of stores of low-quality grain, or perhaps the grain beetles arrived in some completely different way.

The largest group at Coppergate corresponded to house fauna (Group A) as defined by Kenward and Hall (1995), and a very similar association is seen elsewhere (particularly at Tanner Row, Table 14). At the Magistrates' Courts site this group was fragmented at the  $p < 0.01$  level, effectively into three (HA1-3). The implication is that these taxa may have had varied origins, in contrast to Coppergate and Tanner Row, where they consistently occurred together in buildings (or in dumps or scatter from them). Possibly HA3 represents taxa most often found in cleaner structures: (APUNCT, the woodworm, *Anobium punctatum*, PTINUS, the spider beetle *Ptinus fur*, and CSCUT, the mould feeder *Cryptophagus scutellatus*). HA2 may have been favoured by domestic floors and may also have occurred in the waste from them (PULEX, human fleas, *Pulex irritans*, and PEDHUM, human lice, *Pediculus humanus*, MELOV, the sheep ked *Melophagus ovinus* from wool cleaning, and MHIRT, *Mycetaea hirta*, associated with mouldering wood or dryish plant debris). HA1 includes five very typical house fauna taxa, but these may have lived in hay or animal litter. The inclusion of APION and SITONA (clover weevils, *Apion* and *Sitona* spp., the latter mostly *S. lineatus* at this site) would reasonably be taken to indicate an origin in hay. However, SITONA is linked to *Pediculus humanus*, perhaps suggesting a domestic origin; both routes of entry may have obtained, of course. The contrast between this linkage of *Sitona* to house fauna at the Magistrates' Courts site and its lack of correlations at Tanner Row is striking. (The only links, even at  $p < 0.05$ , at Tanner Row was with the crucifer feeder *Ceutorhynchus contractus* and with *Omosita* spp., which are associated with dead animal matter including old bones.) *Sitona* may have had some specialised, perhaps domestic, origin at the Hull site, but it seems to have been generally distributed and probably of multiple origins at Tanner Row. (The records of *Sitona* are discussed at length above.)

Three aquatic taxa were mutually linked (Group HQ); they probably lived on the site in water-filled cuts, as well as being imported in water used for domestic and craft activity, and perhaps for livestock. TQORO and ARUG probably represent part of an outdoor fauna, as do PNIT and AGRAN (linked to SITONA).

Numerous taxa have no linkages to any other at  $p < 0.01$ , indicating an essentially random distribution among the samples at this level of probability.

Figure 2 shows a draft of the constellation diagram produced by including linkages at  $P < 0.05$ . Although the diagram becomes a little muddled at this level, it is notable that the taxa forming the groups suggested at  $p < 0.01$  (HA and HB) are brought together more clearly, with relatively few inter-group links. However, only group HA can be isolated using three-way linkages. Even so, this association does not represent the large, strongly linked, house fauna group so often found elsewhere. The enlarged core of HB, with numerous internal links, gains a swarm of hangers-on with relatively few links. The association of 'foul mouldering' taxa with outdoor species and others from very foul matter is seen at several other sites (all Roman), where it seems to represent the pathway from the stable floor to overgrown middens, but this succession seems less clear at the Magistrates' Courts site. (For Tanner Row it is very clear in the full constellation diagram, as well as in output from multidimensional scaling (using SPSS) and detrended correspondence analysis (using the CANOCO package; ter Braak, 1987); these results are not shown here.)

The 'house fauna' taxa placed in Groups HA1-3 are joined in a weak group with rather more internal but few external links (none has more than one). Group HB gains numerous internal links at  $p < 0.05$ , but some of the taxa have a substantial number of connections to a swarm of peripheral ones. As already suggested, this whole group (HB plus peripheral swarm) probably represents decomposers in stable manure or something resembling it, the strongly linked HB group living in the fresher material it (in buildings or in drier accumulations in the open) and the others invading fouler matter, probably mostly in the open. The aquatics remain isolated at  $p < 0.05$ , except via links to TQORO (the ground beetles *Trechus quadristriatus* or *obtusus*) and APHOD (dung beetles), the first suggesting that they were primarily from open air habitats, but the second leaving the possibility that they arrived indirectly in imported water or dung. The grain pests, too, appear to have rather tenuous connections with any other ecological group, strengthening the suspicion that they either had multiple routes of entry or some specialised one.

### *Summary of implications of species associations*

The implications of the species association analysis for this site are not completely clear (the technique is a novel one and there is much to learn about its exploitation and appropriate subsidiary analyses), but it appears likely that Group HB and its peripheral swarm indicate a taphonomic pathway from foul mouldering matter, perhaps indoors, to wetter, fouler accumulations in the open. There is little to suggest that aquatics represent the watering of livestock or spillage or waste from domestic activity (the abundance of halophile *Ochthebius* at the site would reinforce this conclusion). The isolation of grain pests is a strong contrast with some other sites (e.g. Tanner Row, Table 14), and they seem not to have been primarily introduced as animal feed: indeed cereals may have arrived separately from the other materials indicated by the insects, and perhaps passed down the taphonomic pathway in isolation too. The possibility that they exploited grain in cereal thatch might be entertained, although there is a lack of associations with any likely thatch beetles (several of the house fauna species, for example). The weak association of HA taxa (house fauna) is a strong contrast with most other sites and suggests that some were predominantly from fairly clean buildings, some from domestic floors, and others were from hay or litter. It is likely that the implications of this analysis will be come much clearer when more sites have been studied in detail using the same technique.



## ***A note on Deraeocoris lutescens***

The capsid bug *Deraeocoris lutescens* was recorded from Context 1062, a Period 2 floor deposit. The remains almost certainly belong to this period rather than having been reworked. *D. lutescens* is a small brown bug recorded in Britain south of a line joining The Wash and Cardigan Bay (a single Scottish record seems likely to be erroneous); it is also absent from northern continental Europe. It lives on a range of trees, but occasionally on nettles and other herbage (Southwood and Leston 1959). The means of importation of the specimens to the building in which they were found can only be speculated upon, but if (as seems most likely) they were of local origin, temperatures above those of the present day are clearly indicated.

## **Comments on the non-marine mollusc remains**

Only samples from Context 794 gave large assemblages of mollusc remains. The remains from these samples were, however, highly fragmented and largely unidentifiable. The assemblage from Sample 244 (11 kg bulk sample) was recorded in detail and minimum numbers of individuals (MNI) recorded for the identified taxa (Table 16). These MNIs should be viewed with some caution, however, in view of the abundant unidentified fragments, apparently of the same taxa as those identified, but of no use in estimating minimum numbers. The counts are thus indicative of relative abundance rather than absolute values and will be biased by over-representation of shells that are either more robust or more easily identified from their fragments. The assemblage from Sample 243 (10 kg bulk sample) contained the same suite of taxa as that found in Sample 244 in similar proportions. Given that, as for Sample 244, the remains were again highly fragmented and mostly unidentifiable, this assemblage was recorded semi-quantitatively on a four-point scale (f—few; s—some; m—many; v—very many).

Both of the assemblages from Context 794 were of an extremely mixed character containing taxa representing a variety of aquatic, aquatic marginal, and terrestrial habitats. Given that these assemblages were recovered from a feature within a building (fill of cut in Room 1, Building 2) it seems most probable that most, if not all, of the recovered remains arrived in the deposit as a side-effect of human importation of other resources (e.g. food, water, cut vegetation), or that the components have been brought together through reworking of originally separate deposits.

The presence of *Theodoxus fluviatilis* in several of the samples (Samples 218, 243, 244, 519, 539) was somewhat curious. This is a species of swift-flowing rivers and streams and the wave-wash zones of lakes which is unlikely to be found living in the immediate vicinity of the site. Its remains were perhaps brought into the deposits directly by flooding of the river, or brought downstream by flooding and subsequently incorporated into the deposits as a result of human activity.

In general, the non-marine mollusc assemblages were very small and, taken individually and as a whole, showed a preponderance of aquatic taxa. Overall, the recovered remains, though of little interpretative value in themselves, supported the impression gained from other lines of evidence that many of the deposits were rather mixed, probably as a result of reworking.

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## Appendix 1: Report on selected remains of immature Diptera from the Magistrates' Courts site, Kingston-upon-Hull

by P. Skidmore (with annotations by A. Hall and H. Kenward)

Whilst the general state of preservation of this material was good, identification to species was rendered impossible in the case of a large proportion of the specimens by the fact that most of the adults had emerged and the pupae or puparia were incomplete. In a number of cases however, specific identity could be established, and these are highlighted below.

That adults had emerged from most of the pupae and puparia indicates optimum breeding conditions and suggests that the flies had already emerged when the deposits were sealed.

None of the taxa were unequivocally wholly aquatic; indeed, even the very few chironomid head-capsules may have belonged to terrestrial species. The condition of these was inadequate for positive identification even to subfamily. Had there been any long-term marine or freshwater flooding of these deposits whilst they were exposed, one would have expected a periodic preponderance of aquatic or littoral taxa, such as psychodids, tipuloids, dolichopodids and ephyrids. These were however virtually absent. The dipterous communities present typified deposits of occupation refuse.

Although insects from numerous grave cuts were examined, the only unequivocal indicators of carrion were two blowfly puparia from a sample (683) from Context 2175, one of the fills of the recut of the large Period 1 feature 2158. Unfortunately these could not be positively referred to genus as the larval mouthparts were absent; they were either *Calliphora* ('bluebottles') or *Lucilia* ('greenbottles'), both of which develop only in carrion, or in damaged or diseased tissue of live animals. Perhaps surprisingly, no obligate carrion flies were found in association with the coffins. This strongly suggests that the bodies had been placed in the coffins soon after death (or during cold weather), for otherwise one would have expected some necrophilous flies. Also notable was the absence of puparia of coffin-flies (Phoridae), which might be expected to have colonised corpses after burial. (Burrowing beetles had invaded in some cases, however, see main text.)

There were some phytophages (plant-feeders), the most characteristic being two 'false puparia' of *Mayetiola* in Samples 682 and 683 (from two of the fills of Cut 2158). These develop in grasses and often occur in great abundance amongst grass-heaps, hay or straw. The Chloropidae, a few of which were tentatively recorded from two of the richly organic deposits, are also grass feeders. (This evidence ties in well with that from plant remains from many of the same contexts.)

A few of the taxa require comment:

*Ceroxys urticae*: Two puparia of this species were recovered, from Samples 310 and 317, both from Context 873, associated with a skeleton. The location is very peculiar as this species is not known to develop in carrion. It is however recorded from synanthropic situations, namely from garbage and refuse dumps and from horse and cattle manure. However it also evidently develops in decaying, probably sodden, vegetation, as it occurs in lowland swamps dominated by *Glyceria aquatica* and *Phragmites* dominated fens, often in estuarine areas. It occurs for instance in such places along the Humber and the lower reaches of its main tributaries today. (These remains were, like so many other plant and animal fossils at this site, doubtless redeposited from Period 1.)

*Thoraco chaeta zosterae*: This species is very familiar in archaeological excavations where it was long identified erroneously as the urinal fly *Teichomyza fusca*. Like that fly it indicates high concentrations of urea, occurring in great profusion in foul ammoniacal drains, cess-pits, etc. Today in Britain it only occurs in coastal areas where it breeds in masses of putrefying seaweed. At the Magistrates' Courts site the

species may have bred in either type of habitat, but since no other littoral flies were present it might be argued that it was breeding in human excrement. (There were, however, numerous beetles indicative of contamination by seawater.)

*Musca domestica*: This, the 'house-fly', breeds in a very wide range of decaying organic media but in our climate it is strongly synanthropic, requiring an artificially high temperature which does not occur in nature, but only in situations where bacterial fermentation is occurring, such as silage heaps, cess-pits, manure-heaps and uncovered garbage and refuse dumps which are in constant use. The same requirement is shared also by the biting house-fly *Stomoxys calcitrans*. The frequent occurrence of both species in the deposits from this site accords with the evidence from plant and other insect remains that foul material from human occupation was accumulating.

Scatopsidae indet.: These were very small puparia, measuring about 1.5 mm in length. Male genitalia were dissected from one of them, but differed from any of the figures in Freeman and Lane (1985).

*Themira ?putris*: This is the only British species in this genus which is large enough to match the puparia from this excavation.

*Limosina silvatica*: One of these puparia contained an unhatched male and hence it was possible to confirm identity on genitalia characters.

For further information on the biology of some of the taxa discussed see Smith (1989).

### Species lists by sample

*Fills of coffins and grave cuts (probably all or mostly redeposited from Period 1 contexts)*

**Context 614, Sample 291/T1 (fill of brick-lined grave, under coffin 824):** ?*Scatopse notata* 1; scatopsid sp. 1; *Themira* 22; *Sepsis* 5; *Heleomyza* 2; *Sphaerocera curvipes* 3; *Thoraco chaeta zosteræ* 17; Limosiniinae (c.3 species) 40; Milichiidae (?*Madiza*) 1; *Hydrotaea dentipes* 2.

**Context 696, Sample 281/T1 (lower fill of coffin):** *Thoraco chaeta zosteræ* 1; Limosiniinae 4 [1 possibly a *Trachyopella*]; ?*Scatella* 1.

**Context 697, 251/T1 (grave fill):** ?*Spelobia* 2; *Musca domestica* 12.

**Context 864, Sample 289/T1 (organic patch within grave fill):** *Scatopse notata* 2; *Sepsis* 12; *Heleomyza* 2; *Sphaerocera curvipes* 19; *Ischiolepta scabricula* [thorax of adult] 1; Limosiniinae (at least 3 species) c. 30; Anthomyiidae (?*Delia*) 1; *Musca domestica* 2.

**Context 873, Sample 310/T1 (fill of coffin of skeleton 873):** ?*Scatopse notata* 1; *Ceroxys urticae* 1; *Sepsis* 2; *Thoraco chaeta zosteræ* 1; Limosiniinae 3; *Musca domestica* 2; *Stomoxys calcitrans* 1. **Sample 317/T1:** Scatopsidae sp. 4; *Ceroxys urticae* 1; *Themira* 24; *Sepsis* 6; *Ischiolepta* adult head capsule 1; *Thoraco chaeta zosteræ* 3; Limosiniinae c. 12 [two about 1.5mm long with anal spiracles exerted and tiny short, bilobed anterior spiracles]; *Musca domestica* 7; *Stomoxys calcitrans* 1.

**Context 1015, Sample 412/T1 (fill of coffin 1014):** *Themira* 2. **Sample 419/T1 (fill of coffin 1014, from around the skull of skeleton 1015):** ?*Scatopse notata* 1; *Thoraco chaeta zosteræ* 1

**Context 1368, Sample 506/T1 (fill of coffin, from head end):** *Themira* 3; *Sepsis* 3; *Thoraco chaeta zosteræ* 1; ?*Trachyopella* 2; *Musca domestica* 1.



*Organic-rich levelling or occupation debris*

**Context 1457, Sample 527/T1:** *Corynoptera* 18 adult thoraxes, 5 wings and 3 pupae; Scatopsidae sp. 8; *Sphaerocera curvipes* 6; *Ischiolepta* 34; *Copromyza* 2; *Thoracochaeta zosteræ* 2; Limosininae (3 species) 60; ?*Scatelia* 1; *Musca domestica* 38; *Stomoxys calcitrans* 2. **Sample 528/T1:** *Corynoptera* adult thorax 1; Scatopsidae sp. 40; *Sepsis* 1; *Sphaerocera curvipes* 5; *Ischiolepta* 9; ?*Thoracochaeta zosteræ* 1; ?*Pullimosina heteroneura* 28; other Limosininae (at least 3 species) 44; ?Chloropidae sp. 4; *Musca domestica* 15; *Stomoxys calcitrans* 1.

*Fills of Cut 2158*

**Context 1626, Sample 657/T1:** Lepidoptera sp. 1. ?*Scatopse notata* 1; *Themira* 3; *Sepsis* 1; Limosininae c.30; ?*Scatella* 1; Anthomyiidae/Muscidae 1. **Sample 658/T1** (tube a) pupal respiratory processes (c. 10) of ?*Eristalis*; Limosininae 3; (tube b) Chironomidae larval head capsule 1; *Themira* 2; *Sphaerocera curvipes* 1; *Ischiolepta* 1; Limosininae (at least 4 species) c. 20

**Context 2175, Sample 662/T1:** ?*Scatopse notata* 6; *Sphaerocera curvipes* 6; *Thoracochaeta zosteræ* 1; Limosininae (at least 4 species) 12; *Musca domestica* 1. **Sample 679/T1:** *Ischiolepta* 2; *Thoracochaeta zosteræ* 1; *Limosina silvatica* 1; Limosininae 30 (including c.10 ?*Trachypella* and 1 ?*Pullimosina heteroneura*; Anthomyiidae 2. **Sample 676/T1:** *Themira* 8; *Thoracochaeta zosteræ* 20; Limosininae (at least 3 species including probable *Trachypella*) c. 30; *Stomoxys calcitrans* 1; ?*Spilogona* 3. **Sample 682/T1 1626** ?*Scatopse notata* 4; *Mayetiola* 1; *Themira* 2; *Sepsis* 1; *Thoracochaeta zosteræ* 2; ?*Pullimosina heteroneura* 7; other Limosininae (at least 3 species) 8; ?Chloropidae 1; *Stomoxys calcitrans* 2. **Sample 683/T1:** Chironomidae larval head capsule 1; ?*Scatopse notata* 1; Scatopsidae sp. *Mayetiola* 1; *Themira* 2; *Sepsis* 1; *Limosina silvatica* 1; ?*Pullimosina heteroneura* 25; ?*Trachypella* 4; other Limosininae 10; *Meonura* 3; *Stomoxys calcitrans* 2; *Calliphora/Lucilia* 2.

*Miscellaneous contexts*

**Context 1062, Sample 425/T1 (floor deposit):** ?*Scatopse notata*.

**Context 1277, Sample 481/T1 (fill of pit 1278):** *Sepsis* 4; ?*Spelobia* 1.

**Context 1435, Sample 702/T1 (part of organic rich dumps pre-dating Friary):** *Themira* 1.

**Context 2016, Sample 629/T1 (primary fill of E-W ditch):** Psychodidae 1; Chironomidae larval head-capsule few; *Themira* c. 25; *Thoracochaeta zosteræ* 50+; Limosininae 5; ?*Scathophaga* 1.

**Context 2385, Sample 707/T1 (organic layer):** ?*Scatopse notata* 5; *Themira* c. 35; *Sepsis* 5; *Ischiolepta* 1; *Thoracochaeta zosteræ* c. 3; Limosininae (several species) c. 20; ?*Scathophaga* 1; *Musca domestica* 5.

*Spot sample*

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## Appendix 2: Period 3 material

This appendix presents results pertaining to bone and shell material from contexts rephased as Period 3 later in the project

CHOIR

### Context 456 (demolition/levelling)

**Hand-collected bone:** Although preservation was variable (the condition of most fragments being recorded as 'good', with a few as 'fair'), the overall impression was that the material was very uniform. Colour was noted as brown, verging on dark brown in a few cases. Angularity was variable, with a mixture of spiky and battered fragments. Most were between 50 and 200 mm in largest dimension. Less than 10% of the fragments were affected by dog gnawing and fresh breakage, whilst a slightly higher proportion were butchered.

Of the 56 fragments (weighing 1091 g) recovered from this context, 35 were identifiable. Mammals present included cattle, pig, caprovid and dog (including a chopped pelvis). Domestic fowl were represented by four fragments and geese by three, two of which were of similar size to greylag specimens in the EAU reference collection. The third goose bone was larger and may, therefore, represent a domestic individual.

Duck remains were rather numerous, with five juvenile fragments and nine adult bones. Of these, four were similar size to mallard (*Anas platyrhynchos* L.) specimens in the EAU reference collection and four were larger than mallard (therefore possibly domestic individuals). A single cranium was between teal and mallard in size and morphologically most similar to gadwall (*A. strepera* L.).

*Sample 137/BS* (8.5 kg): Vertebrate material from this sample was scanned. Preservation was similar to that for the hand-collected assemblage. Almost all fragments were less than 50 mm in largest dimension. Species present included cattle, ?chicken (juvenile coracoid and phalanges) and eel. Most of the unidentified fraction consisted of fish and bird remains.

*Sample 138/BS* (9 kg): Vertebrate material from this sample was scanned. Preservation was again similar to that for the hand-collected assemblage and almost all fragments were less than 50 mm in largest dimension. Fish present included herring and haddock. A wader humerus was recovered, which was of similar size to the jack snipe (*Lymnocyptes minimus* Linnaeus) in the EAU reference collection, but not quite the same morphologically. In addition, chicken-sized digits and phalanges and a few ?human bone fragments were identified. Most of the unidentified fraction consisted of fish remains.

*Sample 199/BS* (8 kg): A total of 98 fragments (weighing 18.1 g) was recorded from this sample. Mammalian species included pig (juvenile phalanges and scapula) and ?rat (cf. *Rattus* sp., vertebrae of rat/water vole size). Birds contributed the most fragments, including 61 in the unidentified fraction, a single femur of sparrow size, and 17 duck bones, all of mallard size. Many of the duck bones were probably from the same bird but certainly more than one individual was represented. Fish species included eel, herring and ?dover sole.

### **Context 507** (demolition deposit)

*Sample 168/T* (7 kg): dry, light to mid greyish, indurated to unconsolidated (when wet), silty clay sand. Inclusions present consisted of flint and chalk, brick/tile, large mammal bone and marine mollusc shell. Mortar/plaster fragments were common. Modern contamination was noted in the form of a growth of algae.

A small assemblage of molluscs was recovered from this sample. The remains were mostly of two species, *Discus rotundatus* and *Aegopinella nitidula*, together indicating the presence of moist herbage—perhaps garden rubbish.

Of the 469 fragments of bone (weighing 166.2 g) recovered from this sample, only 32 were identifiable. Two human fragments were identified (both teeth). Cattle and cat represented the domestic mammals, whilst commensal/wild mammals included mouse, vole/mouse and ?black rat (cf. *Rattus rattus*). A single chicken bone was present. Fish species included eel, herring, gadid, and ?long rough dab. In addition, a single fragment of crab claw was recovered.

**Hand-collected bone:** Overall preservation was described as fair, and colour as fawn. Angularity was recorded as variable, both spiky and battered fragments being present. The degree of fragmentation was quite high, with 20-50% of the fragments being less than 50 mm in largest dimension. Less than 10% of fragments were butchered and slightly more showed evidence of fresh breakage.

Of the 66 fragments (weighing 178 g) recovered from this context, 23 were identifiable. The major domesticates (cattle, pig, and caprovid, including sheep) were present, together with a juvenile cat scapula. In addition, three rabbit and three rat (possibly black rat) bones were recovered. Other evidence of rodents was present in the form of an extensively gnawed pig astragalus.

Birds were represented by chicken (a single fragment), goose (three fragments of similar size to greylag), Columbidae (a single bone similar in size to rock pigeon or rock dove, *Columba livia* (Gmelin)), and two rook/crow bones. In addition, single vertebrae of a gadid (possibly cod) and ?plaice were recovered.

With respect to the excavator's question as to whether this deposit indicates post-friary activity, it seems unlikely that such a deposit would form whilst the friary was in use, but whether it formed pre- or post-demolition is debatable. From the vertebrate remains, it certainly seems that this area was used as a rubbish dump for both butchery and domestic refuse. The presence of rat, pigeon and rook/crow remains suggests this may have been an open area dump.

NAVE

### **Context 818** (demolition/levelling)

**Hand-collected bone:** Preservation of material from this context was very similar to that from Context 798 (from the latest phase of Period 1), with the exception that the colour was paler overall, more fawn than ginger.

Of the 198 vertebrate remains (weighing 2706 g) recovered, 81 were identifiable to species or species group. As with Context 798 the most numerous fragments were those of human bone, 53 fragments representing at least 4 individuals. One clavicle showed evidence of a healed fracture. Cattle and caprovid were represented by ten fragments each (including four identified as sheep), with pig and cat also present. Three chicken bones were identified, together with a single goose bone (of similar size to greylag). The presence of human bone suggests reworking of Period 2 deposits.

## NORTH CHAPEL

**Context 24:** floor type debris, domestic? result of post-dissolution activity?

**Hand-collected bone:** Preservation was described as fair or good, with colour ranging from fawn to brown. Angularity of most fragments was recorded as spiky, but a few battered fragments were noted. More than half the fragments were between 50 and 200 mm in size. Fresh breakage was evident on 20-50% of the material, whilst up to 10% of the fragments were affected by dog gnawing or butchery. Although no burnt fragments were noted, some of the fragments had a 'clinkery' feel, indicating they had been subjected to some heat.

A total of 33 fragments (weighing 328 g) was recovered from this context, of which eight were identifiable. Species present included cattle, pig, dog, cat, chicken and goose. The pig tibia was from a large individual.

## CLOISTER

**Context 1258** (demolition layer)

**Hand-collected bone:** Preservation was recorded as fair, with colour ranging from beige to brown. The angularity of fragments was a mixture of spiky and battered. Over half the fragments were within the 50-200 mm size category, the rest being smaller. Dog gnawing had affected up to 10% of the fragments, whilst butchery and fresh breakage were noted on 10-20% of the assemblage.

Only four of the 21 fragments (weighing 253 g) were identifiable. Cattle, caprovid and pig were all represented by single fragments. The remaining fragment is of particular note, being a fragment of a cetacean (marine mammal) vertebra. From the size of the fragment it is suggested this came from a whale-sized cetacean rather than porpoise/dolphin.